Spring 2024 Graduate Research Symposium

Poster and Oral Presentations

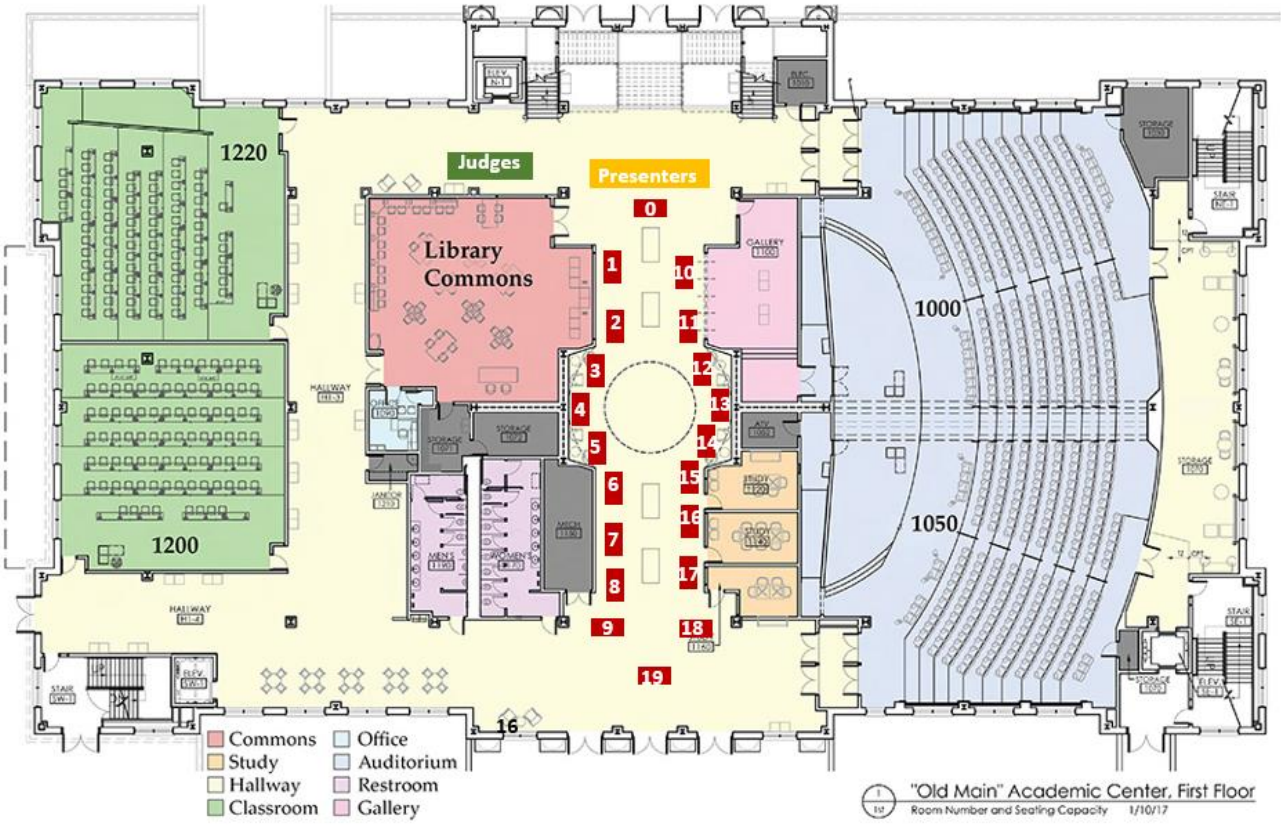
Saturday, February 24, 2024
8 AM to 4 PM
Old Main Academic Center

MISSISSIPPI STATE UNIVERSITY
GRADUATE STUDENT ASSOCIATION

MISSISSIPPI STATE UNIVERSITY
THE GRADUATE SCHOOL

Session Schedule Outline

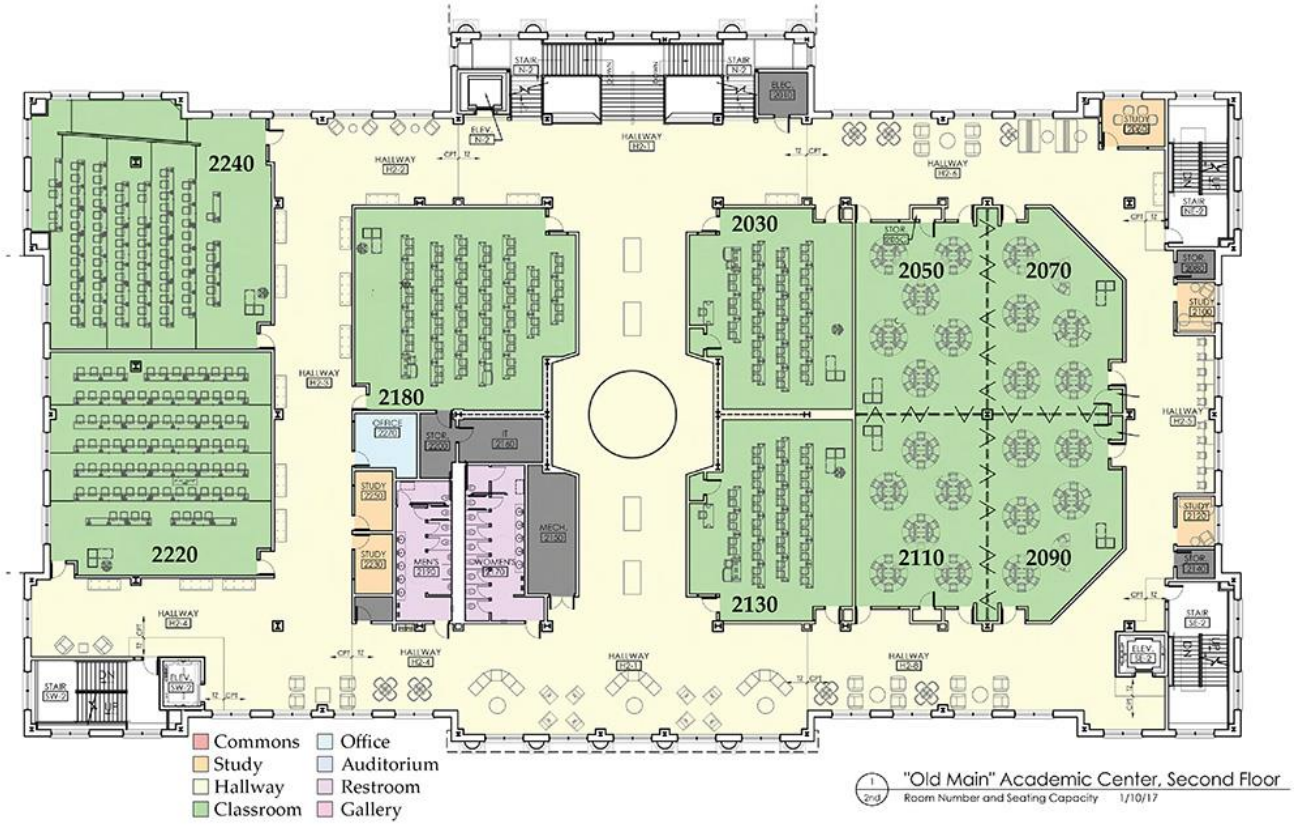
Session	Session Code	Location	Time
AM Poster 1	MP1	1st Floor Lobby	8 AM – 9:50 AM
AM Poster 2	MP2	1st Floor Lobby	8 AM – 9:50 AM
AM Poster 3	MP3	1st Floor Lobby	10:00 AM – 12 PM
AM Poster 4	MP4	1st Floor Lobby	10:00 AM – 12 PM
AM Oral 1	MO1	Room 1220	8 AM – 9:30 AM
AM Oral 2	MO2	Room 1200	8 AM – 9:30 AM
AM Oral 3	MO3	Room 2180	8 AM – 9:30 AM
AM Oral 4	MO4	Room 2130	8 AM – 9:30 AM
AM Oral 5	MO5	Room 2240	8 AM – 9 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 2240	10 AM – 11:00 AM
PM Poster 1	AP1	1st Floor Lobby	1 PM – 3:30 PM
PM Poster 2	AP2	1st Floor Lobby	1 PM – 3:30 PM
PM Oral 1	AO1	Room 2180	1 PM – 2 PM
PM Oral 2	AO2	Room 1200	1 PM – 2 PM
PM Oral 3	AO3	Room 1220	1 PM – 2:15 PM
PM Oral 4	AO4	Room 2180	2:15 PM – 3:30 PM
PM Oral 5	AO5	Room 1200	2:15 PM – 3:15 PM
PM Oral 6	AO6	Room 2130	2:15 PM – 3:15 PM



SIGN IN STUDENTS

SIGN IN JUDGES

Poster Presentations



MORNING SESSION: 8 AM—12 PM

Poster Sessions

Poster Session 1

8 AM – 9:50 AM

1st Floor Lobby – Posters 1-9

Moderator: Sushma Perati

Evaluators:

1. Joel Komakech, Food Science, Nutrition and Health Promotion
2. Peixin Fan, Animal and Dairy Sciences

Participants:

1. Bala Subramanyam Sivarathri, Plant and Soil Sciences, *Influence of Biostimulants on Emergence and Seedling Vigor under Low and High Temperatures*
2. Sujan Poudel, Plant and Soil Sciences, *Morpho-physiological and Yield Responses of Cowpea to Drought Stress*
3. Lahari Nekkalapudi, Plant and Soil Sciences, *Evaluating the Impact of Cover crop and Nitrogen treatments on Soil Microbial dynamics in Sweet Potato production system*
4. Mohan K Bista, Plant and Soil Sciences, *Effects of Heat Stress on Cotton Physiology and Yield*
5. Praveen Gajula, Plant and Soil Sciences, *Impact of Biostimulants at Variable Nitrogen Rates in Mississippi corn*
6. Raveendra Chandavarapu, Plant and Soil Sciences, *Does the root-to-shoot ratio plasticity during the seedling stage contribute to chilling tolerance in rice?*
7. Manoj Kumar Reddy Allam, Plant and Soil Sciences, *Morphological Evaluation of Rice Genotypes for Elevated CO2 Conditions*
8. Kerington Bass, Plant and Soil Sciences, *Evaluation of Plant Growth Regulators on Sweet Potato Slip Production*
9. Michael Carroll, Poultry Science, *Modeling of thermal inactivation of avian pathogenic Escherichia coli, E. coli O157:H7 and non-pathogenic E. coli in poultry feeds using a lab-based circulating water bath*

Poster Session 2

8 AM – 9:50 AM

1st Floor Lobby – Posters 10-19

Moderator: Grayson Edwards

Evaluators:

1. Ling Li, Biological Sciences
2. Vitor Martins, Agricultural and Biological Engineering
3. Zaccheus J. Ahonle, Counseling, Higher Education Leadership, Educational Psychology, & Foundations

Participants:

1. Emmanuel Oladejo, Animal and Dairy Sciences, *Oxidative stress alters intestinal microbiota in young growing pigs*
2. Himani Joshi, Animal and Dairy Sciences, *Rumen microbiome signature-based machine learning model for heat stress prediction*
3. Minel Guler, Human Development and Family Science, *Video Games, Basic Psychological Needs, and Stress Recovery: Comparisons between Solo and Social Play*
4. Lisa Ziegler, School of Human Sciences, *Growing young minds: Integrating child mental health support within 4-H STEM education*
5. Andrea Berryhill and Lendon Chandler, Teacher Education and Leadership, *Second Graders' use of Spatial Reasoning Skills to Solve Contextual Problems*
6. Arpita Deb, Comparative Biomedical Sciences, *Optimization of immune complex formation to trigger Fcγ receptor signaling for in vitro immunotoxicity assays*
7. Rideeta Islam Aishy, Comparative Biomedical Sciences, *Exploring molecular determinants of Antimicrobial Resistance through Adaptive Laboratory Evolution*
8. Hemraj Kathayat, Comparative Biomedical Sciences, *Understanding Edwardsiella ictaluri efflux pump system*
9. Seto C. Ogunleye, Comparative Biomedical Sciences, *Unveiling the Role of Catabolite Control Protein C (ccpC) in Nutrient Metabolism, Competitiveness of Listeria monocytogenes*
10. Fenny Patel, Comparative Biomedical Sciences, *Comparative genomics analyses provide deep insights into the Edwardsiella genus diversity*

Poster Session 3

10 AM – 12:00 PM

1st Floor Lobby – Posters 1-9

Moderator: Sushma Perati

Evaluators:

1. Joel Komakech, Food Science, Nutrition and Health Promotion
2. Peixin Fan, Animal and Dairy Sciences

Participants:

1. Getrude Aturu, Forestry, *Foliar and Soil Nutrient Content, Carbon Allocation, and Root Systems of 12 Longleaf Pine Genotypes*
2. Kelechi Godwin Ibeh, Forestry, *Forest Tree Competition: A Method for Assessing Distance-Dependent and Independent Competition Indices Using FIA Data*
3. Quentin Boccaleri, Forestry, *Optimized Site Selection for Short Rotation Woody Crop Systems in the Lower Mississippi Alluvial Valley*
4. Sushma Bhattarai, Forestry, *Ecological, social, and economic impacts of chronic wasting disease*
5. Segun Adeyemo, Forestry, *Optimizing Habitat Suitability Models to Guide Restoration of Bottomland Hardwood Forests in the Lower Mississippi River Floodplain*
6. Carlos Rivera, Forestry, *Molecular Archiving of Stoneville and Other Eastern Cottonwood Clones*
7. Caroline Teal, Wildlife, Fisheries, and Aquaculture, *Assessing Genetic Variation in Etheostoma lachneri*
8. Maya Stratman, Wildlife, Fisheries, and Aquaculture, *The potential for Conservation Grazing in Coastal Uplands*
9. Zoe Scott, Wildlife, Fisheries and Aquaculture, *Red-headed woodpecker nest site selection and nest success in managed pine forests*

Poster Session 4

10 AM – 12:00 PM

1st Floor Lobby – Posters 10-17

Moderator: Ana Valencia

Evaluators:

1. Ayantha Senanayaka, Center for Advanced Vehicular Systems
2. Kristin Javorsky, Teacher Education and Leadership
3. Rooban Venkatesh K G Thirumalai, Institute of Imaging and Analytical Technologies

Participants:

1. Miguel A. Cabrera, Chemistry, *Silylphosphine and silanephosphine nickel complexes as catalyst in the hydrofunctionalization of unsaturated bonds*
2. Nishat Shermin , Geosciences, *Mapping the luminous intrusion: A nationwide Emerging Bivariate Cluster analysis of nighttime light's intervention on bat habitats over 30-years*
3. Madison Bibbs, Psychology, *Perceived Parental Psychopathology and Family Functioning in Emerging Adults*
4. Heather-Ann Layth, Sociology, *Are you an Antifascist?: it's not all just punching Nazis*
5. Rejane S. Paulino, Agricultural & Biological Engineering, *Atmospheric correction of Sentinel-3A/B images for mapping water quality parameters in Mississippi coastal waters*
6. Praveen Shalika Amarasinghe, Amarasinghe Arachchige, Agricultural and Biological Engineering, *Spectral Discrimination of Sweetpotato Potyvirus Complex Infection*
7. Chamika A. Silva, Agricultural and Biological Engineering, *Rapid estimation of macro and micronutrients in fresh and dry plant leaf tissues using infrared spectroscopy*
8. Mikias Workneh Gugssa, Civil and Environmental Engineering, *Smart Safety System with Enhanced Human-Technology Interactions (HTIs) for Work Zone Safety Improvement*

Oral Sessions

Oral Session 1

8 AM – 9:30 AM

Room 1220

Moderator: Chamal De Silva

Evaluators:

1. Godfred Inkoom, Physics and Astronomy
2. Maryam Mirabolghasemi, Chemical Engineering
3. Maxwell Young, Computer Science and Engineering
4. Stephen Torri, Computer Science and Engineering

Participants:

1. Abdur Rahman, Industrial and Systems Engineering, *Boosting Discriminability of Transferable Features in Unsupervised Domain Adaptation*
2. Aditya Shah, Aerospace Engineering, *Manufacturing and Testing of a Stitched Sandwich Composite Main Landing Gear Door*
3. Ally Cummings, Mechanical Engineering, *Finite element modeling for thermomechanical prediction of wire-arc directed energy deposition with ER120S-G*
4. Ahmed Manavi Alam, Electrical and Computer Engineering, *Microwave Radiometer Calibration Using Deep Learning With Reduced Reference Information and 2-D Spectral Features*
5. Mohammad Abdus Shahid Rafi, Electrical and Computer Engineering, *Performance assessment of crop line detection in corn field from unmanned aerial vehicle video*
6. Md Elias Hossain, Computer Science and Engineering, *Enhancing Graph-Based Residual Network for Effective Classification of long Cancer-related Documents*

Oral Session 2

8 AM – 9:30 AM

Room 1200

Moderator: Kevin Jones

Evaluators:

1. Matt Griffin, CVM PPM
2. Sheida Riahi, Marketing, Quantitative Analysis & Business Law

Participants:

1. Ethan Brister, Biological Sciences, *Advancing Soybean Seed Protein: Insights from QQS Gene Exploration*
2. Moshood Fagbolade, Biological Sciences, *Functional complementation and occidiofungin susceptibility of fungal actin orthologs in S. cerevisiae*
3. Prattay Dey, Biological Sciences, *Exploring ANXA2 as a critical host receptor in advancing protein-based vaccine development against Streptococcus pneumoniae*
4. Rezwan Tanvir, Biological Sciences, *Taxonomically restricted QQS associated 1 (TRQA1): a regulator of plant metabolism controlling protein and starch content*
5. Tristan Henderson, Biological Sciences, *Decoding the doo-doo dilemma: how amoebas in poop create societies*

Oral Session 3

8 AM – 9:30 AM

Room 2180

Moderator: Mary Miller

Evaluators:

1. Sumudu Athukorale, Chemistry
2. Peter Liam Ryan, Executive Vice President & The Graduate School

Participants:

1. Gabriel F. Nyen, Forestry, *Seeding Understory Species, an Approach to Restoring the Longleaf Pine Ecosystem*
2. Jiaxin Wang, Forestry, *Measuring stomatal and guard cell metrics for plant physiology and growth using StoManager1*
3. Segun Adeyemo, Forestry, *Optimizing Habitat Suitability Models to Guide Restoration of Bottomland Hardwood Forests in the Lower Mississippi River Floodplain*
4. Ridwan T. Ayinla, Sustainable Bioproduct, *Synthesis of green active materials for high-performance flexible supercapacitor*
5. Crystal Lodi Conde, Wildlife, Fisheries, and Aquaculture, *Evaluating the Effect of the Dietary Supplementation of Soy Lecithin in the Production Performance and Physiological Responses of Channel Catfish (Ictalurus punctatus)*
6. Jing Huang, Wildlife, Fisheries, and Aquaculture, *Dietary Supplementation of Lactococcus lactis Isolate MA5 on Hybrid Catfish (Channel x Blue): Effects on Growth Performance, Immune Modulation, and Disease Resistance*

Oral Session 4

8 AM – 9:30 AM

Room 2130

Moderator: Christiana Eziashi

Evaluators:

1. Mohammad Heshmati, Chemical Engineering
2. Enock Amoateng, Chemistry
3. George Trawick, Computer Science and Engineering

Participants:

1. Samuel Juárez, Chemistry, *Synthesis of New Zr Organometallic Emitters for Applications in OLED Devices*
2. Oluwabori Adekanye, Comparative Biomedical Sciences, *Carboxylesterase 1 knockdown thp-1 macrophages show a disrupted citric acid metabolite similar m1 macrophage*
3. Saida Zinnurine, Comparative Biomedical Sciences, *Characterization of RTX and Chitinase-deficient mutants of virulent Aeromonas hydrophila*
4. Ishmael Apachigawo, Physics and Astronomy, *Photonics probing of alcohol and probiotic Influence on DNA spatial structural changes in colon cancer via confocal Imaging*
5. Yukai Ai, Physics and Astronomy, *Characterization of single aerosol particles in a reactive atmospheric environment using optical trapping- Raman spectroscopy*

Oral Session 5

8 AM – 9:00 AM

Room 2240

Moderator: Suman Pradhan

Evaluators:

1. Marcus McGee, Animal and Dairy Sciences
2. Tim Boltz, Poultry Science

Participants:

1. Alaina M. Richardson, Plant and Soil Sciences, *Cover Crop Allelopathy: A Sustainable Weed Management Strategy in Sweet Potato*
2. Alyssa Lea Miller, Plant and Soil Sciences, *Assessing the allelopathic effects of coumarin and chlorogenic acid alone and in synergy with glyphosate on the management of Palmer amaranth*
3. Apphia Santy, Plant and Soil Sciences, *Testing different Raspberry cultivars for production in Mississippi*
4. Oluwaseyi Emmanuel Olomitutu, Plant and Soil Sciences, *Corn Response to Planting Speed in Mississippi*

Oral Session 6

10 AM – 11:30 AM

Room 1220

Moderator: Christiana Eziashi

Evaluators:

1. Ling Li, Biological Sciences
2. Shankar Ganapathi Shanmugam, Institute for Genomics, Biocomputing & Biotechnology

Participants:

1. Sabina Regmi, Agricultural Economics, *Willingness to Pay for Broadband in the United States: A Meta-analysis*
2. Jalyn G. Hawkins, Animal and Dairy Sciences, *High-resolution characterization of the gut microbiota of neonatal dairy calves and associations with calf diarrhea using full-length 16S rRNA gene amplicon sequencing*
3. Allison Griffin, Animal and Dairy Sciences, *An examination of cow grooming behavior with an automated brush system in an intensively managed dairy system*
4. Guyue Tang, Food Science, Nutrition and Health Promotion, *Effects of ammonia stress on the growth performance and filet quality of channel and hybrid catfish*
5. Lizzie Raquel Zaldivar, Food Science, Nutrition and Health Promotion, *Identification of bacterial species composition and diversity of chicken breast meat during processing*
6. Sawyer Wyatt Smith, Food Science, Nutrition and Health Promotion, *Inhibiting Tyrophagus putrescentiae orientation to and reproduction on dry cured hams: The impact of acetic acid-treated ham nets*

Oral Session 7

10 AM – 11:30 AM

Room 1200

Moderator: Kevin Jones

Evaluators:

1. Galen Collins, Biochemistry, Molecular Biology, Entomology, and Plant Pathology
2. Matt Griffin, CVM PPM

Participants:

1. Alena Anderson, Wildlife, Fisheries, and Aquaculture, *Preliminary analysis of blacknose shark (Carcharhinus acronotus) age, growth, and maturity in the northern Gulf of Mexico*
2. Basant Pant, Wildlife, Fisheries, and Aquaculture, *Understanding Acceptance Capacity, and Intentions of Mississippi People to Participate in the Conservation and Management of Black bears in Mississippi: A dissertation proposal*
3. Danielle McAree, Wildlife, Fisheries, and Aquaculture, *Preliminary analysis of tiger shark (Galeocerdo cuvier) age, growth, and maturity in the western North Atlantic Ocean*
4. Darren Shoemaker, Wildlife, Fisheries, and Aquaculture, *Comparative Modeling of Reservoir Impairment from Climate Change Using Human Dimensions*
5. Jacob L. Wessels, Wildlife, Fisheries, and Aquaculture, *Seabird foraging ecology, habitat selection, and fitness along the Gulf Coast of Mississippi*
6. Vandana Dharan, Wildlife, Fisheries, and Aquaculture, *Investigation into the portals of entry and disease progression of Ictalurid herpesvirus 1 in channel catfish, Ictalurus punctatus, blue catfish, I. furcatus, and their hybrid cross using in situ hybridization*

Oral Session 8

10 AM – 11:30 AM

Room 2180

Moderator: Mary Miller

Evaluators:

1. Katerina Sergi, Social Science Research Center
2. Melody Fisher, Communication
3. Eugenie Joan Looby, Counseling, Higher Education Leadership, Educational Psychology, and Foundations
4. Stephanie B. King, Industrial Technology, Instructional Design, and Community College Leadership

Participants:

1. Aleisha M. Reynolds, Anthropology and Middle Eastern Cultures, *The Hamann-Todd & the Heights of Academic Freedom: A Dissection of the Necropolitical Lives & Deaths of Medical Institutional Bodies*
2. Marcus Brumfield, Engineering Education, *The impact of a summer bridge program at a public land-grant university in the southeastern region on the retention of first-time Black students*
3. Junnatun Naym, Finance and Economics, *Delinquent Insider Trade Reporting and Corporate Misconduct*
4. Patricia Lynne McCourt, History, *The Problem With So Many Names: An Analysis of the Relationship Between Mental Illness and Drug Use Among Nineteenth Century Women*
5. Patricia Marie Cordero-Irizarry, School of Human Sciences, *Byte-sized Learning: Agricultural Students in the Online Mix*

Oral Session 9

10 AM – 11:00 AM

Room 2240

Moderator: Seto C. Ogunleye

Evaluators:

1. Raju Bheemanahalli, Plant and Soil Sciences
2. Tim Boltz, Poultry Science
3. Xue Zhang, Food Science, Nutrition, and Health Promotion

Participants:

1. Durga Purushotham Mahesh Chinthalapudi, Plant and Soil Sciences, *Characterizing the Impact of Cover Crop on Soil Microbiome Function Affecting C and N Inputs in Corn Production Systems*
2. Lahari Nekkalapudi, Plant and Soil Sciences, *Evaluating the Impact of Cover crop and Nitrogen treatments on Soil Microbial dynamics in Sweet Potato production system*
3. Mohan K Bista, Plant and Soil Sciences, *Drought Resilience of Cotton Breeding Lines During Reproductive Stage*
4. Tucker Hilyer, Plant and Soil Sciences, *Biological product effects on soybean in Mississippi*

AFTERNOON SESSION: 1 PM—3:30 PM

Poster Sessions

Poster Session 1

1 PM – 3:30 PM

1st Floor Lobby – Posters 0-9

Moderator: Jesse Weaver

Evaluators:

1. Adam Piper, Industrial and Systems Engineering
2. Heesook Choi, Communication
3. Iva Ballard, Marketing, Quantitative Analysis, and Business Law
4. Angelica Abdallah-Ruiz, Food Science, Nutrition and Health Promotion
5. Mehdi Ghahremani, Counseling, Higher Education Leadership, Educational Psychology, and Foundations
6. Meredith Staggers, Counseling, Higher Education Leadership, Educational Psychology, and Foundations
7. Sid Creutz, Chemistry, Chemistry

Participants:

1. Melvy Fernandes, Aerospace Engineering, *Computational study of transport phenomena within a Poultry Incubator*
2. Derek Willis, Computer Science and Engineering, *Enabling Real-Time 3D Visualization in Augmented Reality: A Seamless Integration of R Language and Microsoft HoloLens 2*
3. Iffat Ara Ebu, Electrical and Computer Engineering, *Improved Distance Estimation in Dynamic Environments through Multi-Sensor Fusion with Extended Kalman Filter*
4. Mohammad Abdus Shahid Rafi, Electrical and Computer Engineering, *Automatic vegetation and weed labeling in Corn (Maize) field from unmanned aerial vehicle video*
5. Saviz Saei, Industrial and System Engineering, *On the Nexus of Topological Measures and Their Ability to elucidate Network Vulnerability Patterns*
6. Ethan Schuetzle, Mechanical Engineering, *Melting Cycle of Phase Change Materials in Micro-Gravity*
7. Cassia Caballero, Agricultural & Biological Engineering, *Turbidity Mapping with Sentinel-3 OLCI in the Mississippi Sound*
8. Haiye Xie (Justin), Center for Advanced Vehicular Systems, *Enhanced Predictive Modeling in WA-DED with Physics-Informed Neural Networks*

9. Jeffrey Nyabor, Communication, *The Role of Social Media in Public Health Communication: A Study on CDC's Rx Awareness Campaign*
10. Jillian Ressler, Counseling, Higher Education Leadership, Educational Psychology, and Foundations, *Using a check-in/check-out + behavior report card intervention to increase appropriate social behavior in a self-contained classroom*

Poster Session 2

1 PM – 3:30 PM

1st Floor Lobby – Posters 10-19

Moderator: Patricia Marie Cordero-Irizarry

Evaluators:

1. Aimee Imlay, Sociology
2. Ayoung Kim, Agricultural Economics
3. Blair Booker, Libraries
4. Nisarga K. Narayana, Plant and Soil Sciences

Participants:

1. Notsile Dlamini, Animal and Dairy Sciences, *Extracellular vesicle miRNAs in porcine seminal plasma influence semen quality*
2. Durga Purushotham Mahesh Chinthalapudi, Plant and Soil Sciences, *Fungal Communities Shifts in Corn Production Systems with Varied Cover Crop and Nitrogen Fertilizer Treatments*
3. Ramandeep Kumar Sharma, Plant and Soil Sciences, *Machine Learning Algorithms for Yield Prediction of Corn and Soybean: A Systematic Literature Review*
4. Vijaykumar Hosahalli, Plant and Soil Sciences, *Harnessing the effectiveness of biostimulants in overcoming heat stress in soybeans*
5. Jasmine Sahota , Plant and Soil Sciences, *Characterizing Insect Frass-Associated Microbiome and their Metabolic Diversity Using Biolog Eco Plates*
6. Samrat Sikdar, School of Human Sciences, *Fostering Farmer-Extension Relationships: Insights from Livestock Farmers, Innovation Brokers, and Extension Services in England's Technological Innovation System*
7. Tobin J. Davidson, Wildlife, Fisheries, and Aquaculture, *Mitogenome Surveillance of Invasive Fishes in the Southeastern United States*
8. Vandana Dharan, Wildlife, Fisheries, and Aquaculture, *Investigation into the portals of entry and disease progression of Ictalurid herpesvirus 1 in channel catfish, Ictalurus punctatus, blue catfish, I. furcatus, and their hybrid cross using in situ hybridization*

9. Moshood Fagbolade, Biological Sciences, *Functional complementation and occidiofungin susceptibility of fungal actin orthologs in S. cerevisiae*
10. Daniel O. Oguntuyi, Chemistry, *Comparative Study on Characterization and Adsorption Capacity of Pre- and Post-Modified MnFe2O4-RHBC for Pb(II) Sorption in Aqueous Medium*

Oral Sessions

Oral Session 1

1:00 PM – 2:00 PM

Room 2180

Moderator: Grace Olaitan

Evaluators:

1. Jessie Cossitt, Computer Science and Engineering
2. Wenmeng Tian, Industrial and Systems Engineering
3. Sara Vick, Management and Information Systems

Participants:

1. Zonghan Zhang and Zijian Zhang, Computer Science and Engineering, *Multiple-Source Localization from a Single-Snapshot Observation Using Graph Bayesian Optimization*
2. Ahmed Manavi Alam, Electrical and Computer Engineering, *Radio Frequency Interference Detection for Microwave Radiometer Using Convolutional Neural Networks*
3. Jigar Bhatt, Electrical and Computer Engineering, *Advanced Techniques for Fruit Detection and Ripeness Classification to Enhance Decision-driven Automated Harvesting*
4. Mahathir Mohammad Bappy, Industrial and Systems Engineering, *Adaptive Thermal History Deidentification for Privacy-preserving Process-defect Modeling of Metal Additive Manufacturing*

Oral Session 2

1:00 PM – 2:00 PM

Room 1200

Moderator: Aidan Taylor

Evaluators:

1. Shane Miller, Anthropology and Middle Eastern Cultures
2. Olufunke Ogundimu, English
3. KC New, Libraries

Participants:

1. Catalina Revelo, Classical and Modern Languages and Literatures, *The Facets of Motherhood: Motherhood, Conflict and Deconstruction in the novel 'Esta Herida Llena de Peces' by Lorena Salazar Masso*
2. Daniela Coral Patino, Classical and Modern Languages and Literatures, *The representation of nature in The Shrouded Woman by Maria Luisa bombal*
3. Jessica Li Zhi Biao, Classical and Modern Languages and Literatures, *Empowering Women: Navigating Social Constraints in Une Si Longue Lettre and Beyond*
4. Johana Lozano, Classical and Modern Languages and Literatures, *"La llegada de Miss Piggy Vaquera" and Queer expression in Colombian literature*

Oral Session 3

1:00 PM – 2:15 PM

Room 2130

Moderator: Asishana Ajayi

Evaluators:

1. Fernando Yamamoto, Delta Research & Extension Center
2. Haifeng Wang, Industrial and Systems Engineering
3. Beth Peterman, Pathobiology and Population Medicine
4. Naflath Thenveettil, Plant and Soil Sciences

Participants:

1. Bala Subramanyam Sivarathri, Plant and Soil Sciences, *Characterization of root trait variability in soybean*
2. Ncomiwe Andile Maphalala, Plant and Soil Sciences, *Assessing the Effects of Rhizobium japonicum and Plant Growth-Promoting Rhizobacteria (PGPR) on Soybean (Glycine max L.) Seed Inoculation: Implications for Yield, Soil Microbial Properties, and Herbicide Carryover Management*
3. Raveendra Chandavarapu, Plant and Soil Sciences, *Does the root-to-shoot ratio plasticity during the seedling stage contribute to chilling tolerance in rice?*
4. Sujan Poudel, Plant and Soil Sciences, *Morpho-physiological and Yield Responses of Cowpea to Drought Stress*
5. Vijaykumar Hosahalli, Plant and Soil Sciences, *Harnessing the effectiveness of biostimulants in overcoming heat stress in soybeans*

Oral Session 4

2:15 PM – 3:30 PM

Room 2180

Moderator: Emmanuel Oladejo

Evaluators:

1. Amanda Patrick, Chemistry
2. Attila Karsi, Comparative Biomedical Sciences
3. Matt Griffin, CVM PPM

Participants:

1. Tanveer Shaikh, Chemistry, *Engineering Biomimetic Protein Coronas for Precision Regulation of Nanoparticle Function*
2. Vaishali A. Kshirsagar, Chemistry, *Partial and Complete Anion Exchange of Colloidal Ternary Chalcogenides for Optical Tunability*
3. Ana Maria Valencia, Chemistry, *Cationic Copolymerization of Styrene Derivatives for Degradable Alternatives*
4. Seto C. Ogunleye, Comparative Biomedical Sciences, *Regulatory Roles of Glutamate Synthase Gene in L. monocytogenes*
5. Sujita Balami, Pathobiology and Population Medicine, *In Search of A Polyvalent, Orally Delivered Edwardsiella Vaccine in Hybrid Catfish (Blue Catfish ♂× Channel Catfish ♀)*

Oral Session 5

2:15 PM – 3:15 PM

Room 1200

Moderator: Ranlissihia Tickles

Evaluators:

1. Hasan C. Tekedar, Comparative Biomedical Sciences
2. Andrea Germany, Meridian Division Arts & Sciences

Participants:

1. Camilo Suarez Barazeta, Wildlife, Fisheries, and Aquaculture, *Evaluating the phytocompounds carvacrol, thymol, and citral in Vitro: potential antagonism of fish pathogenic bacteria*
2. Jaden Akers, Wildlife, Fisheries, and Aquaculture, *Effects of Structural Design on Oyster Survival in Artificial Reefs*
3. Kevin Jones, Wildlife, Fisheries, and Aquaculture, *Detection of Walleye in eastern Mississippi streams using eDNA*
4. Krista Ruppert, Wildlife, Fisheries, and Aquaculture, *Multispecies Occupancy Modeling of Amphibian Breeding Communities in South Alabama*

Oral Session 6

2:15 PM – 3:15 PM

Room 2130

Moderator: Grace Olaitan

Evaluators:

1. Jennifer McGillan, Libraries
2. Hilary DeShong, Psychology

Participants:

1. Madeline McKnight, Animal and Dairy Sciences, *Describing the consumption of chlortetracycline-containing mineral offered free-choice to pregnant commercial beef cows on pasture*
2. Marley Cruise, Anthropology and Middle Eastern Cultures, *E-girls are Ruining this Paper*
3. Chuck Burdine, Forestry, *Conserving American Chestnut Genotypes for Future Breeding with Pathogen-Resistant Seedlings*
4. Kristina Balentine, Geosciences, *Determining the Influence of Broadcast Visuals and Messaging on the Public's Perception and Intent to Shelter in Tornado Warnings*

Presenters & Abstracts

MISSISSIPPI STATE UNIVERSITY

GRADUATE STUDENT ASSOCIATION

MISSISSIPPI STATE UNIVERSITY

THE GRADUATE SCHOOL

Presenter: Oluwabori Adekanye

Presentation Session: MO4

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Matthew Ross, Professor Comparative Biomedical Sciences

Title: Carboxylesterase 1 knockdown thp-1 macrophages show a disrupted citric acid metabolite similar m1 macrophage.

Abstract: Macrophages are innate immune cells with the capacity to differentiate into classically activated (M1) or alternatively activated (M2) cells that promote or attenuate inflammation, respectively. Inflammation that is precipitated in response to pathogen-associated molecular patterns (PAMPs) or damage-associated molecular patterns (DAMPs) is normally resolved during healthy physiology. However, dysregulated inflammation can lead to chronic inflammation, which initiates or complicates diseases like T2 diabetes, cancer, and atherosclerosis. Carboxylesterase 1 (CES1) is a serine hydrolase that catabolizes neutral lipids. Our published results indicate that THP-1 macrophages with deficient CES1 expression (CES1KD cells) exhibit larger quantities of lipid droplets than normal THP-1 macrophages (control cells) due to their reduced lipolytic activity. Further, CES1KD cells produce more IL-1B and prostaglandin E2 than control cells. Studies have also shown that classically-activated M1 macrophages exhibit a broken citric acid cycle causing an intracellular buildup of proinflammatory citrate and succinate metabolites. Here, we report that CES1KD cells have greater levels of several TCA metabolites than control cells under both baseline and lipopolysaccharide (LPS)-stimulated conditions. These include lactate, citrate, cis-aconitate, and □-ketoglutarate, while succinate levels were depressed. Furthermore, in CES1KD cells there was a striking reduction in UDP-GlcNAc levels, a metabolite made by M2 macrophages. Surprisingly, LPS treatment of control and CES1KD cells did not alter any of the polar metabolites. Consistent with the cell-type differences found for the polar metabolites, RNA-seq indicated that M2 marker gene expression levels of ALOX15, FABP4, and CD206 in CES1KD cells were lower than those in control cells. Gene ontology, KEGG, and Reactome database enrichment analyses of unstimulated CES1KD cells revealed an enrichment of upregulated gene pathways that are involved in antibacterial and antiviral defense, which was similar to the signature seen in control cells stimulated with LPS and IFN-γ. Thus, CES1KD macrophages under baseline conditions appear to exhibit a similar immunophenotype as M1 control cells. These findings further confirm that CES1 plays a role in regulating macrophage inflammatory immune responses, and that enhancing CES1 activity might reverse or attenuate the progress of diseases caused by chronic inflammation. [Supported by NIH R15HL157818-01A1].

Presenter: Segun Adeyemo

Presentation Session: MO3

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Joshua J. Granger, Department of Forestry

Title: Optimizing Habitat Suitability Models to Guide Restoration of Bottomland Hardwood Forests in the Lower Mississippi River Floodplain

Abstract: The Lower Mississippi Alluvial Valley (LMAV) in the southern US contains some of the country's most extensive and biologically diverse bottomland hardwood (BLH) forests. However, these forests have suffered major losses over the past century due to land use changes. Restoration and sustainable management of oak species in this region are needed to recover valuable wildlife habitat and ecosystem services. The goal of this project is to develop habitat suitability models, optimize growth and yield models, and assess landscape dynamics to improve oak regeneration success and quantify restoration outcomes in the LMAV. Occurrence data for eight oak species will be obtained from Forest Inventory and Analysis records. Environmental predictor variables related to climate, soils, hydrology, and land cover will be compiled. Habitat suitability models for the oak species will be developed using an ensemble modeling approach. Growth and yield models will be optimized by incorporating habitat suitability model predictions. Landscape metrics will be calculated from land cover maps to assess structural changes related to restoration over time. The outputs will assist forest managers, planners, and conservation organizations in understanding oak species distributions, growth responses, and landscape dynamics in this unique and threatened forest ecosystem. The models and assessments developed will support informed decision-making for sustainable management and restoration of BLH forests.

Presenter: Segun Adeyemo

Presentation Session: MP3

Level of Study: PhD

Department: Forestry

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Advisor: Joshua J. Granger, Forestry

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Presenter: Yukai Ai

Presentation Session: MO4

Level of Study: PhD

Department: Physics and Astronomy

Category: Engineering

Advisor: Chuji Wang

Title: Characterization of single aerosol particles in a reactive atmospheric environment using optical trapping- Raman spectroscopy

Abstract: 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 applied a time-resolved, optical trapping-Raman spectroscopy (OT-RS) technique to characterize single, trapped bioaerosol particles under well-controlled reactive conditions that mimic the native state of particles in the atmosphere. We measured Raman spectra of seven different fungus samples using an OT-RS system, in which single fungal aerosol particles of tens of microns in size are trapped without photo-damage while relative humidity and ozone concentration around the particle were well controlled. We initially obtained Raman spectral fingerprints of seven different single-trapped fungal aerosol particles in air. We then measured time-resolved Raman spectra of the fungal aerosol particles trapped in air over a period of 40 minutes and characterized the temporal behavior of the trapped particles in terms of Raman band structure and intensity. We also measured time-resolved Raman spectra of the fungal aerosol particles exposed to ozone in a controlled concentration and relative humidity and compared the spectral features with those obtained when the single fungal aerosol particles were exposed to 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 such as lipids and proteins that undergo chemical reactions with ozone. This work demonstrated that OT-RS is a powerful technology for characterization of physical, chemical, and biological properties of single bioaerosol particles in simulated atmospheric condition and for potential detection of single bioaerosol particles in the atmosphere using Raman spectral fingerprints.

Presenter: Rideeta Islam Aishy

Presentation Session: MP2

Level of Study: Master's

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

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

Co-Advisor: Dr. Mark L. Lawrence, Director and Professor, Department of Comparative Biomedical Sciences

Title: Exploring molecular determinants of Antimicrobial Resistance through Adaptive Laboratory Evolution

Abstract:

Background: Aquaculture, vital for fish production, faces a critical challenge from antibiotic resistance due to extensive antibiotic use, leading to multidrug resistant pathogens. In response, Adaptive Laboratory Evolution (ALE) offers a promising strategy to trace the evolutionary mechanisms that drive the antibiotic resistance. In addressing this issue, Adaptive Laboratory Evolution (ALE) presents a promising avenue to elucidate the evolutionary drivers of antibiotic resistance. In our investigation, we used Edwardsiella ictaluri 93-146 as the model organism to perform ALE study. E. ictaluri, a gram-negative rod-shaped pathogen, is known to afflict farm-raised channel catfish, causing enteric septicemia.

Methods: We first determined the minimum inhibitory concentration (MIC) of colistin against E. ictaluri, achieving a 90% growth inhibition rate. Subsequently, 4 independent replicates of E. ictaluri 93-146 were exposed to gradually increasing dose of colistin. The 4 replicates had their respective independent controls to account for potential random mutations. Both populations were exposed to the same concentration of colistin for 4 passages, to stabilize the new adaptations, before passaging to next increase in antibiotic dose. This prolonged exposure to antibiotics simulated the selective pressures encountered in aquaculture settings, potentially inducing genetic rearrangements and random mutations that facilitate antibiotic resistance. Continual monitoring of both the exposed and control groups provided valuable insights into the dynamic and protracted adaptive responses observed in laboratory evolution studies. Further investigation, we will conduct genome sequencing and comparative genomics, which are crucial for a comprehensive understanding of the mechanisms driving this adaptation.

Conclusion: Our study demonstrates the effectiveness of ALE in probing the molecular mechanisms of antibiotic resistance. Comparative genomic analysis promises deeper insights into the genetic alterations driving antibiotic resistance, informing the development of tailored interventions to combat this threat and uphold the integrity of fish production while safeguarding animal and human health.

Presenter: Jaden Akers

Presentation Session: AO5

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Eric Sparks - Wildlife, Fisheries, and Aquaculture

Title: Effects of Structural Design on Oyster Survival in Artificial Reefs

Abstract: Eastern oysters are well known ecosystem engineers responsible for water filtration, providing habitat and refuge for numerous species, and other ecosystem services. However, natural oyster reefs are declining due to several natural and anthropogenic threats. To mitigate for the loss of natural oyster reefs, many reef restoration projects have been completed and several more are being planned. It is known that variation in reef height, interstitial space, and slope can encourage oyster settlement, but little is known about how reefs can be designed to exclude predation of oysters by oyster drills, fish, crabs, and other predators. In this study, we seek to quantify the effectiveness of varying oyster reef designs at excluding predation. Sixteen replicates each of eight different reef designs varying in height, slope, and vertical spacing have been created from Portland cement and seeded with oysters from Auburn Shellfish Lab. These reefs have been deployed in Bayou La Batre, AL in a block design with two replicates of each reef design deployed in a single block. Monthly photographs to determine oyster growth and survival in addition to predator counts will be collected and analyzed. After 8 months, 50% of the reef units were removed from the field and placed in a mesocosm with 8 separate blocks (1 replicate each). Daily monitoring captured the location of oyster drills on each reef unit. Results from this study can be used to inform the design of oyster reef restoration projects.

Presenter: Ahmed Manavi Alam

Presentation Session: AO1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

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

Co-Advisor: Dr. Vuk Marojevic, Associate Professor, Electrical and Computer Engineering

Title: Radio Frequency Interference Detection for Microwave Radiometer Using Convolutional Neural Networks

Abstract: Passive remote sensing is a crucial technology for climate studies and Earth science. National Aeronautics and Space Administration's soil moisture active passive (SMAP) is a remote sensing observatory that uses passive microwave radiometer measurements to estimate soil moisture and detect the freeze or thaw state. Despite operating in the protected band of the radio spectrum (1400–1427 MHz), the radiometer's measurements are nonetheless tainted by radio frequency interference (RFI). An increasing number of radio frequency transmissions such as those from air surveillance radars, 5G wireless communications, and unmanned aerial vehicles are contributing to RFI through either out-of-band emissions or operating in-band illegally. Physical modeling to detect RFI globally might prove to be challenging as RFI can be generated from single as well as multiple sources and these can be divided as pulsed or continuous wave RFI. In this study, a deep learning (DL) based RFI detection method is proposed with a novel convolutional neural network framework that can detect different types of RFI on a global scale. This is a data-driven approach where the detection framework learns directly from the SMAP data products to make a decision whether a certain footprint is RFI contaminated or not. SMAP's level 1 A data products containing antenna counts of different raw moments along with Stokes parameters are used in this study to produce spectrograms and level 1B data products containing the quality flags are used to dynamically label those spectrograms. This study's robust DL framework provided the highest accuracy with the raw moments of horizontal polarization (99.99%) to detect RFI globally.

Additional information: Published Journal Article: https://ieeexplore.ieee.org/abstract/document/9954900

Presenter: Ahmed Manavi Alam

Presentation Session: MO1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

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

Co-Advisor: Dr. Vuk Marojevic, Associate Professor, Electrical and Computer Engineering

Title: Microwave Radiometer Calibration Using Deep Learning With Reduced Reference Information and 2-D Spectral Features

Abstract: The accuracy of geophysical retrievals from radiometers relies on calibration quality, encompassing both absolute radiometric accuracy and spectral consistency. Radiometers have employed various calibration techniques, including external targets, vicarious sources, and internal calibrators like noise diodes or matched reference loads. Calibration techniques face challenges like frequency dependence, instrumental effects, environmental influences, drift, aging, and radio frequency interference. Recent hardware advancements enable radiometers to collect raw samples containing both temporal and spectral information. Leveraging advanced modeling techniques like deep learning (DL) enables the detection of subtle correlations, non-linear dependencies, and higher-order interactions within the data extracting valuable information that may have been challenging with conventional methods. This study utilizes NASA's Soil Moisture Active Passive (SMAP) satellite's level 1A and level 1B data products to develop a DL-based radiometer calibrator to estimate antenna temperature. Spectrograms of second raw moments equivalent to power carrying the 2-D spectral features serve as primary input in a supervised convolutional neural network-based architecture. DL-based calibrator has demonstrated high correlation and low root mean square error when incorporating spectral information from both reference and noise diodes and when not considering this information. Findings suggest that the ancillary features such as internal thermistor temperature and loss elements exhibit sufficient accuracy in estimating antenna temperature to compensate for variations in receiver noise temperature and short-term gain fluctuations in the absence of the reference load and noise diode power. The proposed calibration technique with reduced reference information might enable radiometers for a higher number of antenna scene observations within a footprint.

Additional information: Published Journal Article: https://ieeexplore.ieee.org/abstract/document/10318952

Presenter: Manoj Kumar Reddy Allam

Presentation Session: MP1

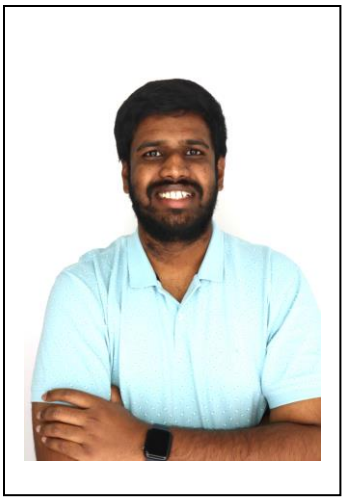
Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. K Raja Reddy, Research Professor, Plant and Soil Sciences.

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



Title: Morphological Evaluation of Rice Genotypes for Elevated CO2 Conditions

Abstract: Rice (Oryza sativa L.) is a staple food crop for more than 3.5 billion people globally. As a C3 crop, growth and yield will be affected by changes in climate, such as carbon dioxide (CO2). Screening and identifying genotypes that respond positively to the rise of CO2 ensures better yield. This study evaluated a rice diversity panel under ambient CO2 (aCO2; 425 ppm) and elevated CO2 (eCO2; 725 ppm) conditions using the sunlit plant growth chambers under optimum water and nutrient supply. Growth and developmental rates, stomatal conductance, transpiration, photochemical properties, and leaf temperature were measured 60 days after sowing. All the measured traits showed significant variability among genotypes except for leaf temperature. The eCO2 resulted in notable differences in shoot height, number of leaves, and root-to-shoot ratio. All the physiological parameters were significantly influenced by eCO2. There was a detectable reduction in stomatal conductivity (36%), electron transport rate (34%), chlorophyll content (44%), and nitrogen balance index (33%) compared to control. There was a considerable variation in leaf area among the genotypes at aCO2, ranging from 61 to 713 cm2, while at eCO2, it ranged from 60 to 712 cm2. The genotype RU1601105 performed better under aCO2 for both growth and physiological vigor indices with 5.8 and 8.7, respectively, compared to others, and the least was observed for INIA38 (2.4 and 7.2). In contrast, genotype INIA09 had the highest growth (5.04) and physiological (10.2) vigor index at eCO2, while RU1703132 exhibited the least vigor index (2.9 and 5.8). The genotypes INIA09 and RU1703110 showed the highest positive and lowest negative responses based on a combined CO2 response index (1.29 and 0.74) across the panel. The identified genotypes can be used as a genetic source for breeding new cultivars for the future at eCO2. The results emphasize the necessity of using adaptation techniques in agricultural practices to address the possible difficulties caused by increased CO2 levels and maintain rice production's resilience in the face of continuous climate change.

Presenter: Alena Anderson

Presentation Session: MO7

Level of Study: Master's

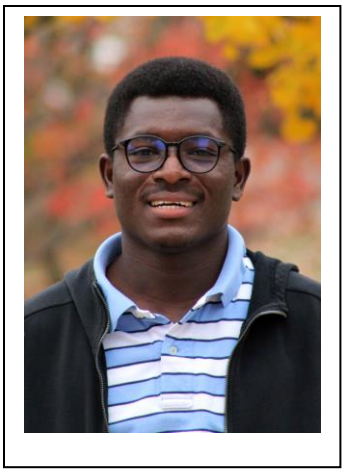
Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Marcus Drymon, Associate Extension Professor, Wildlife, Fisheries and Aquaculture

Title: Preliminary analysis of blacknose shark (Carcharhinus acronotus) age, growth, and maturity in the northern Gulf of Mexico

Abstract: The blacknose shark, Carcharhinus acronotus, is a small coastal shark found in the western Atlantic Ocean from Virginia to Brazil, including the Gulf of Mexico (GoM). Like other coastal sharks in the western Atlantic, blacknose sharks experienced historic overfishing throughout the 1970s and 1980s. The GoM blacknose shark stock status is reportedly unknown; however, studies have observed that GoM blacknose sharks have not shown signs of recovery, primarily due to susceptibility to capture as bycatch. Although several studies have evaluated the age, growth, and maturity of blacknose sharks throughout their range, the most recent study in the GoM used samples collected two decades ago, and updated data are needed to better understand the current population dynamics of the stock. Therefore, the objectives of this study are to 1) determine the sex-specific and overall growth parameters of GoM blacknose sharks and 2) determine the size and age at maturity of GoM blacknose sharks. From 2000 to 2023, blacknose sharks (n = 183) were collected from the northern GoM via bottom longline and gillnet surveys. A section of vertebrae was extracted from each fish for aging. Blacknose sharks ranged in size from 36-114 cm fork length, with females significantly larger than males ($p = 0.005$). The male-to-female ratio was 1.3:1 and did not significantly differ from a 1:1 ratio ($X2 = 3.147$, $df = 1$, $p = 0.076$). This study is necessary for evaluating the health of the GoM blacknose shark stock and informing effective management measures that ensure population sustainability.



Presenter: Ishmael Apachigawo

Presentation Session: MO4

Level of Study: PhD

Department: Physics and Astronomy

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Pradhan Prabhakar, Physics and Astronomy

Title: Photonics probing of alcohol and probiotic Influence on DNA spatial structural changes in colon cancer via confocal Imaging

Abstract: A photonics localization method, called inverse participation ratio (IPR), is adeptly applied to elucidate the effects of probiotics and alcohol on colon cancer by quantifying the DNA molecular-specific spatial structural changes in colon cancer cell nuclei on a colon cancer mouse model via confocal imaging. The IPR light localization technique measures the degree of structural disorder of DNA molecular-specific spatial mass density fluctuations. The nuclear structural alterations in colon cancer cell nuclei have been known to begin at the nano-to-submicron level, which precedes and predicts more prominent microscopic observations later in the disease. The effects of probiotics on alcohol-treated colon cancer is not a well-understood problem. However, probiotics like Lactobacillus have proven effective in enhancing colon cell/tissue functions. The IPR study results show that alcohol treatment enhances colon cancer, and the treatment of probiotics on alcohol-treated colon cancer tries to bring colon cancer less severe to normal. We acknowledge the grant NIH- R21CA260147.

Presenter: Praveen Shalika Amarasinghe, Amarasinghe Arachchige

Presentation Session: MP4

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

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

Title: Spectral Discrimination of Sweetpotato Potyvirus Complex Infection

Abstract: Spectroscopy, with its diverse applications, grows rapidly in various scientific domains. The technology recently became a pivotal tool for the identification of plant stresses including infections. Sweetpotato potyvirus complex comprising Sweet Potato Feathery Mottle Virus (SPFMV), Sweet Potato Virus C (SPVC), Sweet Potato Virus G (SPVG), and Sweet Potato Virus-2 (SPV2), often express mild or no symptoms posing diagnostic challenges despite the significant yield impact. Hence this project aims to identify spectral signatures for non-invasive, low cost, and rapid discrimination of infected from the healthy plants early in the growing season. In light of this, healthy and infected plants were established in different greenhouses using two commercial varieties: B14 and Orleans. Scans from adaxial surfaces of first, third, and fifth fully opened leaves were obtained using a visible-near infrared (350-2500 nm) spectrometer at biweekly intervals. The spectral data was preprocessed and analyzed using Principal Component Analyses, where it reveals that at 5th week after planting, the spectral discrimination is more prominent. Furthermore, the spectral data was analyzed using four classification modeling techniques: Logistic regression (LR), Random Forest (RF), Support Vector Classification (SVC) and Partial Least Squares-Discriminant Analysis (PLSDA). The classification results from LR, RF, and SVC confirmed that the spectral data collected at the fifth week after planting had better accuracies over 90%. Shapley values of spectral bands revealed an important signature at 707 nm and was reaffirmed by remodeling with the range 707 nm ± 10 where all models showed over 90% accuracies for the five-week-old plants.

Presenter: Getrude Aturu

Presentation Session: MP3

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Esteban Galeano, Professor, Forestry

Title: Foliar and Soil Nutrient Content, Carbon Allocation, and Root Systems of 12 Longleaf Pine Genotypes

Abstract: Longleaf pine (Pinus palustris) is a key species that is both ecologically and economically important in the Southeastern US. This pine species is well-known for its impressive growth rate and longevity. Also, its high-quality wood and capacity to thrive in diverse environmental conditions make it a resilient and valuable species for restoration and tree improvement (which is the process of selecting the trees that are outperforming in a plantation to increase gains). The root system of longleaf pine helps it access water and nutrients from deeper soil layers, contributing to its resilience to drought conditions and nutrient-deficient soils. Additionally, longleaf pine forests sequester and store an impressive amount of carbon, making them effective carbon sinks. Unfortunately, longleaf pine tree improvement has not progressed at the same rate as loblolly pine in the last four decades, leading to a lack of knowledge about the performance of genotypes in seed orchards. This project offers an opportunity to understand and optimize the genotype-based performance of nutrient absorption, carbon allocation, and root development across diverse soil conditions. The objectives of this project are to evaluate 12 different genotypes from 3 provenances growing in a seed orchard in Eutaw, AL, to determine differences in (1) foliar and soil nutrient content; (2) photosynthesis rate; (3) soil carbon characterization; and (4) root system structure. We will collect needles and soils from each genotype to quantify foliar nutrient contents (N, P, K, Ca, Mg, S, B, Cu, and Zn) using Optical Emission Spectroscopy. We will use a Portable Photosynthesis System to measure the photosynthesis rate. Also, soil carbon quantity and quality will be quantified using Elemental Combustion. Then, we will survey the root system of each genotype using Ground Penetrating Radar. Data will be analyzed using genetic mixed models and multivariate statistical approaches. As result, we expect to (1) recognize performance for each genotype and provenance based on nutrient assimilation efficiency, soil carbon allocation, and root development; (2) develop genotype-specific nutrient prescriptions for optimal growth; and (3) increase the knowledge related to climate-smart forestry to promote carbon sequestration using longleaf pine improved seeds for reforestation and restoration purposes.

Presenter: Ridwan T. Ayinla

Presentation Session: MO3

Level of Study: PhD

Department: Sustainable Bioproduct

Category: Forest Resources and Veterinary Medicine

Advisor: Prof. El-Barbary Hassan

Title: Synthesis of green active materials for high-performance flexible supercapacitor

Abstract: The pursuit of sustainable energy storage solutions has driven research efforts towards the synthesis of green materials for high-performance flexible supercapacitors. This study focuses on developing environmentally friendly materials that exhibit exceptional performance for flexible supercapacitor applications. Herein, we developed green materials for the design of electrodes and electrolytes for high-performance flexible supercapacitors. Activated carbon prepared from pine bark using acid, base, and salt as activation agents at different temperatures (600, 800, and 1000 ℃) was used as the active material of the electrodes. Cellulose nanofiber was also derived from wood pulp and crosslinked with mobile Cu2+ ions as the electrolyte. The surface area and porosity of the prepared activated carbon showed an increasing trend with increasing activation temperature for all activation agents. Flexible supercapacitors were designed and electrochemically tested for performance and mechanical stability using an aqueous, ionic liquid, and physically crosslinked Cu2+ on cellulose matrix electrolytes. Real supercapacitors were fabricated with excellent energy and power densities. The development of green flexible supercapacitors aligns with global efforts towards eco-friendly energy solutions, paving the way for the development of high-performance and environmentally conscious energy storage technologies.

Presenter: Sujita Balami

Presentation Session: AO4

Level of Study: PhD

Department: Pathobiology and Population Medicine

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Matt Griffin, Research Professor, College of Veterinary Medicine

Title: In Search of A Polyvalent, Orally Delivered Edwardsiella Vaccine in Hybrid Catfish (Blue Catfish ♂× Channel Catfish ♀)

Abstract: Edwardsiella piscicida is a gram-negative bacterium which infects a wide range of cold, temperate and warmwater fishes. Given its adaptability, E. piscicida is a widespread pathogen affecting multiple aquaculture industries worldwide, including farm-raised catfish in the United States. In catfish aquaculture, the channel (Ictalurus punctatus) x blue (Ictalurus furcatus) catfish hybrid is more susceptible to the disease, accounting for ~95% of E. piscicida diagnoses at the Thad Cochran National Warmwater Aquaculture Center (NWAC) in Stoneville, MS. Outbreaks of E. piscicida have been increasing over the past decade, concurrent with increased adoption of hybrids, which now account for >50% of total production. As such, there is an industry defined need for effective treatments or preventive measures to control the disease. Researchers at NWAC have developed an orally delivered, live attenuated Edwardsiella ictaluri vaccine which provides significant protection against E. ictaluri infection in channel catfish. Fortuitously, this vaccine also provides some level of cross-protection against the closely related E. piscicida, suggesting the presence of shared epitopes among E. ictaluri and E. piscicida that could be exploited in the development of polyvalent or cross-protective vaccines. In this study, formalin-killed E. piscicida bacterins were mixed with commercial catfish feed (~1x107 cells/g of feed) and delivered alone or in the presence of the E. ictaluri LAV (~1x107 CFU/g of feed). In addition, β-glucan 1mg/g of feed was investigated as a potential dietary immunostimulant. Treatment consisted of the bacterin alone or the bacterin mixed with the E. ictaluri LAV and administered to hybrid catfish fingerlings that had received dietary β-glucan either for 7 days before vaccination, 7 days after vaccination or 7 days before and after vaccination (14 days total). Thirty-three days post-vaccination, fish were challenged with E. piscicida isolate S11-285 by intraperitoneal injection (1x106 CFU/fish; 2.7x104 CFU/g of fish). Results indicate the oral delivery of the bacterin alone was not beneficial, however, the bacterin combined with the E. ictaluri LAV provided significant protection against E. piscicida challenge. In addition, administration of β-glucan for 7 days prior to vaccination appeared to enhance protective immunity, while addition of β-glucan post-vaccination had limited effect. This work provides evidence that the protective efficacy of the E. ictaluri vaccine against E. piscicida can be improved by inclusion of a concurrently delivered E. piscicida bacterin, which may be further be enhanced by the inclusion of dietary β-glucan for 7 days before vaccination. This work lays the foundation for additional research optimizing immunizing doses of the bacterin and LAV, as well as inclusion rates of dietary β-glucan to improve immunization strategies against Edwardsiella spp. in catfish aquaculture.

Presenter: Kristina Balentine

Presentation Session: AO6

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Kathleen Sherman-Morris, Professor, Geosciences

Title: Determining the Influence of Broadcast Visuals and Messaging on the Public's Perception and Intent to Shelter in Tornado Warnings

Abstract: Tornadoes are life-threatening natural disasters that require the public to make quick, life-saving decisions. Radar products, like storm-relative velocity and correlation coefficient, are often used during tornado warning coverage. Another element of wall-to-wall coverage is the broadcast meteorologist's call-to-action for the people in the warning to seek shelter. Some meteorologists also ask for viewers to submit any photos or videos they have of the tornado or air the videos of someone not sheltering during an active tornado warning. There are latent areas of research that investigate how the public is influenced by this conflicting messaging and their understanding of radar products and how these products may influence their decision making. Results of a 2 (radar product shown: base velocity vs. correlation coefficient) × 2 (first video shown: radar product vs. tornado traffic camera) × 3 (call-to-action message: proper vs. with request for video vs. with viewer-submitted video aired) between-subjects ANOVA found that the respondents were significantly more likely to shelter if they were shown video of the tornado on a traffic camera before viewing the radar with a warning polygon. It was also found that the respondents were significantly less likely to trust the meteorologist or believe the meteorologist was taking the tornado warning seriously if they were presented with the call-to-action with the request for viewers to submit video of the tornado to the station. Despite the data being non-normal, Mann-Whitney U tests analyzing the same relationships were also significant. A Chi-square test found that the survey participants were significantly more likely to correctly identify the location of a tornado using the radar product the meteorologist explained to them than one they were not shown. Results of how each video made the participants feel will be revealed at the symposium.

Presenter: Mahathir Mohammad Bappy

Presentation Session: AO1

Level of Study: PhD

Department: Industrial and Systems Engineering

Category: Engineering

Advisor: Dr. Wenmeng Tian, Associate Professor, Industrial and Systems Engineering

Title: Adaptive Thermal History Deidentification for Privacy-preserving Process-defect Modeling of Metal Additive Manufacturing

Abstract: In cloud-based additive manufacturing (AM) systems, sharing process data across multiple users can provide small to medium-sized manufacturers (SMMs) with enlarged training data for part certification, facilitating accelerated adoption of metal-based AM technologies. The aggregated data can be used to develop a process-defect model that is more precise, reliable, and adaptable. However, the AM process data often contains sensitive design information about printing path trajectories that is unfortunately vulnerable to confidential product design information leakage when shared among different users. In this study, a new adaptive AM data deidentification method is proposed that takes process data of melt pool images as input. This method generates surrogate melt pool images by masking the major design information of the instantaneous printing path trajectory as a privacy attribute while retaining the utility or quality attributes for process-defect modeling. This approach integrates stochastic image augmentation (SIA) and adaptive surrogate image generation (ASIG) via tracking melt pool geometric changes to assure both data privacy and utility. A convolutional neural network (CNN) classifier is used to evaluate the proposed method regarding privacy gain (i.e., identifying printing orientations) and utility loss (i.e., detecting process anomalies). The proposed method is validated using data collected from two cylindrical specimens using the directed energy deposition (DED) process. The deidentified dataset significantly improved privacy preservation while sacrificing little or no data utility, once shared on the cloud-based AM system for collaborative process-defect modeling.

Presenter: Camilo Suarez Barazeta

Presentation Session: AO5

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Fernando Yamamoto

Co-Advisor: Dr. Jordan Heather

Title: Evaluating the phytocompounds carvacrol, thymol, and citral in Vitro: potential antagonism of fish pathogenic bacteria

Abstract: The use of plant derived products as nutraceutical agents, immunostimulants, or antibiotics has been empirically proven in traditional medicine and in multiple in vivo and in vitro studies. However, there is a lack of knowledge of which metabolic pathways can be affected with the presence of these components during bacterial infections. To this end, the potential inhibitory effects of purified phytocompounds Citral, Cravacol and Thymol on fish pathogenic bacteria were assessed. These compounds were tested against Edwardsiella ictaluri (S97-773), E. piscicida (S11-285), Aeromonas hydrophila (ML09-119 and S14-452), Streptococcus agalactiae (RUSVM-CV), S. iniae (LSU 01-105, LSU 10-070, LSU 94-034, LSU 96-525, LSU 94-0.36), S. ictaluri (CNA2848) and S. dysgalactiae subsp. equisimilis (STC3). Antagonism of the select plant derived compounds were evaluated against bacterial pathogens by disk diffusion [50 mg/ml] as well as broth microdilution assays with [1.56 mg/ml] to assess antibiotic potential. Further, the inhibition of bacterial biofilms were evaluated using gentian violet; inhibition of proteolytic activity was assessed by a casein hydrolysis test, and hemolytic inhibition was evaluated with blood agar – Brain Heart Infusion plates. Disk diffusion assays revealed both carvacrol and thymol significantly inhibited the growth of all pathogens. These results were confirmed in broth microdilution assays, which allowed the identification of minimum inhibitory concentrations (MIC) and minimum bactericidal concentration (MBC) for all tested pathogens. For the biofilm inhibition test, fractions of the observed MICs significantly reduced the attachment of pathogenic bacteria to polystyrene plates. Proteolytic and hemolytic activity assessments are pending. These preliminary data show promise, suggesting the presence of these plant-derived nutraceuticals in culture media (even in concentrations lower than the observed MIC) can effectively alter the physiology of these various fish pathogens. These findings lay the foundation for future investigations into the potential of these plant derived compounds as antibiotic alternatives to mitigate bacterial disease. Such alternatives could play a crucial role in reducing selective pressures contributing to antibiotic resistance in aquaculture.

Presenter: Kerington Bass

Presentation Session: MP1

Level of Study: Master's

Department: Plant and Soil Sciences

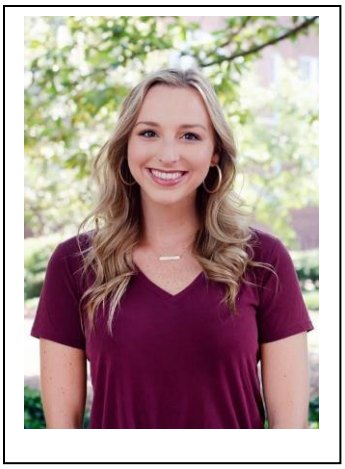
Category: Agriculture and Life Sciences

Advisor: Lorin Harvey, Professor, Plant and Soil Science, Ponotoc

Co-Advisor: Guihong Bi, Professor, Plant and Soil Science

Title: Evaluation of Plant Growth Regulators on Sweet Potato Slip Production

Abstract: The production cycle of sweet potato involves several phases presenting unique challenges, notably during the transplanted slip stage. Sweetpotato slips, used for asexual propagation, often exhibit non-uniform characteristics, leading to difficulties during transplanting. Additionally, the transition from greenhouse conditions to the field environment poses environmental risks and challenges, resulting in low transplant survival rates. High slip mortality rates present economic and logistical problems to producers. Several plant growth regulators (PGRs) have been documented to induce lignification or thickening of cell walls and can mitigate environmental stresses in other crops, but have not been studied its effects when it comes to their application in sweet potato slips. Therefore, the current study at Mississippi State University involves greenhouse trials with the primary goal of identifying the most effective PGR types and rates to enhance sweetpotato slip quality and improve transplant establishment rates. The study involves a randomized complete block design testing multiple PGR types and concentrations on sweet potato slips. Data on plant height, stem diameter, number of nodes, SPAD, leaf area, and water content were collected to determine the effects of PGRs on the plants. The experiment aims to contribute to our understanding of the effects of PGRs on sweet potato slip quality, enhance sweet potato production, and reduce losses associated with low slip survival rates.



Presenter: Andrea Berryhill

Presentation Session: MP2

Level of Study: Master's

Department: Teacher Education and Leadership

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Rebecca Robichaux-Davis, Teacher Education and Leadership

Co-Advisor: Sarah Salisbury, Teacher Education and Leadership

Title: Second Graders' use of Spatial Reasoning Skills to Solve Contextual Problems

Abstract: The Common Core State Standards for Mathematics (CCSSO, 2010) define standards that emphasize conceptual understanding of rigorous content and applying concepts to authentic situations through divergent thinking and complex reasoning skills. The Standards for Mathematical Practice (CCSSO, 2010) and Principles to Action (NCTM, 2014) underscore the need for students of mathematics to “think like mathematicians” when problem solving. Students are expected to persevere in solving challenging problems, realizing that multiple approaches might be necessary. To facilitate this kind of mathematical understanding, students should be given opportunities to problem solve in original ways. Through this study, an opportunity to do this was provided to thirty-six second graders. The purposes of this exploratory study were 1) to investigate second graders’ ability to use spatial reasoning to solve a progressively challenging sequence of problem solving tasks; 2) to determine the extent to which second graders can apply knowledge of circles; and 3) to determine second graders’ Van Hiele level of geometric thought. Participants in this study completed a series of tasks that involved knowledge of circles and cumulative distances. The tasks were presented in a context familiar to the participants to facilitate sense making. Materials for acting out the problem were available to the participants if they wanted to use such tools, but these materials were not forced upon the participants. The tools included rope, poles, string, and dowel rods. Colored pencils were also provided to the participants. There were no time limits placed on the participants to complete the tasks; they were allowed to collaborate with each other if they wanted, just as “real world” mathematicians would do. On average, the participants spent two hours completing the tasks. Participants recorded their responses and their visual representations of the tasks on a recording sheet. Data were extracted from the completed recording sheets and coded based on precision of the visual representation, accuracy of the computations and evidence of Van Hiele Level 0, 1 or 2 thinking. Results of the qualitative data analysis revealed that these second graders are primarily functioning at Van Hiele Levels 0, Visualization, and 1, Analysis. Their ability to effectively use spatial reasoning was dependent on the level of difficulty of the task. As the tasks increased in rigor, the participants relied less on spatial reasoning and more on concrete strategies, i.e. acting the problem out. The participants appeared to use some prior knowledge of circles and cumulative distances, but it was limited. Implications of these findings will be shared.

Presenter: Jigar Bhatt

Presentation Session: AO1

Level of Study:

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Chaomin Luo, Professor, Electrical and Computer Engineering

Title: Advanced Techniques for Fruit Detection and Ripeness Classification to Enhance Decision-driven Automated Harvesting

Abstract: Image detection and object classification models are crucial in various sectors, particularly in agriculture, where they facilitate the identification of ripe fruits and vegetables, thereby enhancing produce quality and streamlining harvesting processes. This research aims to evaluate the efficacy of pre-trained models in handling such tasks when applied to custom datasets. You Only Look Once (YOLO) is a family of object detection models, each of which use deep learning algorithms to pair bounding box prediction and classification into a single end-to-end neural network. In comparison to R-CNN or Fast R-CNN models, YOLO encodes contextual information about the inputs to increase generalizability, drastically improving the accuracy when testing novel unexpected inputs. Specifically, the YOLO v5, v7, and v8 architectures were assessed using open-source datasets encompassing different fruit ripeness classifications, focusing on blueberries, strawberries, and bananas. Each model underwent training on these datasets and subsequently underwent testing with new fruit images to evaluate classification accuracy and confidence levels. Performance metrics including Precision, Recall, F1 score, AP, mAP, and IoU area values were analyzed to assess the strengths and weaknesses of each model. Preliminary findings suggest that the anchor-free structure of YOLOv8 enhances generalizability, facilitating robust inference on diverse datasets with predefined ground truths. Conversely, while the anchor-based structures of YOLOv5 and v7 necessitate extended data collection, they demonstrate comparable accuracy and efficiency, particularly with uniformly scaled data. Future research directions involve expanding testing to curated datasets tailored to this study, providing deeper insights into model feasibility and accuracy. Additionally, exploration of custom-designed computer vision models tailored to project requirements through precise training will enhance research outcomes.

Presenter: Sushma Bhattarai

Presentation Session: MP3

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

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

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

Title: Ecological, social, and economic impacts of chronic wasting disease

Abstract: Hunting has become an important source of revenue for landowners and other stakeholders associated with the hunting business and has a substantial impact on local and state economies. However, chronic wasting disease (CWD), a fatal and incurable disease, affects wild and captive cervids in several countries including the United States, Canada, Finland, Norway, Sweden, and South Korea. Despite extensive research on CWD, the complete extent of its ecological, social, and economic impacts remains unclear. This study conducted a systematic review of the published peer-reviewed papers focused on CWD (N=134) to identify patterns in its impacts. Environmental factors, such as soil, water, and plants, were identified as the most common transmission sources, with a higher prevalence rate among adult male cervids. Hunters demonstrated a higher risk perception and were more likely to alter their hunting behavior in response to CWD detection. Ecological impacts included reduced survival rates, lower population growth, and decline in cervid populations. Although culling is an effective management strategy across countries, it was often met with public resistance. Despite the potential for significant negative economic impacts due to CWD, research on this subject has been limited. Future efforts to control and manage CWD will require continuous disease surveillance, further research, and engagement with all affected stakeholders. The results will help outline the priorities for future CWD research and identify the most effective CWD mitigation interventions, which will help researchers, practitioners, policymakers, and other relevant stakeholders develop more effective disease management strategies to limit its spread.

Presenter: Jessica Li Zhi Biao

Presentation Session: AO2

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Karim Simpore, Associate Professor, Classical and Modern Languages and Literatures

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

Title: Empowering Women: Navigating Social Constraints in Une Si Longue Lettre and Beyond

Abstract: This presentation examines the impact of education on women's lives from an autonomous perspective, as depicted in Une si Longue Lettre (A Very Long Letter). Through the lens of Ramatoulaye's narrative, I explore the correlation between societal constraints and individual empowerment. This presentation aims to explore the transformative power of literature, fostering the cultivation of ideas, history, science, and personal growth. Ramatoulaye's journey unfolds against the backdrop of her husband Modou's abandonment, thrusting her into the dual roles of provider and caregiver for their children. The absence of fatherhood significantly influences her daughter Daba's rebellious behavior, highlighting the profound influence of parental presence on one's developmental trajectory. The narrative also showcases women's resilience, exemplified by the strong friendship between Ramatoulaye and Aissatou, who divorces her husband upon his polygamous choices. Aisatou's pursuit of education and career advancement reflects her leadership skills at the Senegalese Embassy in New York, which shows the power of education in developing an independent personal development mindset. Furthermore, this presentation sheds light on the societal barriers faced by women, such as caste-based discrimination, which contribute to the dissolution of marriages. In this presentation, I speak about the role of education in empowering women to navigate societal constraints to shape their destinies. In addition, this presentation aims to establish a comparative approach between women's condition in Africa, Mauritius, and women in the United States, which pinpoints the common factor of universal challenges that women encounter daily around the world, which are but not limited to discrimination, systematic inequalities, racial and social disparities. Through this presentation, I highlight the imbrication of women's experiences across diverse cultural contexts worldwide.

Presenter: Madison Bibbs, B.A.

Presentation Session: MP4

Level of Study: PhD

Department: Psychology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Mitchell Berman, Professor and Department Head, Psychology

Co-Advisor: Dr. Cliff McKinney, Professor, Psychology

Title: Perceived Parental Psychopathology and Family Functioning in Emerging Adults

Abstract: Children who are raised by parents with psychological problems are at increased risk of developing their own psychological and behavior problems in the future (Leahy et al., 2015). As such, parental psychological problems are associated with reduced or poor psychological family functioning. Prior research has found that parental psychopathology can be linked to reduced family functioning related to its association with increased family conflict, less communication, and lower feelings of family connectedness in families with children (Wieg and Grefe et al., 2019). Understanding psychological family functioning can potentially increase the family's cohesion and adaptability, thus, improving psychological well-being. Although family functioning can affect individuals across the lifespan, few studies have observed the effects in emerging adults. Given this, the current study investigated how parental psychological problems were associated with family functioning. The study also examined whether the relations were moderated by the gender of the parents and participants. The sample consisted of 1116 emerging adults (45.7% women, 54.3% men; 2.1% Asian or Asian American, 16.8% Black, 2.5% Multi-racial, 76.8% White, and 1.8% otherwise specified) from a southern university. Participants completed an online survey where they reported on their parents current psychological problems using the Adult Behavior Checklist (ABCL; Achenbach & Rescorla, 2003) and their family functioning based on their current parental household using the Family Adaptability and Cohesion Evaluation Scale (FACES- IV; Olsen, 2011). Multivariate regression was conducted in Amos 29.0 where perceived maternal and paternal depressive, anxiety, and antisocial problems were used to predict family cohesion, flexibility, disengagement, enmeshment, rigidity, and chaos. Although perceived parental depression and anxiety associated with some family functioning characteristics (i.e., 5 of the 48 pathways were significant), perceived parental antisocial problems was a more consistent predictor of family functioning (i.e., 14 of the 24 pathways were significant). Specifically, perceived parental antisocial problems generally predicted lower cohesion and flexibility, higher disengagement and enmeshment and chaos. Some of these effects were stronger for mothers than fathers, and for women than men. Although research points to the effects of parental depression and anxiety, the current study suggests the stronger relation between parental antisocial problems and family functioning.

Presenter: Mohan K Bista

Presentation Session: MO9

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: Drought Resilience of Cotton Breeding Lines During Reproductive Stage

Abstract: Cotton (Gossypium spp.) is an industrial crop cultivated worldwide for textile fiber and high-quality oil and protein meal. Cotton is predominantly grown in upland conditions but faces significant production challenges. Suboptimal rainfall and prolonged droughts during sensitive growth stages threaten cotton production in all growing regions, including the US midsouth. Moreover, the scarcity of irrigation sources during the reproductive stage further exacerbates the drought stress. Therefore, developing drought-tolerant cultivars has become a priority. Understanding the reproductive stage response of breeding lines to drought stress is essential. Twelve cotton breeding lines were exposed to 100% (control) and 50% irrigation (drought) during the flowering and boll development stages to explore the phenotypic plasticity of physiological, tissue temperature, and yield-related parameters. The results revealed that drought-stressed plants had lower stomatal conductance by 83%, transpiration by 73%, and the quantum efficiency of photosystem II (PhiPS2) by 12% compared to the control. Further, cotton boll temperature exhibited no significant increase under drought; however, both canopy (2.6°C) and leaf temperature (1.7°C) demonstrated a marked elevation ($p < 0.01$) in drought-stressed plants compared to control. This observation suggests a potential difference in transpiration between the vegetative and reproductive parts of cotton under drought stress conditions. The compromised physiological traits significantly reduced boll number (57%) and cotton seed yield (59%). These findings indicate that the variability observed in cotton breeding lines under drought stress can be utilized in drought-tolerant breeding programs and genomic studies.

Presenter: Mohan K Bista

Presentation Session: MP1

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 Heat Stress on Cotton Physiology and Yield

Abstract: Although cotton is well adapted to tropical and subtropical regions, it is vulnerable to heat stress during its flowering and boll development stages. Rising temperatures due to climate change significantly threaten cotton production in major cotton-growing regions. On the other hand, modern cotton cultivars are more sensitive to heat stress, resulting in variable yields from year to year when exposed to temperatures above the optimum. Thus, identifying and selecting stress-tolerant lines or traits that boost tolerance to stress is a crucial first step for breeding. To examine the impact of heat stress on cotton, a study was conducted on 12 breeding lines exposed to heat stress (38°C/24°C, day/night temperature) during flowering and boll development. The genetic variability in physiological, canopy temperature, and yield-related parameters were explored. The results revealed that heat stress led to a significant reduction in stomatal conductance (83%), transpiration (49%), and quantum efficiency of photosystem II (37%) across cotton lines, compared to the control (32°C/24°C, day/night). Furthermore, heat-stressed plants had a higher (90C) leaf temperature than the control plants. Cotton seed yield declined significantly (5% to 34%) due to heat stress, while the decline on boll number was less (1% to 20%). Some lines (Coker-315, Deltapine, and M-240) showed minimal cotton seed yield decline (<10%) and better physiology under heat stress. The study also explored the variability of fiber quality traits among breeding lines and their interaction with heat stress. These findings highlight the need for developing heat-tolerant cotton cultivars to ensure stable yields in the face of climate change.

Presenter: Quentin Boccaleri

Presentation Session: MP3

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Krishna Poudel, Assistant Professor, Department of Forestry

Title: Optimized Site Selection for Short Rotation Woody Crop Systems in the Lower Mississippi Alluvial Valley

Abstract: The advent of the carbon market along with demands for bioenergy has created expanding opportunities for Short Rotation Woody Crop (SRWC) systems. In the Lower Mississippi Alluvial Valley (LMAV), opportunities for landowners manifest as afforestation projects for Populus deltoides and Salix nigra on marginal agricultural sites. These pioneer species thrive on alluvial sites and have strong genetic improvement. This makes them the best candidates for SRWC plantations in the region. This project seeks to develop a spatial process-based 3PG (Physiological Processes Predicting Growth) model for both species and conduct simulations across the LMAV based on a variety of silvicultural and site inputs. Biomass yield from this model will be used to develop an economic analysis to determine the viability of the site for afforestation in the context of pervious agricultural yield. This poster will showcase the justification, methods and expected results of this project.

Presenter: Ethan Brister

Presentation Session: MO2

Level of Study: Master's

Department: Biological Sciences

Category: Agriculture and Life Sciences

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

Title: Advancing Soybean Seed Protein: Insights from QQS Gene Exploration

Abstract: Enhancing soybean seed protein holds profound significance, augmenting the nutritional quality of soybeans and addressing global concerns about food security and sustainable agriculture for both human and livestock consumption. Additionally, increased soybean seed protein is pivotal for diverse industrial applications, spanning high-protein animal feed to the production of plant-based protein products. The Arabidopsis orphan gene Qua-Quine Starch (QQS) has emerged as a key player in elevating protein levels in leaves and seeds across various plant species. Through a comparative analysis of RNA transcript levels in wild-type and QQS-expressing (QQS-E) soybean leaves, we successfully identified potential candidate genes associated with high-protein content. These genes exhibited higher transcript levels in QQS-E lines compared to the wild type, establishing a clear positive correlation with high protein content. To deepen our understanding of the interplay between these soybean genes and protein content, we conducted experiments involving the over-expression of these genes in wild-type Arabidopsis plants. Quantification of transcript levels and thorough analysis of leaf and seed composition in promising lines unveiled the potential of these candidate soybean genes enhance leaf protein content in Arabidopsis. Armed with these compelling findings, we aim to illustrate the practical applications of these discoveries and their potential impact on augmenting soybean seed composition, thereby contributing to advancements in both agricultural and industrial sectors.

Presenter: Marcus Brumfield

Presentation Session: MO8

Level of Study: PhD

Department: Engineering Education

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Jean Mohammadi-Aragh, Ph.D., Associate Professor, Department of Electrical and Computer Engineering

Co-Advisor: Dr. Lesley Strawderman, Ph.D., Associate Professor, Department of Industrial and Systems Engineering

Title: The impact of a summer bridge program at a public land-grant university in the southeastern region on the retention of first-time Black students

Abstract: According to a study by Fry, Kennedy, and Funk (2021), underrepresentation is prevalent in the science, technology, engineering, and math (STEM) workforce. The researchers revealed that only about 17% of STEM-related employees are Black or Hispanic. Over the past few decades, there has been a push to retain and increase URM student participation in STEM fields. To address this need, there are STEM Summer Bridge programs that specifically target underrepresented minority (URM) students to assist with the transition from high school to college.

Summer bridge programs were established as a response to the effort to help with the transition from high school to college for first-time students. There are a number of these programs that specifically target URM students with the goal of increasing the diversity within professions that are related to the STEM areas of study. One of the challenges of establishing these programs involves identifying factors such as academic goals, psychological goals, and departmental goals that help first-time URM students succeed in STEM undergraduate programs.

The goal of this research is to examine the impact that an engineering-focused summer bridge program has on the retention and STEM career obtainment for URM students at a PWI in the southeastern region of the United States. We will use an engineering-focused summer bridge program to identify which program goals lead to the retention and degree obtainment for URM students.

Additional information: The research is from a manuscript dissertation consisting of three studies. The focus will be the overall findings.

Presenter: Chuck Burdine

Presentation Session: AO6

Level of Study: Master's

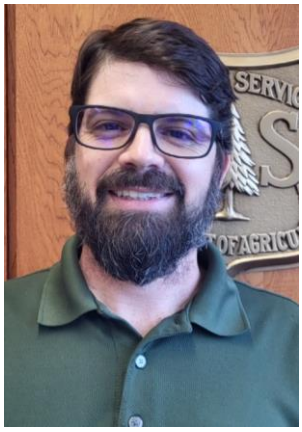
Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Esteban Gomez

Co-Advisor: Dr. Joshua Granger

Title: Conserving American Chestnut Genotypes for Future Breeding with Pathogen-Resistant Seedlings



Abstract: The loss of the American chestnut (Castanea dentata) to chestnut blight (caused by Cryphonectria parasitica) is often considered North America's greatest most significant ecological disaster. The destruction of the chestnut severely impacted the Appalachian forests along with local and regional economies. Thanks to the tree breeding efforts underway by various entities, blight-resistant seedlings are expected to be available in the next few years. However, before reintroduction to the forest, it is vital to produce resistant seedlings adapted to the local environment. Due to the coppice regenerating nature of stumps in the wild, an opportunity to preserve local genotypes by establishing germplasm conservation orchards is possible. In the last couple of years, the Southern Research Station (SRS) has made substantial progress in developing a modified nut-grafting technique that is resulting in the conservation of rare American chestnut genotypes located in natural forests and plantings in Mississippi, Alabama, Kentucky, and Georgia. In total, we clonally propagated scions from 76 genotypes. Overall, for the 2022/2023 grafting season, 67.4% of the grafts survived, with modest differences observed among scion origins, ranging from 76.7% for north Georgia to 61.1% for northeast Mississippi. We will provide an update on the pots, media, and environmental settings that allowed optimal growth and development. In addition, rootstock species (i.e., Chinese versus American chestnut) also resulted in variation in overall graft success (78% in Chinese compared to 42% for American chestnut). Key factors affecting grafting success include the timing of scion collection, scion preparation, rootstock preparation, cutting blade type, and acclimation of grafted plants from one stage to the next. Of further importance, it is expected that American chestnut genotypes that evolved in the most southwestern area of the species' range (i.e., northeast Mississippi) will prove to be valuable sources of germplasm for breeding trees that are adapted to warmer environments.

Presenter: Cassia Caballero

Presentation Session: AP1

Level of Study: PhD

Department: Agricultural & Biological Engineering

Category: Engineering

Advisor: Dr. Vitor Souza Martins, Professor, Department of Agricultural & Biological Engineering

Title: Turbidity Mapping with Sentinel-3 OLCI in the Mississippi Sound

Abstract: The Mississippi Sound (MS) is a region located along the coasts of Mississippi and Alabama in the northern Gulf of Mexico. It is a crucial area for commercial and ecological activities, particularly shellfish harvesting. In recent years, water quality in the region has been a significant concern due to oil spills, sediment influx, and human activities such as openings of the Bonnet Carré spillway. Turbidity is a critical factor in water quality monitoring and measures water clarity by determining how much light is scattered by material in a body of water, and high levels of turbidity can reduce the availability of light required for aquatic life. This study implemented the turbidity mapping using Sentinel-3 OLCI image along Mississippi Sound. Global Reflectance Community Dataset for Imaging and Optical Sensing of Aquatic Environments (GLORIA) dataset was used to create a general turbidity model from 247 global locations. Multiple estimation models were tested, and we found that the Nonpower linear model had the lowest mean absolute error (MAE) (3.93 NTU) using the red edge (0.7091 μm).. We applied the model on a Sentinel-3B OLCI image over MS sound in September 2023. Compared to in situ data measured at 20 points along the coast, the accuracy assessment of the estimated turbidity achieved a MAE of 2.43 NTU. The results show that a general model for turbidity did not perform well in the studied region, especially because the turbidity values were relatively low, and indicates the need for the collection of additional ground truth data to develop regional-based models for water quality monitoring.

Additional information: Project's funding number: MBRACE # 8007148-04.01 MSU

Presenter: Miguel A. Cabrera M.S.

Presentation Session: MP4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Vicky Montiel-Palma, Chemistry Department, MSU.

Title: Silylphosphine and silanephosphine nickel complexes as catalyst in the hydrofunctionalization of unsaturated bonds

Abstract: Silylphosphines such as PSiR2H (R= methyl or isopropyl) are a kind of bidentate ligands with strong sigma donor character, ideal for synthesizing nickel complexes via oxidative addition of the Si-H moiety by the metal center. In some cases, a non-classical sigma bond is observed depending on the substituents on the silicon. Moreover, nickel is a low-cost transition metal, abundant and easy to handle. Therefore, a nickel silylphosphine and silanephosphine family of complexes have been synthesized, characterized by 1H NMR and 31P{1H}- NMR, and used as a catalyst in the hydrofunctionalization of alkenes and aldehydes. Hydroboration of aldehydes and ketones has been demonstrated as an excellent synthetic path to functionalize organic molecules to be used as starting materials in further reactions such as C-C coupling or to access primary or secondary alcohols after the hydrolysis of the boronated ester. Similarly, organosilicon compounds are great starting materials for further applications such as pharmaceuticals or feedstock for industrial applications.

Presenter: Michael Carroll

Presentation Session: MP1

Level of Study: Master's

Department: Poultry Science

Category: Agriculture and Life Sciences

Advisor: Dr. Timothy Boltz, Assistant Professor, Poultry Science

Title: Modeling of thermal inactivation of avian pathogenic Escherichia coli, E. coli O157:H7 and non-pathogenic E. coli in poultry feeds using a lab-based circulating water bath

Abstract: Feed hygienics are of increasing concern for poultry producers in the effort to produce safe feed for poultry and ultimately safer products for the consumer. One disease of concern for broilers is colibacillosis which is caused by Avian Pathogenic E. coli (APEC). This disease is a persistent issue for poultry producers often resulting in decreased performance, production, and animal welfare. While a common vector for Escherichia coli (E. coli) transmission to poultry can be feed, proper feed manufacturing can help mitigate the prevalence of pathogens with thermal treatment during conditioning. This study aimed to model the thermal inactivation of non-pathogenic E. coli and APEC during thermal processing in a lab-based circulating water bath and to determine the suitability of this non-pathogenic E. coli as a surrogate for future research. Two-gram samples were inoculated with one of the two E. coli strains and submerged in a circulated water bath set at 75, 80, 85, 90, and 95˚C, for 0 to 180 s. Feed samples were then spread plated onto Tryptic Soy Agar (TSA) with 200 ppm Nalidixic acid (NaL) and incubated at 37oC for 24 h. United States Department of Agriculture (USDA) IPMP-Global fit software was used to calculate D-values from Weibull models and z-values from Linear models for feed heated at the five temperatures. Weibull model D-values were 19.8, 12.8, 10.4, 8.6, and 8.06s for the APEC and 8.0, 8.55, 5.3, 5.96, and 4.77s for the non-pathogenic E. coli when heated at 75, 80, 85, 90, and 95°C, respectively. The z-values from linear models were 51.6 and 56.8oC for APEC and non-pathogenic E. coli, respectively. These data indicate that the non-pathogenic E. coli may not be an ideal candidate to be used as an E. coli surrogate due to its lower thermal resistance than APEC. Results from this study demonstrate that Weibull and linear models are appropriate for predicting thermal inactivation of E. coli in poultry feed. Future work from this study is to find a suitable non-pathogenic E. coli surrogate for feed hygiene research.

Presenter: Raveendra Chandavarapu

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

Co-Advisor: Dr. K. Raja Reddy, Research Professor, Plant and Soil Sciences

Title: Does the root-to-shoot ratio plasticity during the seedling stage contribute to chilling tolerance in rice?

Abstract: Rice is a staple food crop for over half of the world's population, providing around 23% of the world's food. Early-stage chilling stress is one of the challenges limiting seedling emergence and crop establishment. Poor germination, improper seedling emergence, withering or yellowing of leaves, and poor biomass production can lead to yield loss under chilling stress. Therefore, we hypothesized that rice genotypes that emerge uniformly and maintain vigorous shoot-root growth would enhance early-stage chilling tolerance. This research explored genetic variability in cold tolerance among 236 diverse rice germplasm and identified chilling-tolerant genotypes with superior seedling vigor. In this study, rice genotypes were exposed to two growing temperatures representing early (22/14 °C, day/night temperatures, chilling) and regular planting (30/22 °C, day/night temperatures; control) plant conditions for 14 days after the two-leaf stages. At 28 days after sowing, chilling stress induced a significant reduction in the number of leaves (54.5%), shoot length (56.6%), root length (6.9%), shoot biomass (133.5%), root biomass (109.5%) compared to control. In contrast, chilling stress induced a 14.57% increase in the root-shoot ratio. Reduction in vigor index (33.5%) was significantly correlated with root length ($r=0.90$, $p<0.001$) and shoot length ($r=0.73$, $p<0.001$) under chilling. Selecting genotypes with superior root systems could be useful to breed cultivars with chilling stress tolerance. Moreover, mapping potential genetic loci linked with these traits would help resilience to the chilling stress tolerance in rice.

Keywords: Rice; Chilling stress; Root length; Shoot biomass; Root biomass; Vigor index

Presenter: Raveendra Chandavarapu

Presentation Session: MP1

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

Co-Advisor: Dr. K. Raja Reddy, Research Professor, Plant and Soil Sciences

Title: Does the root-to-shoot ratio plasticity during the seedling stage contribute to chilling tolerance in rice?

Abstract: Rice is a staple food crop for over half of the world's population, providing around 23% of the world's food. Early-stage chilling stress is one of the challenges limiting seedling emergence and crop establishment. Poor germination, improper seedling emergence, withering or yellowing of leaves, and poor biomass production can lead to yield loss under chilling stress. Therefore, we hypothesized that rice genotypes that emerge uniformly and maintain vigorous shoot-root growth would enhance early-stage chilling tolerance. This research explored genetic variability in cold tolerance among 236 diverse rice germplasm and identified chilling-tolerant genotypes with superior seedling vigor. In this study, rice genotypes were exposed to two growing temperatures representing early (22/14 °C, day/night temperatures, chilling) and regular planting (30/22 °C, day/night temperatures; control) plant conditions for 14 days after the two-leaf stages. At 28 days after sowing, chilling stress induced a significant reduction in the number of leaves (54.5%), shoot length (56.6%), root length (6.9%), shoot biomass (133.5%), root biomass (109.5%) compared to control. In contrast, chilling stress induced a 14.57% increase in the root-shoot ratio. Reduction in vigor index (33.5%) was significantly correlated with root length ($r=0.90$, $p<0.001$) and shoot length ($r=0.73$, $p<0.001$) under chilling. Selecting genotypes with superior root systems could be useful to breed cultivars with chilling stress tolerance. Moreover, mapping potential genetic loci linked with these traits would help resilience to the chilling stress tolerance in rice.

Keywords: Rice; Chilling stress; Root length; Shoot biomass; Root biomass; Vigor index

Presenter: Lendon Chandler

Presentation Session: MP2

Level of Study: Master's

Department: Teacher Education and Leadership

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Rebecca Robichaux-Davis, Teacher Education and Leadership

Co-Advisor: Sarah Salisbury, Teacher Education and Leadership

Title: Second Graders' use of Spatial Reasoning Skills to Solve Contextual Problems

Abstract: The Common Core State Standards for Mathematics (CCSSO, 2010) define standards that emphasize conceptual understanding of rigorous content and applying concepts to authentic situations through divergent thinking and complex reasoning skills. The Standards for Mathematical Practice (CCSSO, 2010) and Principles to Action (NCTM, 2014) underscore the need for students of mathematics to “think like mathematicians” when problem solving. Students are expected to persevere in solving challenging problems, realizing that multiple approaches might be necessary. To facilitate this kind of mathematical understanding, students should be given opportunities to problem solve in original ways. Through this study, an opportunity to do this was provided to thirty-six second graders. The purposes of this exploratory study were 1) to investigate second graders’ ability to use spatial reasoning to solve a progressively challenging sequence of problem solving tasks; 2) to determine the extent to which second graders can apply knowledge of circles; and 3) to determine second graders’ Van Hiele level of geometric thought. Participants in this study completed a series of tasks that involved knowledge of circles and cumulative distances. The tasks were presented in a context familiar to the participants to facilitate sense making. Materials for acting out the problem were available to the participants if they wanted to use such tools, but these materials were not forced upon the participants. The tools included rope, poles, string, and dowel rods. Colored pencils were also provided to the participants. There were no time limits placed on the participants to complete the tasks; they were allowed to collaborate with each other if they wanted, just as “real world” mathematicians would do. On average, the participants spent two hours completing the tasks. Participants recorded their responses and their visual representations of the tasks on a recording sheet. Data were extracted from the completed recording sheets and coded based on precision of the visual representation, accuracy of the computations and evidence of Van Hiele Level 0, 1 or 2 thinking. Results of the qualitative data analysis revealed that these second graders are primarily functioning at Van Hiele Levels 0, Visualization, and 1, Analysis. Their ability to effectively use spatial reasoning was dependent on the level of difficulty of the task. As the tasks increased in rigor, the participants relied less on spatial reasoning and more on concrete strategies, i.e. acting the problem out. The participants appeared to use some prior knowledge of circles and cumulative distances, but it was limited. Implications of these findings will be shared.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Presentation Session: MO9

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shankar Ganapthi Shanmugam, Assistant research professor, Plant and Soil Sciences

Co-Advisor: Dr. William Kingery, Professor, Plant and Soil Sciences

Title: Characterizing the Impact of Cover Crop on Soil Microbiome Function Affecting C and N Inputs in Corn Production Systems

Abstract: Soil microbial communities are pivotal players in nutrient cycling processes that substantially impact crop yield and soil vitality in agricultural systems. Despite the growing recognition of cover crops as a promising avenue for enhancing soil health and shaping microbial composition, a comprehensive understanding of their synergistic effects on ecosystem services remains notably deficient. Addressing this significant knowledge gap, our three-year study employs a strip plot design across two distinct locations—Starkville and Newton—to rigorously assess the effects of various cover crops (ryegrass, balansa clover, red clover, radish, and cover-crop mixes) and nitrogen levels (0 lb. and 100 lb.) on soil microbial communities and carbon/nitrogen cycling within corn production systems. Preliminary findings show significant disparities in microbial community structures across locations. While Shannon diversity indices revealed no significant differentiation among cover crop treatments in Newton, significant differences were observed among cover crops in Starkville. Intriguingly, plots receiving 100 lbs. of N showed elevated Shannon diversity compared to 0 lbs. N plots. Moreover, enzymatic assays and active carbon analyses results show that soils from plots with ryegrass and CC-mix2 had higher activity relative to other treatments. Nitrogen cycling genes, specifically amoA and nifH, also exhibited significant differences across cover crop treatments. Overall, our initial results indicate that ryegrass and CC-mix2 markedly enhance bacterial richness, Shannon diversity, POXC, soil enzymatic activity, and the abundance of microbial taxa integral to nitrogen cycling processes.

Presenter: Durga Purushotham Mahesh Chinthalapudi

Presentation Session: AP2

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Co-Advisor: Dr. William Kingery, Professor, Plant and Soil Sciences

Title: Fungal Communities Shifts in Corn Production Systems with Varied Cover Crop and Nitrogen Fertilizer Treatments

Abstract: Cover cropping (CC) is proposed to augment soil microbial diversity and activity, which are critical components of soil health. This is due to the pivotal role of soil microbial communities in driving essential biogeochemical processes. Moreover, the diversity within these communities are sensitive to agricultural management practices, potentially resulting variations in ecosystem functionality. Especially, different CC species on fungal groups varies, underlining the intricate relationship between CC and soil microbial ecology. We compared fungal community compositions of bulk soils differing by cover crop and N fertilizer treatments. Our three-year study employs a strip plot design across two distinct locations—Starkville and Newton—to rigorously assess the effects of various cover crops (ryegrass, balansa clover, red clover, radish, and cover-crop mixes) and nitrogen levels (0 lb. and 100 lb.). In our study, we employed Illumina amplicon sequencing to assess the impact of cover crop (CC) and nitrogen (N) fertilizer treatments on fungal assemblages. Alpha diversity results revealed that neither CC's nor N fertilizer treatments significantly influenced the diversity within fungal communities. However, in terms of beta diversity, we observed notable distinctions, with significant clustering evident across different locations and in response to various cover crop treatments. Predominant fungal phyla identified in both locations included Ascomycota (~90%), Basidiomycota, Rozellomycota, Chytridiomycota, and Mortierellomycota, each constituting around 1%. Notably, these phyla exhibited significant across cover crop plots. Overall, our preliminary findings indicate that while fungal alpha diversity remained unaffected, beta diversity and the abundance of major fungal phyla were significantly influenced by both cover crop and N fertilizer treatments.

Presenter: Crystal Lodi Conde

Presentation Session: MO3

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Fernando Yugo Yamamoto

Co-Advisor: Dr. Peter Allen

Title: Evaluating the Effect of the Dietary Supplementation of Soy Lecithin in the Production Performance and Physiological Responses of Channel Catfish (Ictalurus punctatus)

Abstract: Soy lecithin (SOL) is a co-product extracted from soy and used in aquafeeds for their high content of phospholipids. The supplementation in aquafeed for farmed fish, using SOL as a feed additive improve the physiological and metabolic response. The addition of phospholipid in the diet decreases the stress response, increases the growth performance and survival of different aquatic species. The objective of this present study is evaluating the ideal dose of SOL (0, 0.5, 1.0, 1.5, and 2%) in catfish diets with components from plant-based feed. For 10 weeks, the fish were fed experimental diets. In a recirculating system, 750 channel catfish juveniles (with an initial weight of 4.4 ± 0.1 g) were equally divided among 25 (110-L) aquaria. After the end of the feeding trial, fish from each tank were group weighed to measure the production performance, and three fish were randomly assigned to collect blood samples hematological assays, and condition indices. The remaining fish were fed for four additional days, and they were exposed to an air stress challenge. All fish were netted out from each tank, where they were air exposed for two minutes. Blood samples were taken shortly after, at 0, 0.5, 1, 2, and 6 hours following the test, from 4 fish per treatment per time-point. Evaluations are being done on hematological parameters as well as the stress markers (plasma cortisol, blood glucose, plasma osmolality, and lactate).

Presenter: Patricia Marie Cordero-Irizarry

Presentation Session: MO8

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Donna Peterson, School of Human Sciences

Title: Byte-sized Learning: Agricultural Students in the Online Mix

Abstract: This study explores students' perceptions of their online learning readiness, with a focus on interactions with in-person and online course formats, gender, and student classification level. Utilizing the Online Learning Readiness Scale (OLRS), which consists of computer/internet self-efficacy, self-directed learning, learner control, motivation for learning, and online communication self-efficacy, the research aims to understand students' perceived preparedness for the evolving online learning environment. The study was conducted with 79 undergraduate students in an agricultural education, leadership, and communication course offered in both online and in-person formats, from Fall 2023 to Spring 2024. Self-directed learning emerged as a perceived strength, while learner control was identified as a potential area for improvement. Gender differences were observed, with females scoring higher in self-directed learning, motivation for learning, and online communication self-efficacy. Additionally, the interaction between student classification level and course format significantly impacted scores for self-directed learning and learner control. These findings suggest the importance of tailoring online courses to address learner control issues, recognizing gender-specific needs, and adapting courses based on student level and delivery format. These considerations will help educators foster a more inclusive, effective, and supportive online learning experience for all students.

Presenter: Marley Cruise

Presentation Session: AO6

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sydney Pullen, Assistant Professor, Department of Anthropology and Middle Eastern Cultures

Title: E-girls are Ruining this Paper

Abstract: The E-girl fashion aesthetic went viral on social media platforms in early 2019 and peaked by December 2020. The look was developed by teens during COVID-19 lockdowns; they drew primarily on anime aesthetic, while also drawing on the clothing associated with goth, BDSM, and skater subcultures. In this paper, I identify the E-girl as a continuation of the history of western commodification of Asian labor and material culture. This paper draws on data from the E-girls fandom wiki, TikTok videos, and media relevant to the E-girl trend, such as anime and social media presence of artists who have adopted or engaged with the E-girl aesthetic. I argue that an analysis of the E-girl aesthetic sheds light on the reproduction of orientalism through the commodification and fetishization of Asian consumer goods and Asian women. In this paper I first discuss the emergence of and influences on the E-girl. I then summarize the relevant literature on orientalism that I'm drawing on, before applying that theoretical framework to my data sources. Situating the E-girl aesthetic in terms of orientalism demonstrates the theoretical relevance of similar social media trends for scholars of global capitalism.

Presenter: Ally Cummings

Presentation Session: MO1

Level of Study: Master's

Department: Mechanical Engineering

Category: Engineering

Advisor: Dr. Matthew W. Priddy, Associate Professor, Mechanical Engineering

Title: Finite element modeling for thermomechanical prediction of wire-arc directed energy deposition with ER120S-G

Abstract: Wire-arc directed energy deposition (arc-DED) is a metal-based additive manufacturing method that utilizes a wire feedstock and an electric arc to build parts in a layer-wise welding process. Arc-DED demonstrates high deposition rates, reduced material waste, and the ability to produce large-scale components, making it of interest to the field of metal manufacturing. Finite element (FE) simulations can predict the thermal and mechanical response of parts undergoing arc-DED. These simulations enable the exploration of print parameter effects on residual stress concentration and distortion, which are prominent issues with arc-DED. In this work, three geometries – thin wall, S wall, and cylinder – are printed via arc-DED with ER120S-G steel. All parameters are held constant except toolpath. The experimental data collected is used to simultaneously calibrate the thermal FE model for all three geometries. Model calibration has historically been performed using a single geometry. The calibrated thermal models are subsequently used to explore the effect of varying heat input on maximum temperatures and residual stress concentrations. Von Mises stress predictions are generated using a Johnson-Cook plasticity model for ER120S-G. Future work includes predictive modeling for three additional geometries for the purpose of model validation. The overarching goal of this work is to identify relationships between various deposition factors and the overall success of the printed part so that arc-DED may be optimized for widespread use.

Presenter: Tobin J. Davidson

Presentation Session: AP2

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

Title: Mitogenome Surveillance of Invasive Fishes in the Southeastern 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. This study includes development of noninvasive environmental DNA (eDNA) protocols designed for early detection of invasive freshwater fishes in the southeastern United States. The mitochondrial genome is targeted by traditional eDNA assays, but public DNA sequence repositories are inadequate resources for species-specific eDNA primer development. In this study, we describe a novel single PCR assay that successfully amplifies the nearly complete mitochondrial genome of a broad diversity of actinopterygian fishes, including those identified with high invasive potential by the Department of Interior Horizon Scan project. We present a pipeline for rapid noninvasive detection of species with high potential for invasion of North America's freshwater biodiversity hotspot. Results of controlled trial experiments provide proof of concept for effective deployment of this pipeline in real-world situations where traditional sampling methods are inadequate for development of "rapid, cost-effective, noninvasive tools to monitor the geographic range of invasive species" (Presidential order 13751). Thus, the deliverables of this study represent a rapid and cost-effective alternative to traditional sampling methods, and a cost-effective contribution to preserving the world's most biodiverse temperate freshwater ecosystem.

Presenter: Arpita Deb

Presentation Session: MP2

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

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

Title: Optimization of immune complex formation to trigger Fcγ receptor signaling for in vitro immunotoxicity assays

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 will inhibit antibody-dependent immune responses in cells expressing Fcγ receptors (FcγRs). Thus, this study aimed to optimize immune cell stimulation through FcγRs. Our preliminary results showed a variable and modest amount of cytokine production from SPLC stimulated with total IgG, Fc portion of IgG, or anti-CD16, which is an antibody directed against one of the FcγRs. Pre-coating the plates with antibodies did not stimulate a significant immune response. We noted that immune complexes rather than just immobilized IgG1 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. Cells were incubated with immune complexes, and extracellular markers were analyzed by flow cytometry. 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 TNP BSA-TNP IgG1 modestly increased IL-6 but streptavidin-biotinylated IgG1 increased the production of IL-6, TNF-α, and C3a. Together our results provide evidence that the streptavidin-biotinylated IgG1 immune complex formation effectively triggered FcγR signaling to activate innate cells. This stimulation can be used to investigate the mechanisms by which AHR ligands and other potential immunotoxicants suppress antibody-dependent immune responses.

Presenter: Prattay Dey

Presentation Session: MO2

Level of Study: PhD

Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

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

Title: Exploring ANXA2 as a critical host receptor in advancing protein-based vaccine development against Streptococcus pneumoniae

Abstract: Abstract: Streptococcus pneumoniae (pneumococcus), is a gram-positive colonizer of the human nasopharynx, capable of causing minor infections and life-threatening diseases. Polysaccharide-based vaccines protect against specific invasive serotypes but do not address colonization rates, which have remained stable despite vaccination. Additionally, serotype replacement is increasing. Our research focuses on Pneumococcal Surface Adhesin A (PsaA) and its interaction with Annexin A2 (ANXA2), a human receptor. We hypothesize that epitope mapping of PsaA and using far western blot to identify other host cell receptors could revolutionize protein-based vaccine development, aiming to prevent colonization by a broad range of serotypes.

We designed a staphylococcal expression vector to express recombinant PsaA, which was purified by affinity chromatography, followed by biotinylation. Biotinylated PsaA served as the "bait" protein in a far-western blot experiment to identify specific host cell ligand proteins that interact with PsaA, thus identifying ANXA2. Subsequently, 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 and expressed each using the pET100 vector, followed by nickel-affinity purification, for epitope mapping studies. Furthermore, we conducted far western blot experiments using whole-cell lysates from JS1 strain 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. Also, far western blot analysis of JS1 whole cell lysates revealed multiple bands, indicating additional pneumococcal proteins interact with ANXA2. ANXA2 appears to serve as a receptor for various pneumococcal proteins expanding its potential role in host-pathogen interactions.

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: Vandana Dharan

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

Co-Advisor: Dr. Larry Hanson, Professor, Comparative Biomedical Sciences

Title: Investigation into the portals of entry and disease progression of Ictalurid herpesvirus 1 in channel catfish, Ictalurus punctatus, blue catfish, I. furcatus, and their hybrid cross using in situ hybridization.

Abstract: Detection of nucleic acids from infectious agents within lesions is important for establishing an agent's role in disease progression. In situ hybridization (ISH) is a molecular technique used to localize specific nucleic acid sequences in tissue preparations. Ictalurid herpesvirus 1 (IcHV 1) aka channel catfish virus (CCV) is a significant pathogen infecting fry and fingerling stages of channel catfish that poses a serious threat to commercial hatchery operations. A comprehensive, longitudinal study on the portals of entry and disease progression of CCV is needed to elucidate the viral pathogenesis in detail for the development of treatment and management strategies. Channel catfish, blue catfish, and hybrid catfish (channel × blue) fingerlings were exposed to CCV at a dose of 2x105 TCID50/L via immersion. Fish were sampled at days 1, 2, 3, 5, 7, 14, 21, and 28 post-infection. Samples were formalin-fixed, decalcified, trimmed, paraffin-embedded, and sectioned at 5 µm onto charged slides. An RNAScope chromogen assay was carried out on the slides using specific probes designed to target the Auburn 1 strain of IcHV 1 according to the manufacturer's protocol. CCV positive signals were detected in greatest intensity in the stromal cells of the kidney, renal lesions, heart, skin, and endothelial cells lining the blood vessels from day 1-7 in channel catfish. A weak signal was detected from 14-day post-infection that led to little or no signal towards 21-28 days in channel catfish. Hybrid and blue catfish had no detectable signal in any tissue at any time point. The wide tissue distribution of the virus prior to lesion formation indicates rapid systemic dissemination of CCV shortly after infection. Heart tissue holds promise for viral isolation and diagnostic confirmation in addition to the kidneys. The lack of CCV positive signal in channel catfish at later stages suggests either the lack of sensitivity of the assay to detect latent virus under the experimental conditions or clearance of the pathogen by the host. The lack of signal in hybrid and blue catfish suggests these species are refractory to infection with CCV at the tested dosage and unlikely to serve as reservoirs in commercial facilities.

Presenter: Vandana Dharan

Presentation Session: AP2

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

Co-Advisor: Dr. Larry Hanson, Professor, Wildlife, Fisheries, and Aquaculture

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Presenter: Notsile Dlamini

Presentation Session: AP2

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr Jean M.N. Feugang, Associate Research Professor, Animal and Dairy Sciences

Title: Extracellular vesicle miRNAs in porcine seminal plasma influence semen quality

Abstract: The use of artificial insemination (AI) with liquid semen has increased considerably in the swine industry in recent years. Semen comprises of seminal plasma which serves as a conducive environment for sperm maturation, viability, and fertilization. Notably, seminal plasma contains extracellular vesicles (EVs) and microRNAs, whose role in semen quality requires further elucidation. This study aimed to investigate the microRNA content of seminal plasma-derived EVs (SP-EVs) isolated from accepted (passed) or rejected (failed) boar semen. Over an eight-week period, raw semen was collected (n=83) from sexually mature Duroc boars at a commercial boar stud (Prestage Farms, MS). Raw semen samples were subjected to sperm motility and morphology analyses and classified as Passed or Failed quality based on predefined assessment criteria (≥70% and <70%, respectively). Semen samples were subjected to serial centrifugation to obtain seminal plasma (SP). SP-EVs isolated from SP were characterized using transmission electron microscopy (TEM) and nanoparticle tracking analysis (NTA), with their miRNA cargo identified through the Illumina NextSeq sequencing platform. Significant differences were set for $P<0.05$. Both TEM and NTA revealed the presence of cup-shaped SP-EVs within the size range of 50-300nm. A total of 437 and 443 miRNAs were expressed in the Failed and Passed SP-EV groups, respectively. Differential expression analysis revealed 28 downregulated and 2 upregulated miRNAs in the Passed SP-EV group compared to the Failed group. Validated miRNAs targeted pathways such as N-glycan biosynthesis, p53 signaling, and apoptosis. These findings suggest that SP-EVs contain distinct miRNA cargos that might be associated with boar semen quality. Consequently, these SP-EV miRNAs show promise as potential biomarkers for sperm quality and may contribute to the development of therapeutic strategies for male infertility.

Presenter: Iffat Ara Ebu

Presentation Session: AP1

Level of Study: Master's

Department: Electrical and Computer Engineering

Category: Engineering

Advisor: Dr. Umar Iqbal, Associate Teaching Professor, Electrical and Computer Engineering

Title: Improved Distance Estimation in Dynamic Environments through Multi-Sensor Fusion with Extended Kalman Filter

Abstract: Accurate distance estimation between vehicles in a dynamic environment is a critical component of advanced driver-assistance systems (ADAS) and autonomous vehicles. Multisensor fusion is important because using a single camera or radar can limit performance in adverse conditions. Combining camera and radar data enhances reliability, adaptability, and object recognition. Our goal is to achieve more accurate distance measurements and reduce inaccuracies in dynamic scenarios. The first step is to collect data from the sensors and compare it to ground truth values. Sensor fusion algorithms are then used to combine the data and minimize the error between the measured and actual distances. Our research utilizes multi-sensor fusion with an Extended Kalman Filter (EKF), a common sensor fusion technique, to combine noisy sensor measurements with a dynamic system model, enhancing distance estimation accuracy and robustness. We utilize the Mississippi State University Autonomous Vehicular Simulator (MAVS) to create a controlled environment for data collection and MATLAB for data analysis. Both qualitative and quantitative metrics were utilized to assess the performance of our sensor fusion approach. Qualitative metrics involved visualizing the fused sensor data in comparison to the ground truth values. Quantitative metrics included root mean square error (RMSE) and mean absolute error (MAE). Initial results showed that the combined sensor data yielded more accurate distance estimates than the data from individual sensors. The fusion of camera and radar sensor data with the Extended Kalman Filter yields promising results, improving accuracy and reliability. Sensor measurement noise variance and plant noise variance were tested, and the optimal plant noise variance value is 0.8. Real-world data from the Cadillac Lyriq (by collaborating with the team of EcoCAR EV Challenge) will be incorporated to further validate our approach. In summary, our research employing Multi-sensor fusion with an Extended Kalman Filter significantly improves distance estimation accuracy in dynamic environments. This approach is supported by comprehensive evaluation metrics. Transitioning to real-world data will further refine the methodology for safer and more reliable autonomous vehicles.

Presenter: Moshood Fagbolade

Presentation Session: MO2

Level of Study: Master's

Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Donna M. Gordon, Professor, Biological Sciences

Title: Functional complementation and occidiofungin susceptibility of fungal actin orthologs in S. cerevisiae

Abstract: Occidiofungin is cyclic glycolipopeptide produced by the soil bacterium Burkolderia contaminans MS14 with demonstrated fungicidal activity against yeast and filamentous fungi of clinical and agricultural importance. Recent studies have identified the cytoskeletal protein actin, as its biological target. Actin is an essential protein that plays an important role in cellular processes such as endocytosis, vesicle and organelle trafficking, nuclear positioning, and polarized cell growth in yeast cells. Despite >90% amino acid conservation between fungal actin proteins, sensitivity to occidiofungin has been shown to vary with C. albicans, F. oxysporum, and P. digitatum exhibiting a resistant profile relative to S. cerevisiae. To determine whether differences in the amino acid sequences of actin contributed to differences in occidiofungin susceptibility, we expressed the actin gene from these fungal organisms in our ACT1 S. cerevisiae shuffle strain. The functionality of actin gene products were determined by measuring growth complementation, actin protein levels, nuclear position, and actin cable formation. Results demonstrated functional complementation for all actin orthologs. Data for susceptibility testing of the fungal actin orthologs to occidiofungin by minimum inhibitory concentration indicates a similar sensitivity profile as cells expressing ACT1 from S. cerevisiae. These findings suggest that the amino acid differences in the actin protein for these fungal organisms are not directly linked to the reduced susceptibility to occidiofungin, and that other cellular factors are likely responsible for such differences.

Presenter: Moshood Fagbolade

Presentation Session: AP2

Level of Study: Master's

Department: Biological Sciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Donna M. Gordon, Professor, Biological Sciences

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Presenter: Melvy Fernandes

Presentation Session: AP1

Level of Study: Master's

Department: Aerospace engineering

Category: Engineering

Advisor: Dr. Shanti Bhushan, Mechanical Engineering

Title: Computational study of transport phenomena within a Poultry Incubator

Abstract: The quality of incubator conditions has a crucial impact on the health of hatched chicks. An insight into the spatiotemporal distribution of environmental factors like temperature, humidity, ventilation, and gas concentration within an incubator can be the key to reduce the risk of pathogen spread. Computational fluid dynamics (CFD) has the potential to provide a better understanding of such complex biological systems. The objective of this study is to create a computational model of the hatcher incubator by using Ansys software. The goal is to predict the spatiotemporal gradients such as temperature, velocity, and concentration of key species like water vapor (WV) and carbon dioxide (CO_2), through transient simulations, assuming egg tray to be fixed. The preliminary results show non-uniform temperature and humidity distribution due to egg and tray obstructions affecting the airflow. The temperature between the eggs in a large incubator depends on proximity to the inlet, fan and the heat exchange between the eggs and the microenvironment. A parametric study is performed to understand the accumulation of moisture and CO_2 depending on the fan speed, the heat transfer and to identify computationally cheaper numerical models for fan to reduce computational cost and allow long time simulations. Investigation of varying fan speeds (0-375 rpm) revealed higher fan speeds enhanced flow mixing and scalar variable distribution, emphasizing the significance of meticulous fan speed selection for creating an ideal incubation environment. The heat transfer study determined that constant heat flux boundary condition at the heating element is more comparable to the experimental results. MRF technique emerged as a cost-effective alternative with 60% reduction in computational cost and its potential to allow larger time step to establish them as the optimal blade modeling approach for extended duration simulations.

Presenter: Praveen Gajula

Presentation Session: MP1

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Impact of Biostimulants at Variable Nitrogen Rates in Mississippi corn

Abstract: Corn (Zea mays L.) is a versatile crop, ranked third in acerage within Mississippi (MS). Nonetheless, current stagnant yield, inefficient nitrogen (N) recovery, and fertilizer cost fluctuations are inflicting economic losses and contributing to environmental degradation. Failure to seek a new strategy poses a risk to meeting the global food demand, creating uncertainty in food supply. The utilization of biostimulants in agricultural practices has garnered significant interest due to their potential to enhance crop productivity and reduce environmental impact. Thus, a field study was carried out in 2022 and 2023 at two locations in MS. A split plot design was implemented, with four N rates as main plot including 0 (control), 90, 180, 224 kg N ha-1 at Starkville and an additional 270 kg N ha-1 at Stoneville. Subplot factor was six microbial biostimulants (Source®, Envita®, iNvigorate®, Blue N®, Micro AZTM, and Bio level phosN®) applied as both foliar and in-furrow at V4-V5 growth stages, alongwith a no biostimulant check. R statistical software was used to analyze the data. Nitrogen rates significantly influenced grain yield at all site years, whereas biostimulants showed no effect on yield. Specifically, in Starkville 2023 the yield varied from 3.77 Mg ha-1 in control to 12.15 Mg ha-1 at 180 kg N ha-1. In Stoneville (2022 & 2023) the yield ranged from 6.55 to 14.20 Mg ha-1. Overall, microbial biostimulants had no impact on corn yield and further research on diverse biostimulant categories is warranted to reveal their potential benefits for productivity and environmental sustainability.

Presenter: Allison Griffin

Presentation Session: MO6

Level of Study: Master's

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Marcus McGee, Assistant Clinical Professor, Animal and Dairy Sciences

Title: An examination of cow grooming behavior with an automated brush system in an intensively managed dairy system

Abstract: Recently, the dairy industry has transitioned its focus towards prioritizing optimal living conditions for indoor-housed animals by employing increasingly prevalent intensive management practices. Proposed enrichment strategies, such as the integration of automated brushes, aim to enhance the overall well-being of intensively managed dairy cows. These strategies promote natural behaviors, reduce boredom, and foster social interactions. With this known, the objective of this study was to evaluate the usage of an automated brush system for grooming behaviors by lactating dairy cows housed in a freestall setting.

A total of 29 (n=20 Holstein-Friesian; n=9 Jersey) cows were observed for automated brush use over three 21-day trials, with continuous video capture during four hour periods after each milking session for a total of eight hours of video data per day. Cows were housed in a single pen with sand bedding at the Joe Bearden Dairy Research Center, managed according to standard operating procedures, with passive data collection to prevent the influence of behavioral changes. Video was captured in 4k resolution using a four camera CCTV system. Video was scored with NOLDUS Observer XT software. Temperature and humidity were recorded daily using wall mounted monitors.

Results indicate that cows increased brush use in the evenings ($p=0.05$) compared to the mornings. Additionally, a tendency was noted ($p=0.09$) suggesting animal motivation for brush interaction was affected by temperature and humidity during the trial periods. Lastly, an examination of continued interest in the brush system was performed suggesting that animals utilized the system similarly throughout the trial ($p=0.60$) indicating continued interest throughout the evaluated period.

This study elucidates behaviors of lactating dairy cows in response to an automated brush system in a freestall setting. These findings have implications for animal welfare and farm management strategies, suggesting that automated brush systems can be effectively utilized to provide dairy cattle with opportunities for comfortable grooming experiences, regardless of environmental variations.

Presenter: Mikias Workneh Gugssa

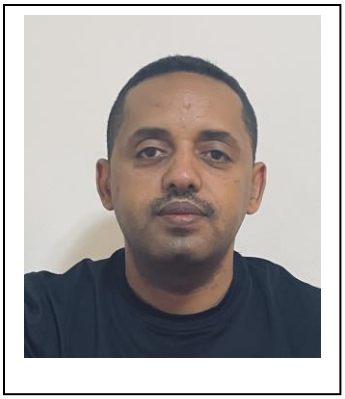
Presentation Session: MP4

Level of Study: PhD

Department: Civil and Environmental Engineering

Category: Engineering

Advisor: Dr. Jun Wang, Assistant Professor, Civil and Environmental Engineering



Title: Smart Safety System with Enhanced Human-Technology Interactions (HTIs) for Work Zone Safety Improvement

Abstract:

Background: Construction workers in work zones encounter significant safety risks and experience a high rate of injuries. Studies about safety training using Virtual Reality (VR) have shown promising results in helping enhance safety situational awareness. However, the current methods fall short of providing timely feedback during the training process, limiting the training effectiveness. Therefore, this study developed a smart safety training system using VR, body trackers, and human-system interactions to enhance workers' safety awareness.

Method: This study developed a smart VR-based safety training system with enhanced Human-Technology Interactions (HTIs). In this system, the body trackers collect trainees' postures and motions, and the feedback system allows the trainees to get real-time feedback on their performance while completing tasks in the immersive virtual environment. Two safety issues are considered and included in the developed safety training system. The system was tested and examined by participants in experiments, and the effectiveness of the smart training system was analyzed through several metrics, including participants' knowledge gain, motivation, simulation sickness, system usability, and user experience.

Results: The results of the knowledge gain analysis found significant enhancements in users' safety awareness across the safety training scenarios considered. The developed smart safety training system demonstrated above-average performance in several key aspects, including motivation, experience involvement, immersion, visual quality, interface quality, as well as sound quality. The system also achieved minimal symptoms in simulation sickness and reflected positively on system usability.

Conclusion: This study demonstrated that the system was capable of monitoring users' performance pertaining to the two types of hazards during training, enhancing human-system interactions, and providing timely feedback. This study is promising to enhance the effectiveness of safety training by increasing knowledge transfer using immersive technologies.

KEYWORDS: Work Zone Safety, Smart Training System, Virtual Reality, Human-Technology Interaction

Presenter: Minel Guler

Presentation Session: MP2

Level of Study: PhD

Department: Human Development and Family Science

Category: Agriculture and Life Sciences

Advisor: Dr. Benjamin Burke, Human Development and Family Science

Title: Video Games, Basic Psychological Needs, and Stress Recovery: Comparisons between Solo and Social Play

Abstract: Social video gaming is one of the most popular social leisure activities influencing individual well-being (Bowman et al., 2022). Informed by Self-Determination Theory (Deci & Ryan, 2012; Ryan et al., 2006), this study has two purposes. First, this study is designed to examine the direct associations between individual and social (i.e., family members, romantic partners, and friends) video game engagement with the motivation to play video games for the purpose of recovering from daily hassles and stressors. Second, the mediating role of satisfaction of basic psychological needs (i.e., needs for autonomy, competence, and relatedness) was investigated in the association of video gaming (either alone or social) with the motivation to play video games for recovery purposes. The sample consisted of 350 adult participants (44.5% female; Mage = 40.05). A structural equation model was estimated. Results demonstrated that individual and social video gaming was directly and positively associated with the motivation to play video games for recovery purposes ($\beta = .142$, $p = .04$ for individual video gaming and $\beta = .431$, $p < .001$ for social video gaming). Individual video gaming was not significantly associated with the satisfaction of basic psychological needs ($\beta = -.085$, ns), whereas social video gaming was positively associated with the satisfaction of basic psychological needs ($\beta = .213$, $p = .03$). In turn, the satisfaction of basic psychological needs was negatively associated with the motivation to play video games for recovery purposes ($\beta = -.232$, $p = .001$). However, although the total effects of individual and social video gaming were significant on the motivation to play video games for recovery purposes ($\beta = .162$, $p = .013$ and $\beta = .382$, $p < .001$ for individual and social video gaming, respectively), their indirect effects through the satisfaction of basic psychological needs were non-significant ($\beta = .020$, ns and $\beta = -.049$, ns for individual and social video gaming, respectively). This study has empirical, theoretical, and applied implications (e.g., promoting social video gaming to satisfy basic psychological needs and to recover from daily hassles and stressors).

Presenter: Jalyn G. Hawkins

Presentation Session: MO6

Level of Study: Master's

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. P. Fan, Assistant Professor, Animal and Dairy Science

Co-Advisor: Dr. M. McGee, Assistant Professor, Animal and Dairy Science

Title: High-resolution characterization of the gut microbiota of neonatal dairy calves and associations with calf diarrhea using full-length 16S rRNA gene amplicon sequencing

Abstract: Gut microbial dysbiosis often leads to calf diarrhea, a major contributor to calf mortality. Additionally, early gut microbiota has been recently considered as hotspot of antimicrobial resistance, making treatment difficult. Most previous research relied on partial 16S rRNA gene amplicon sequencing for calf microbiota characterization with limited taxonomic resolution. The aim of our study is to obtain a species-level characterization of calf gut microbiota using full-length 16S rRNA gene amplicon sequencing and identify diarrhea-associated bacterial markers using a machine-learning approach. We collected fecal samples on days 4, 7, 11, 14, and 30 from 25 Holstein-Angus crossed calves. The calves were fed colostrum on day 1 and fed milk replacer from days 2 to14 and transitioned to whole milk from day 15 to day 30. The gut microbiota was analyzed using full-length 16S rRNA gene amplicon sequencing on an Oxford Nanopore sequencer GridION. The absolute number of gut bacteria and bacteria resistant to cefotaxime were determined by plating method. The results revealed a significant increase in gut microbial diversity ($P_{Chao\ 1} < .001$; $P_{Shannon} < .001$) from day 4 to day 30, with days 11 and 14 showing similar diversity. Diarrhea prevalence peaked at days 11 and 14. The gut microbiota tended to be different on day 14 ($P_{Bray\text{-}Curtis\ distance} = 0.07$) between healthy and diarrheic calves. Diarrheic calves exhibited a higher relative abundance of pathogenic bacteria, such as Streptococcus lutetiensis and Fusobacterium mortiferum, while commensal bacteria, such as Megasphaera elsdenii and Butyricimonas faecalis were enriched in healthy calves. The built machine learning model with gut microbiota feature using support vector machine algorithm reached 80% accuracy to predict diarrhea and identified seven bacterial species with high importance score. In addition, the alpha diversity showed significant difference between healthy and diarrhea calves on day 4 ($P = .04$). The antimicrobial-resistant bacteria were significantly greater in diarrheic calves on day 14 ($P = .01$), and the trend continued into day 30 ($P = .06$). In conclusion, this study provides species-level insights into neonatal dairy calf gut microbiota, indicating early, immediate, and long-term impacts of diarrhea on microbial composition.

Presenter: Tristan Henderson

Presentation Session: MO2

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Matthew Brown, Professor, Biological Sciences

Title: Decoding the doo-doo dilemma: how amoebas in poop create societies

Abstract: Herbivore dung, a habitat often overlooked, is a treasure trove of nutrients and biodiversity, hosting a dynamic array of organisms including bacteria, fungi, plants, small animals, and amoeboid protists. These organisms thrive in the dung's rapidly changing conditions, showcasing a microhabitat rich in interactions and adaptations. Within this context, our work delves into the world of amoebae that exhibit aggregative behaviors— a form of multicellularity where thousands of individual cells cooperate to form larger structures for dispersal. These behaviors are particularly fascinating as they occur across the tree of life in dung-dwelling organisms, suggesting that the dung environment may drive the convergent evolution of these social life cycles. Our research uncovers a striking phenomenon: removing social dung amoebae from their natural dung environment makes them lose aggregative (social) behavior. This loss is consistent across different strains and species, indicating that dung possesses an essential element for these social behaviors. Intriguingly, even when non-aggregative strains are reintroduced to sterilized dung, the aggregative behavior does not return, hinting at a missing third component for initiating the behavior. This observation, spanning organisms separated by approximately 1.8 billion years of evolution, underscores the evolutionary significance of these findings. Our study not only highlights the role of the dung microhabitat in stimulating unique life cycles but also poses a compelling question about the intrinsic properties of dung that, coupled with ancient eukaryotic cell biology, promoted the emergence of aggregative multicellularity across different evolutionary lineages

Presenter: Tucker Hilyer

Presentation Session: MO9

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Corey Bryant, Assistant Professor, Plant and Soil Sciences

Co-Advisor: Dr. Michael Mulvaney, Associate Professor and Hartwig Endowed Chair, Plant and Soil Sciences

Title: Biological product effects on soybean in Mississippi

Abstract: Soybean (Glycine max (L.)) yields in Mississippi have plateaued in the last six years after increasing by 31% in the previous 14 years. Many different biological products have been marketed to Mississippi soybean producers as the next step to increase soybean yields. However, many of these products lack publicly-generated data with which soybean producers can make informed decisions regarding implementation into their production system. Further complicating biological adoption is a myriad of active ingredients/modes of action within the biological product market. Therefore, these new products entering the biological marketplace must be independently tested and the efficacy verified through non-biased university research. This study seeks to determine the effects of different biological products on soybean productivity in the predominate soybean growing regions of Mississippi. Treatments included a non-treated soybean seed as a negative control, a soybean seed treated with a commercially available fungicide and insecticide as a positive control, and ten biological products applied individually or in combination with one another for a total of 15 treatments. The trial was replicated in three locations in Mississippi in 2023: Starkville (silty clay loam, bedded), Verona (silty clay loam, flat), and Stoneville (very fine sandy loam, bedded). Experimental units were 4-m wide by 10.7-m long. Soybean was planted at 321,230 seed ha-1 and all biological products were applied according to manufacturer recommendations. Results, including emergence, canopy closure rate, tissue nutrient concentration, disease ratings, nodulation, yield components, and yield will be discussed.

Presenter: Vijaykumar Hosahalli

Presentation Session: AO3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Harnessing the effectiveness of biostimulants in overcoming heat stress in soybeans

Abstract: Soybean is one of the most important crops in the world, providing food, feed, and biofuels. However, soybean yield is often compromised by environmental stressors, notably drought, heat, and salinity, leading to lower yields. Among these stresses, heat stress during critical reproductive and grain-filling stages markedly affects soybean productivity. High temperatures during these stages can cause flower and pod abortion, reduced seed size and weight, and ultimately lower yield. Biostimulants have recently been proposed as a sustainable and viable solution to improve soybean productivity under adverse environments. In this study, we investigated the effects of different biostimulants, individually and in combination, on alleviating heat stress during the reproductive and grain-filling stages in soybean. Plants grown under optimum conditions were exposed to long-term heat stress from flowering to physiological maturity using field-based heat tents. Results showed that Azterknot and BioP application (broadcast spray at planting) increased yield by 6% and 5%, respectively, under heat-stress. There was an increase in stomatal conductance with the application of HM-2163 and BioWake + BioFriendly biostimulants by 98% and 74% respectively under heat stress. A decrease in chlorophyll content was observed under heat stress. The highest decline was observed for BioSa+BioFriendly+Polymer combination of biostimulants by 16%. However, with the application of BioP and combination of Fertiactyl and BioFriendly biostimulants, there was increase in protein and oil content by 4% respectively. In conclusion, our findings suggest that biostimulants, particularly Azterknot and BioP, can alleviate the negative effects of heat stress on soybean yield during the reproductive and grain-filling stages. However, more research is required to comprehend the mechanisms by which biostimulants enhance the heat tolerance of soybean plants.

Presenter: Vijaykumar Hosahalli

Presentation Session: AP2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Harnessing the effectiveness of biostimulants in overcoming heat stress in soybeans

Abstract: Soybean is one of the most important crops in the world, providing food, feed, and biofuels. However, soybean yield is often compromised by environmental stressors, notably drought, heat, and salinity, leading to lower yields. Among these stresses, heat stress during critical reproductive and grain-filling stages markedly affects soybean productivity. High temperatures during these stages can cause flower and pod abortion, reduced seed size and weight, and ultimately lower yield. Biostimulants have recently been proposed as a sustainable and viable solution to improve soybean productivity under adverse environments. In this study, we investigated the effects of different biostimulants, individually and in combination, on alleviating heat stress during the reproductive and grain-filling stages in soybean. Plants grown under optimum conditions were exposed to long-term heat stress from flowering to physiological maturity using field-based heat tents. Results showed that Azterknot and BioP application (broadcast spray at planting) increased yield by 6% and 5%, respectively, under heat-stress. There was an increase in stomatal conductance with the application of HM-2163 and BioWake + BioFriendly biostimulants by 98% and 74% respectively under heat stress. A decrease in chlorophyll content was observed under heat stress. The highest decline was observed for BioSa+BioFriendly+Polymer combination of biostimulants by 16%. However, with the application of BioP and combination of Fertiactyl and BioFriendly biostimulants, there was increase in protein and oil content by 4% respectively. In conclusion, our findings suggest that biostimulants, particularly Azterknot and BioP, can alleviate the negative effects of heat stress on soybean yield during the reproductive and grain-filling stages. However, more research is required to comprehend the mechanisms by which biostimulants enhance the heat tolerance of soybean plants.

Presenter: Md Elias Hossain

Presentation Session: MO1

Level of Study: PhD

Department: Computer Science and Engineering

Category: Engineering

Title: Enhancing Graph-Based Residual Network for Effective Classification of long Cancer-related Documents

Abstract: Background: Healthcare relies heavily on the use of electronic health records (EHRs) and classification of medical cancer records in an efficient manner is critical. Recent advances in machine learning (ML) and deep learning (DL) models present promising opportunities to address this particular challenge.

Methodology: In this research, we propose an advanced residual graph-based network, incorporating several graph attention layers, which is capable of comprehensively capturing the complexities within long cancer documents. Our suggested approach can effectively facilitate the

accurate classification of medical records into three specific categories- thyroid, colon, and lung cancer. This study also employed a variety of machine learning (ML) algorithms and deep learning (DL) ensemble networks to classify medical cancer records into three distinct classes. Our approach also incorporates multiple DL models, including specialized clinical large language models (C-LLM) such as bidirectional encoder representations from transformers for biomedical text mining (BioBERT), a robustly optimized BERT approach (RoBERTA), and clinical BERT. Notably, we integrated zero-shot classification (ZSC) techniques on top of C-LLM-based models without modifying the BERT architecture or relying on task-specific training data.

Result and Discussion: The outcome of shallow ML models turned out to be suboptimal, possibly due to the challenges associated with adapting to the domain and vocabulary-related limitations when dealing with cancer-related documents. We observed overfitting in C-LLM due to the limited size of training data and consideration of fixed-length tokens (N=256), which also hinders contextual understanding. Despite employing the BERT zero-shot training technique, achieving the desired level of accuracy proved to be a challenging task. However, our newly developed R-GAT model provided a satisfactory performance with balanced sensitivity and specificity.

Conclusion: This research highlights the significance of ML and DL models in the classification of medical documents, emphasizing their ability to improve document classification. Despite the existence of overfitting issues in conventional ML models and C-LLM, the efficacy of

graph-based text representation is underscored by the R-GAT model's performance when processing medical text data. The aforementioned findings will hold substantial importance for future research and developments in the scientific community.

Presenter: Jing Huang

Presentation Session: MO3

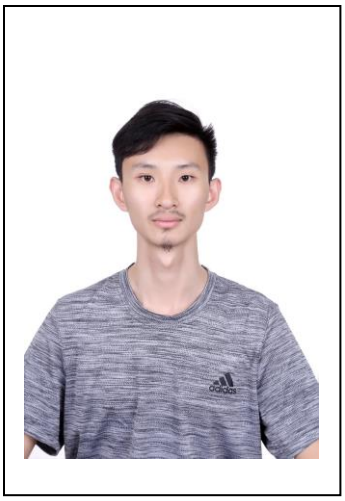
Level of Study: PhD

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, Associate Professor, Department of Biological Sciences



Title: Dietary Supplementation of Lactococcus lactis Isolate MA5 on Hybrid Catfish (Channel x Blue): Effects on Growth Performance, Immune Modulation, and Disease Resistance

Abstract: A potential autochthonous bacterium, Lactococcus lactis MA5, was evaluated as dietary supplement for juvenile hybrid catfish. In this study, the probiotic candidate L. lactis MA5 was prepared daily and blended with a commercial catfish diet (35% crude protein). A total of 560 hybrid catfish juveniles (16.1± 0.1 g initial weight) were equally distributed in 28 aquaria (36.6-L; 20 fish/tank) set up as a flow-through system. The four dietary treatments (Control, 104, 106, 108 CFU of MA5/g of feed) were randomly assigned to the aquaria (n=7), and fish received 3~5% grading levels of experimental diets twice a day, for 56 days. At the end of the feeding trial, (N=3 per tank) fish were randomly selected and euthanized with an overdose MS-222, and tissues samples were collected to evaluate the potential dietary effects from the probiotic. After the 56 days of feeding, experimental fish presented a positive growth performance (~331.2%), but no significant differences were observed among the dietary treatments. No significant differences were also observed for condition indices, survival rate, and feed efficiency. However, innate immune responses, serum superoxide dismutase, and lysozyme activity were enhanced with probiotic supplementation, which could possibly reduce susceptibility to infections. In addition, cytokine gene expressions (IL-1β, IL-6, and TNF-α) in the head kidney were mildly up-regulated. To further assess the intestinal conditions, the mid-gut of the experimental fish was subjected to histological examination. Goblet cells and muscle layer thickness increased for fish treated with the highest probiotic dose. Lastly, fish that received the lowest dose of the probiotic (104 CFU/g) presented a significantly higher survival rate after being infected by Aeromonas hydrophila. These results suggest that dietary supplementation of L. lactis MA5 can significantly modulate non-specific immune responses, gene expression of inflammatory cytokines and enhance resistance against A. hydrophila in hybrid catfish juveniles.

Presenter: Kelechi Godwin Ibeh

Presentation Session: MP3

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Austin Himes, Assistant Professor, Forestry

Co-Advisor: Dr. Joshua J. Granger, Assistant Professor, Forestry

Title: Forest Tree Competition: A Method for Assessing Distance-Dependent and Independent Competition Indices Using FIA Data.

Abstract: Competition among trees is a key driver of forest dynamics, productivity, and ecological structure. It involves multiple mechanisms and interactions between trees that depend on the resources available, such as light, water, and nutrients, and how they are acquired and used by different trees. Spatial arrangement of trees and density strongly affect survival, diameter growth and stand productivity because trees that are closer together are more likely to compete for limited resources. A greater understanding of how neighboring trees, particularly in mixed species stands, interact to impact individual tree growth in a forest community is critical for improving forest management practices. There are several indices for tree competition assessments, many of which require some information about the spatial arrangement of trees (i.e., distance-dependent), however, mapping the spatial arrangement of trees is laborious and rarely done in forest inventories. We used a method for computing distance between trees within Forest Inventory and Analysis (FIA) and applied this information to compare the efficacy of different competition indices in predicting diameter growth in mixed-species stands at a regional scale. This information can help inform decisions in forest management and planning and build scientific knowledge about the relative competitiveness of different tree species.

Presenter: Kevin Jones

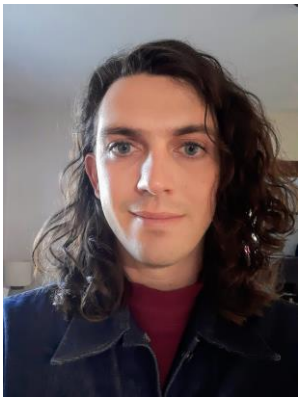
Presentation Session: AO5

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

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



Title: Detection of Walleye in eastern Mississippi streams using eDNA

Abstract: The Gulf Coast strain of Walleye (Sander vitreus) is a genetically unique strain native to the Mobile River Basin and adjacent Gulf of Mexico watersheds. This strain has been threatened by the construction of the Tennessee-Tombigbee Waterway, which resulted in habitat loss, isolation of tributaries, and created the potential for introgression from northern Walleye by connection to the Tennessee River Basin. Historical stocking of northern strain Walleye into the Mobile Basin created further potential for introgression. Populations are now maintained with hatchery-produced Gulf Coast strain Walleye. The efficacy of stocking efforts and the status of remaining wild populations are poorly understood, in part because Gulf Coast strain Walleye habitats can be difficult to sample using traditional gears. During the spring of 2024, tributaries of the Tombigbee River will be sampled for environmental DNA (eDNA) to identify potential remnant populations of Gulf Coast Walleye. This presentation will discuss this upcoming project, as well as evidence for the genetic distinctiveness of the Gulf Coast strain and past and ongoing efforts to restore Walleye populations in Mississippi. By investigating the status of this unique and imperiled Walleye population, this project aims to contribute vital information towards future conservation efforts.

Presenter: Himani Joshi

Presentation Session: MP2

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Peixin Fan, Animal and Dairy Sciences

Title: Rumen microbiome signature-based machine learning model for heat stress prediction

Abstract: Heat stress has a huge negative impact on the global dairy industry, leading to a reduction in milk production and reproduction, as well as alteration of rumen microbiota which can affect rumen fermentation functions. However, the reported heat-stress-associated rumen microbes were not consistent across studies, partially due to the varied microbiota analysis pipelines. To evaluate whether heat stress could be detected from specific rumen microbiota features and identify potential microbial markers, we collected publicly available 16S sequencing data of 55 rumen samples of dairy cows under heat stress or thermoneutral conditions from three studies and built machine learning models with the rumen microbiota profile to predict the heat stress. All the raw sequencing data were analyzed with QIIME2 software and the Silva 138.1 database. The sequencing depth and matrix of absence/presence of the 183 bacterial genera served as independent variables to predict heat stress as the response. The important independent variables that contribute to the model were firstly selected using Boruta with 5-fold cross-validation. The feature-selected dataset containing ten important bacterial signatures was further trained using several binary algorithms, including Random Forest, Support Vector Machines (SVMs), and Logistic Regression. The trained models predicted heat stress with an area under the receiver operating characteristic curve (AUROC) of 0.86-0.93 (interquartile range, IQR, 0.80-0.94). SVMs outperformed other algorithms with a mean accuracy of 92.8%, and a mean AUROC of 0.86-0.93. Moreover, it has been found that certain selected important features, such as Bacteroidales BS11 and Bacillus, have also been reported to be enriched in heat-stressed cattle in multiple studies, suggesting their potential as bacterial markers for heat stress. In conclusion, the high accuracy of the built machine learning model indicates a unique rumen microbiota feature in heat-stressed cows, which may be specifically targeted to mitigate the heat stress responses in dairy cows.

Additional information: Keywords: Heat stress, Rumen microbiota, Machine learning

Presenter: Samuel Juárez

Presentation Session: MO4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. T. Keith Hollis

Title: Synthesis of New Zr Organometallic Emitters for Applications in OLED Devices

Abstract: Commercial emitters based on organometallic and coordination complexes rely on platinum-group elements as their metal centers. Due to their high market price and their low availability in Earth's crust, research has been conducted to find new well-defined metallic complexes made from Earth abundant metals. In this work, we synthesize new organometallic Zr complexes that emit visible light when they are excited under UV light. These complexes possess a rigid tridentate ligand bound to the metal center in a meridional fashion, i.e., a pincer ligand. Our pincer ligand uses three carbon atoms as electron donors, two of them being N-heterocyclic carbenes.

The synthesis of the Zr complexes requires three steps: 1) the synthesis of free N-heterocyclic carbenes, 2) the metalation of the free carbenes, and 3) the ligand exchange reactions. The synthesis of six different Zr pincer complexes is presented, their challenges and the future scope. Further research on the photophysical properties of these complexes is ongoing.

Presenter: Hemraj Kathayat

Presentation Session: MP2

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

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

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

Title: Understanding Edwardsiella ictaluri efflux pump system

Abstract: Edwardsiella ictaluri is a Gram-negative, rod-shaped, and facultative intracellular bacteria causing enteric septicemia in catfish (ESC). This pathogen poses a significant threat to the United States aquaculture industry, leading to substantial economic losses in channel catfish culture. E. ictaluri employs multiple entry points, including mucosal epithelia in the gastrointestinal tract, nares, gills, and skin, to establish acute and chronic infections in catfish. The intestinal epithelium serves as a prominent entry route for E. ictaluri. Among various preventive measures, antibiotics are primarily used in the aquaculture sector. However, bacteria have developed various mechanisms to defend against antibiotics, contributing to their ability to survive in the presence of these drugs. The efflux pump system is one of the mechanisms that actively transport substances, including antibiotics, out of bacterial cells, reducing the drugs' intracellular concentration and hindering their efficacy. To address this challenge, live attenuated vaccines emerge as an effective strategy for protecting the catfish industry against E. ictaluri. The pathogen's single serotype and colonization of internal catfish lymphoid tissues make it suitable for developing live attenuated vaccines. We studied E. ictaluri gene expression in catfish intestines by RNA-seq analysis and identified differentially expressed efflux pump genes. Currently, our lab focuses on understanding the efflux pump system in E. ictaluri by developing and characterizing efflux pump mutants, which can be candidates for vaccine development.

Presenter: Vaishali A. Kshirsagar

Presentation Session: AO4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sid Creutz

Title: Partial and Complete Anion Exchange of Colloidal Ternary Chalcogenides for Optical Tunability

Abstract: The development of inexpensive, low-toxic, and earth-abundant nanomaterials for next-generation solar cells is pivotal. The search for new semiconducting materials has been fast-paced over the past few years. Especially search for the replacement of toxic lead, and cadmium-based nanocrystals (NCs) has gained attention. Bismuth (III) and antimony (III) owing to their similar ns2 outer electronic configuration as lead are identified as viable alternatives. Ternary chalcogenide, silver bismuth sulfide (AgBiS2), is a member of the I-V-VI group and has a bulk bandgap of 1.2 eV and a high absorption coefficient. The antibonding character of the valence band maximum (contributed by ns2 electrons), combined with a high dielectric constant, makes these materials defect-tolerant and well-suited for photovoltaics. However, tailoring of the optical properties by halide exchange is restricted in such AgBiS2 owing to their covalent bonding character and stable crystal structure, unlike lead halide perovskites. The present work highlights the development of synthetic strategies to overcome the important challenge of optical tunability in AgBiS2 nanorods. With the help of the post-synthetic anion exchange technique that involves the replacement of one element with another, we successfully isolated partially and completely halide-exchanged colloidally stable AgBiSxI1-x or AgBiI4 nanocrystals. This approach enables precise control over the electronic and optical properties of the nanocrystals yielding kinetically trapped metastable crystal phases. This method paves the way for tailoring and optimizing the optoelectronic properties of ternary chalcogenides that are otherwise challenging for a broad range of optoelectronic applications.

Presenter: Heather-Ann Layth

Presentation Session: MP4

Level of Study: PhD

Department: Sociology

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Kimberly Kelly, Sociology

Title: Are you an Antifascist?: it's not all just punching Nazis

Abstract: This research seeks to facilitate a greater understanding of how social movement activists justify violent tactics and how the public may interpret such tactics. Conservative media raises the specter of antifa as a popular political boogeyman, but it is important to keep in mind that it is not a cohesive organization, it is rather a nebulous ideology disparate individuals identify with in an effort to stand up to encroaching fascism in the US. This misconception of who antifascists are has limited our understanding of how militant antifascist action occurs. To date, we know strikingly little about activists who engage in militant antifascism and their choices to use political violence or not.

Through semi-structured interviews with 39 self described militant antifascists, I found near universal support for actions like mutual aid and community support. I utilized Snow & Benford's framing theory of collective action to assess the diagnostic, prognostic, and motivational frames deployed by these activists to understand their actions. Support for, or direct engagement in, violence was less common than mainstream media coverage of antifa suggests. Findings indicate that participants are motivated by a fear of loss of rights for themselves and their loved ones into a form of self-defense. The vulnerability of that defensive position is often buttressed by bravado like the "punch Nazis" meme, but more often plays out in the form of food banks, homelessness outreach, rideshares, community gardens, little lending libraries, and other forms of mutual aid than in physical altercations or property damage.

Presenter: Johana Lozano

Presentation Session: AO2

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

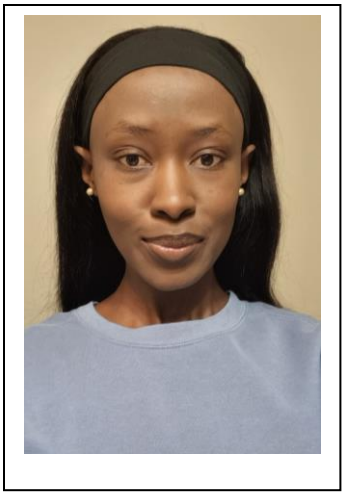
Advisor: Sol Peláez

Title: “La llegada de Miss Piggy Vaquera” and Queer expression in Colombian literature

Abstract: It proposes to analyze the short story "La llegada de Miss Piggy Vaquera" (The Arrival of Miss Piggy Cowgirl) by Andrea Salgado from the short story anthology Cuerpos: Veinte formas de habitar el mundo (Bodies: Twenty Ways to Inhabit the World), where an intriguing exploration of Queer identity in Colombian literature is presented. Through her writing, Salgado not only allows us to recognize, but also bravely represents Queer experiences, highlighting the importance of writing as a powerful tool in the political struggle of minorities against the rejection imposed by the heteronormative norm in Colombian society.

It aims to demonstrate how the author challenges and questions the binaries rooted in society, making visible how the false social construct sustains that heterosexuality is the only natural expression of identity and how, by breaking with these paradigms, the story not only offers a diverse representation of sexual identities, but also contributes to the dismantling of ingrained prejudices and the questioning of oppressive norms. Highlighting how literature becomes the medium through which these themes are explored and how through writing, it allows us to imagine and question social structures from alternative perspectives thanks to the use of direct language, as opposed to the metaphorical and hidden writing of the 20th century, facilitating a clear and concise understanding without resorting to veiled writing to address sexuality.

Presenter: Ncomiwe Andile Maphalala



Presentation Session: AO3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr Te-Ming (Paul) Tseng, Associate Professor, Plant and Soil Sciences

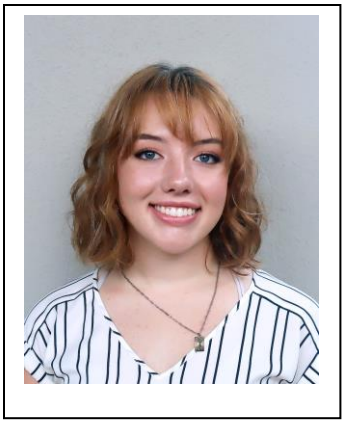
Co-Advisor: Dr Luis Avila, Associate Professor, Plant and Soil Sciences

Title: Assessing the Effects of Rhizobium japonicum and Plant Growth-Promoting Rhizobacteria (PGPR) on Soybean (Glycine max L.) Seed Inoculation: Implications for Yield, Soil Microbial Properties, and Herbicide Carryover Management.

Abstract: Corn (Zea mays L.) and soybean [Glycine max (L.) Merr.] are frequently grown in rotation throughout the mid-western United States and Canada. The success of seeding soybean after corn establishment is influenced by the residual nature of the corn herbicides that were applied. Numerous studies have reported on the impact of residual corn herbicides on soybean yield. For example, there is a concern for carryover from fall-applied dicamba and atrazine in soybean. The aim of this study, therefore, is to determine if inoculating soybean seeds with Rhizobia enables the plants to withstand the impact of corn residual herbicides. Thus, the effect, on plant growth, biomass, injury, and nodulation, of five rates of corn residual herbicides (1x, 0.75x, 0.50x, 0.25x, 0x) on soybean inoculated with Rhizobium and plant growth-promoting rhizobacteria (PGPR) were investigated under greenhouse conditions. PGPR inoculant Bacillus subtillis and Rhizobium japonicum were used for this study. Soybean seeds were inoculated with Rhizobium singly or in combination with Bacillus subtillis. The herbicides under evaluation were atrazine (Aatrex at 2241 g ai ha-1), mesotrione (Callisto at 105g ai ha-1), S-metolachlor+atrazine+mesotrione (Lexar at 1120 g ai ha-1), and rimsulfuron+nicosulfuron (Steadfast at 105 g ai ha-1). A significant variation of plant growth, injury, nodulation, and biomass in response to inoculating or co-inoculating with B.subtillis and B.japonicum, at all atrazine herbicide rates, was observed. Inoculating with B. japonicum at 0, 0.50, and 1X resulted in an increase of 44, 41, and 26 %, respectively, in plant height. Inoculating with B. japonicum and co-inoculation with B. japonicum and B.subtillis, at all herbicide rates except 1X, resulted in a significant increase in plant biomass levels ranging from 31 to 50 %. A principal components analysis reflected a positive correlation between dry biomass and active nodule number. Inoculating soybean seeds with bacterial inoculants could help address corn residual herbicide carryover concerns in soybean. Future experiments will assess soybean yield and soil microbes' response to seed inoculation.

Keywords: residual herbicide, injury, plant growth, rhizobium, herbicide carryover, Glycine max (L.) Merr

Presenter: Danielle McAree



Presentation Session: MO7

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

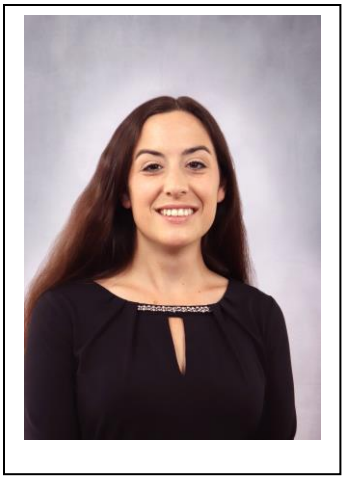
Category: Forest Resources and Veterinary Medicine

Advisor: J. Marcus Drymon, Associate Extension Professor, Wildlife, Fisheries & Aquaculture

Title: Preliminary analysis of tiger shark (Galeocerdo cuvier) age, growth, and maturity in the western North Atlantic Ocean

Abstract: The tiger shark (Galeocerdo cuvier) is a large, highly migratory predator that is distributed in warm-temperate and tropical waters worldwide. In the western North Atlantic Ocean (WNA), tiger sharks occur year-round in the Gulf of Mexico (GoM) and southern U.S. Atlantic and are occasional visitors to waters as far north as Nova Scotia. Like many other shark species, WNA tiger sharks were heavily exploited throughout the 1970s and ‘80s, leading to significant declines in abundance. The 2006 SouthEast Data, Assessment, and Review, which assessed tiger sharks in aggregate with other large coastal sharks, was inconclusive and recommended that each species be assessed separately in the future. Although independent studies have suggested the population is showing signs of recovery, tiger sharks have never been formally assessed in the U.S. as a single species and the stock status is currently unknown. Reliable and updated estimates of tiger shark life history parameters are critical for informed management of this species in the WNA. Therefore, the objectives of this study are to 1) determine the combined and sex-specific growth parameters of WNA tiger sharks and 2) determine the size and age at maturity of WNA tiger sharks. Between 2005 and 2023, tiger sharks (n = 222) were collected from the U.S. GoM and Atlantic coast. Vertebral centra were extracted from each fish for aging. Tiger sharks ranged in size from 56-360 cm fork length, with females significantly larger than males ($p = 0.023$) The male-to-female ratio was 0.98:1 and did not significantly differ from a 1:1 ratio ($X2 = 0.005$, $df = 1$, $p = 0.947$). Findings from this study will inform future management actions to ensure sustainability of the WNA tiger shark stock.

Presenter: Patricia Lynne McCourt



Presentation Session: MO8

Level of Study: PhD

Department: History

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Courtney E. Thompson, Associate Professor, History

Title: "The Problem With So Many Names: An Analysis of the Relationship Between Mental Illness and Drug Use Among Nineteenth Century Women"

Abstract: This paper explores the relationship between mental illness and drug addiction in the United States during the second half of the nineteenth century. It considers the perspectives of both medical professionals and laypeople, specifically women. For several decades now, historians familiar with the rise in drug addiction, particularly to opiates, during this era have attributed the disproportionate number of white, well-off women among habitual users to the greater likelihood that physicians would prescribe them a narcotic to allay suffering associated with a near-infinite number of diseases and symptoms, among them being hysteria, neurasthenia, and any other condition that might be accompanied by mental distress or anxiety. In both scholarly and popular discussions, the nervous middle-aged, middle-class lady sipping laudanum when overwhelmed, depressed, or even bored has stood as the archetypal user prior to tighter narcotic regulation and criminalization. To better understand this character and her real-life counterparts, historians need to take seriously the social conventions and structures under which nineteenth-century women chafed in just as great detail as they do to prevailing medical practices of the era. Consulting medical textbooks, journals, and physicians' casebooks alongside popular media and women's personal accounts describing their drug use, I will demonstrate that the opiate addiction "epidemic" among American women that succeeded the Civil War stands as just an early iteration of an ongoing phenomenon that stretched forward into the twentieth century: the tendency for white women with access to medical care to allay their emotional suffering with psychoactive drugs.

Presenter: Madeline McKnight

Presentation Session: AO6

Level of Study: Master's

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Isaac Jumper, Assistant Professor, Pathobiology and Population Medicine

Co-Advisor: Dr. Kelsey Harvey, Assistant Professor, Animal and Dairy Sciences

Title: Describing the consumption of chlortetracycline-containing mineral offered free-choice to pregnant commercial beef cows on pasture

Abstract: Many beef cattle production systems rely on free-fed mineral supplementation to meet animal nutrient requirements. Feeding mineral supplement in a free-choice manner precludes monitoring daily intake. When free-choice mineral supplement is used to deliver medication such as chlortetracycline (CTC), variation in daily supplement intake may lead to individual over or underconsumption of the medication. Chlortetracycline is commonly included in mineral supplements to mitigate the risk of bovine anaplasmosis in beef herds. The objective of this study was to describe the consumption patterns of a granular, CTC-containing mineral supplement offered free-choice to cows on pasture. A total of 100 nonlactating, pregnant, crossbred beef cows were assigned to 1 of 3 pastures equipped with a portable, self-contained individual feeding unit (SmartFeed; C-Lock Inc.). SmartFeed units were used to record individual animal supplement intake and frequency. Cows were offered dried distillers' grains with salt for 14 days of acclimation (mean intake of 1.03 kg/day) before transition to a commercially available granular mineral containing CTC (6,160 mg/kg) on day 0 for 162 days. Using individual body weights collected prior to the study, the expected total CTC intake for the trial period was calculated for each cow. According to label instructions, cows should be fed such that they consume 1.1 mg CTC/kg body weight daily. The average study cow (BW=530 kg) should, therefore, consume a total of 15.3 kg (94.4 g/cow/day) of mineral supplement over 162 days to receive a total of 94.5 g (0.58 g/cow/day) of CTC during the trial. However, mean mineral supplement consumption was 86.6 g/cow/day, which lead to a mean CTC consumption of 0.54 g/cow/day. The mean number of consecutive days a cow did or did not consume mineral was 2.4 and 3.1 days, respectively. Throughout this study, only 42.1% (40/95) of cows consumed their total expected amount of mineral. In conclusion, feeding CTC-containing mineral supplement in a free-choice manner did not ensure cows consumed the labelled CTC dose of 1.1mg/kg/day.

Presenter: Alyssa Lea Miller

Presentation Session: MO5

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. T. Tseng, Professor, Plant and Soil Sciences

Co-Advisor: Dr. M. Shankle, Research Professor, Pland and Soil Sciences

Title: Assessing the allelopathic effects of coumarin and chlorogenic acid alone and in synergy with glyphosate on the management of Palmer amaranth

Abstract: Herbicides have long been the primary means of controlling weed species in many agricultural fields. However, herbicide resistance has become a significant issue, particularly in cotton production. Resistance is making it challenging to control weeds, and more sustainable options are necessary. Environmental concerns and pressure from the Environmental Protection Agency have made this even more pressing. One promising alternative is the use of allelochemicals, such as coumarin and chlorogenic acid, which can act as bio-herbicides. These chemicals can be used alone or mixed with glyphosate for a synergistic effect that can be applied broadcast, postemergence. Allelochemicals, such as coumarin and chlorogenic acid, have been proven to have weed-suppressive effects; however, data are lacking on the herbicidal effects of these compounds. Two experimental runs were conducted, each consisting of 10 treatments with five replications per treatment. The treatments included independent applications of coumarin and chlorogenic acid, along with subsequent combinations with glyphosate at both 1X and 2X the recommended rate. Observations on plant height and injury were recorded at 7, 14, 21 and 28 DAT. Additionally, fresh biomass was recorded at 28 days after treatment (DAT). A mixture of glyphosate and coumarin produced the most effective control of Palmer amaranth, outperforming both glyphosate-only and coumarin-only treatments in terms of effectiveness. The symptoms induced by this treatment were evident in the form of epinasty, leaf curling, and node stacking, leading to an average visual injury of around 60% on Palmer amaranth plants at 28 DAT. Coumarin + glyphosate treatment also resulted in twice the height reduction in Palmer amaranth plants at 28 DAT compared to the glyphosate-only treatment, suggesting a notable synergistic effect in suppressing Palmer amaranth growth. The results of this study underscore the potential enhancement in the effectiveness of herbicide mixtures through the addition of allelochemicals, offering insights into the improved suppression of weed species.

Presenter: Junnatun Naym

Presentation Session: MO8

Level of Study: PhD

Department: Finance and Economics

Category: Education, Arts and Sciences, and Business

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

Title: Delinquent Insider Trade Reporting and Corporate Misconduct

Abstract: Delinquent insider trade reporting is a violation of securities law. Although these violations may appear insignificant, they indicate a firm's broader culture of noncompliance, which can lead to other forms of misconduct. Using a panel dataset of 23,654 firm-year observations, we test the association between insider filing violations and future corporate misconduct and document a significant positive association. This effect is strongest for firms that do not have a CCO or internally imposed blackout trading restrictions. These findings suggest that implementing a strong internal regulatory system fosters a culture of compliance and establishes checks and balances within the firm.

Additional information: Another co-author is Dr. Caleb Houston, Department of Accounting and Finance, University of Alabama at Birmingham

Presenter: Lahari Nekkalapudi

Presentation Session: MO9

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr.Shankar Ganapati Shanmigham

Co-Advisor: Mark Shankle

Title: Evaluating the Impact of Cover crop and Nitrogen treatments on Soil Microbial dynamics in Sweet Potato production system

Abstract:

Lahari Nekkalapudi*1,2, Mark Shankle1, William Kingery1, Shankar Ganapathi Shanmugam1,2

1Department of Plant and Soil Sciences, Mississippi State University, Starkville, MS 2 Institute for Genomics, Biocomputing & Biotechnology

Mississippi is the third-largest producer of sweet potato (Ipomoea batata) in the United States. An adequate supply of nitrogen (N) is required for profitable and sustainable production of sweet potatoes. Regardless of N supply, microorganisms play a vital role in regulating the availability of N to crops whether in form of fertilizer, organic matter, or crop residues by altering the oxidation state of N. There are limited research studying the role of soil microorganisms in augmenting soil health when integrated with cover crops in sweet potato production system. A study was initiated in 2023 at Pontotoc Ridge-Flatwoods Branch Experiment Station in Pontotoc, Mississippi (MS) to assess the effects of cover crops on nitrogen availability in sweet potato. This study was implemented in a randomized block design following a split block arrangement and replicated four times. A total of three N treatments (0, 50, 100 lb/acre) and three cover crop treatments (no cover crop, winter wheat cover crop, and clover cover crop) were adopted. Cover crops will be planted in fall and terminated in spring before planting sweet potato. Soil samples were collected at the time of planting and after harvesting of sweet potato and termination of cover crop. These collected soil samples undergo analysis for both physical and chemical properties. Amplicon targeting the bacteria (16s) and fungal (ITS) were sequenced for soil microbiome characterization. DNA sequence data was analyzed using MOTHUR (version 1.42.0) and QIIME (Quantitative insights into microbial ecology). R statistical software was used for analyzing the data. Cover crop treatments showed significant difference in measured soil permanganate-oxidizable carbon (PoXC). Specifically, clover cover crop treatment showed significantly higher soil PoXC levels than the control (fallow) treatment. Additionally, evaluating the sequencing data is important for revealing the effects of N and cover crop treatments, which helps us understanding the key mechanisms that influence soil microbial regulation of N in sweet potato and cover crop production systems.

Presenter: Lahari Nekkalapudi

Presentation Session: MP1

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr.Shankar Ganapathi Shanmugham

Co-Advisor: Mark Shankle

Title: Evaluating the Impact of Cover crop and Nitrogen treatments on Soil Microbial dynamics in Sweet Potato production system

Abstract:

Lahari Nekkalapudi*1,2, Mark Shankle1, William Kingery1, Shankar Ganapathi Shanmugam1,2

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Presenter: Jeffrey Nyabor

Presentation Session: AP1

Level of Study: Master's

Department: Communication

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Melody Fisher, Associate Professor, Department of Communication

Co-Advisor: Dr. Holli Seitz, Associate Professor, Department of Communication

Title: The Role of Social Media in Public Health Communication: A Study on CDC's Rx Awareness Campaign

Abstract: The opioid epidemic remains a significant public health challenge in the United States. The Centers for Disease Control and Prevention (CDC) reports that over 75% of the nearly 107,000 drug overdose deaths in 2021 involved an opioid (Centers for Disease Control and Prevention, 2023). As part of efforts to mitigate this problem, in 2017, the CDC launched the Rx Awareness campaign, targeting adults between the ages of 25-54 who have taken opioids for medical use or have misused opioids at least once (Centers for Disease Control and Prevention, 2020). The campaign implored the public to share materials created by the CDC on various social media platforms, including Facebook, Instagram, and X (formerly Twitter). This study analyzes the social media campaign, focusing on the level of audience engagement with the posts. The significance of such a study lies in the need to make necessary interventions in the campaign to ensure its effectiveness, thereby increasing public education against opioid abuse. The main objective for this study aims at analyzing audience engagement with the social media posts. This involves a content analysis of the comments from the audience. One of the goals of the Rx Awareness campaign is to increase knowledge about the addictiveness of the use of opioids. Hence, an analysis of the comments will be able to give an indication if that goal is being met. Based on the findings, recommendations will be made to improve the campaign and similar public health focused campaigns in the future.

Presenter: Gabriel F. Nyen

Presentation Session: MO3

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Adam D. Polinko, Assistant Professor, Forestry

Co-Advisor: Dr. Joshua J. Puhlick, Assistant Scientist, The Jones Center at Ichauway

Title: Seeding Understory Species, an Approach to Restoring the Longleaf Pine Ecosystem

Abstract: Some forest landowners in the Southeastern USA achieve multiple ecological and economic objectives by transitioning even-aged longleaf pine (Pinus palustris Mill.) plantations to uneven-aged stands and restoring historic groundcover communities. We measured understory species community compositions in mid-rotation longleaf pine plantations that received an understory species restoration seeding treatment following their first commercial thinning in 2015. This study was conducted within eight similarly aged longleaf pine plantations at The Jones Center at Ichauway in southwestern Georgia. In the summer of 2023, I conducted species-specific clip plots in these eight stands to identify differences in community composition seven years after the restoration seeding treatments. I observed a significant difference in species assemblages between the seeded and unseeded longleaf pine understories. This valuable study has outlined a successful approach to restoring historic species into mid-rotation longleaf pine understories.

Presenter: Seto C. Ogunleye

Presentation Session: AO4

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hossam Abdelhamed, Assistant Professor, Comparative biomedical Sciences, CVM

Co-Advisor: Dr. Mark Lawrence, Professor and Director, Comparative biomedical Sciences, CVM

Title: Regulatory Roles of Glutamate Synthase Gene in L. monocytogenes

Abstract: Listeria monocytogenes (LM) is a Gram-positive facultative intracellular bacterium that causes listeriosis in humans and animals. LM utilizes glutamate for nitrogen utilization in completion of the tricarboxylic acid cycle (TCA) that is an important source of oxidative energy for competitiveness and pathophysiology. The presence and ability to utilize glutamate in LM relies on the gltC alongside other transcriptional regulators. This study explored the impacts of gltC on the virulence, stress response, and physiology of LM. The importance of prfA regulon for virulence of LM was accessed in ΔgltC by expressing PrfA and LLO proteins using Western Blot, hemolytic assay using sheep RBC and phospholipase activities. Intracellular replication and cell-to-cell spread were tested using macrophage and fibroblast cell lines, respectively. The oxidative stress response of the ΔgltC was assessed using H_2O_2 and biofilm formation was determined using crystal violet method. Virulence abilities was tested in mouse model for bacterial load enumeration. Transcriptomic was performed using RNA seq and verified by RT-qPCR. Our result indicated that LLO and phospholipase activities representing part of the attributes coordinated prfA gene regulon are significantly reduced, while PrfA protein expression, and hemolytic activities where insignificantly impacted compared to the wildtype F2365. The deletion of gltC caused significant reduction in the cell-to-cell spread but not intracellular replication of LM. The biofilm formation by the ΔgltC was significantly impacted at 24 and 72 hrs. The survival of LM upon deletion gltC in pH 6 and 9 and minimal medial were not significantly different from wildtype F2365. Surprisingly, on exposure to 6-, 8- and 10 mM H_2O_2-induced stress, the ΔgltC survived better than wildtype F2365. The virulence of the ΔgltC is surprisingly significantly higher than the wildtype F2365. The transcriptomics shows significant up regulation of genes involved with virulence, nitrogen utilization, and oxidative stress response. The outcomes of this study indicate gltC serves as a negative regulator of genes involved with virulence, stress response and some of the pathophysiological characteristic of LM. This demonstrates the needs for more research into the impacts of the gltC for the development of targeted preventative and control measures.

Presenter: Seto C. Ogunleye

Presentation Session: MP2

Level of Study: PhD

Department: Comparative Biomedical Sciences

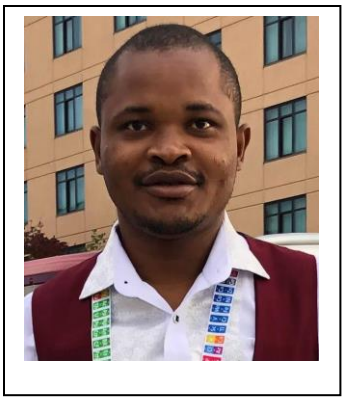
Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Hossam Abdelhamed, Assistant Professor, Comparative biomedical Sciences, CVM

Co-Advisor: Dr. Mark Lawrence, Professor and Director, Comparative biomedical Sciences, CVM

Title: Unveiling the Role of Catabolite Control Protein C (ccpC) in Nutrient Metabolism, Competitiveness of Listeria monocytogenes

Abstract: Listeria monocytogenes responsible for listeriosis, a fatal disease, exhibits resilience to diverse environmental pressure and adapt to several niches within the environment and host body by activities of important genetic arsenals as transcriptional regulators. Catabolite control protein C (ccpC) encoding LysR-type transcriptional regulator regulates important TCA enzyme involved with citrate metabolism. Our previous studies established that ccpC contributes to the virulence and oxidative-stress response in L. monocytogenes. This current study demonstrated the contribution of ccpC to nutrient metabolism and competitiveness of L. monocytogenes through growth in different nitrogen sources, genetic expression, and metabolomic analysis. Deletion of ccpC significantly affects nitrogen utilization under different growth conditions, particularly with nitrogen sources including ammonium, glutamine and ethanolamine. Genetic expression analysis reveals a consistent upregulation of genes associated with citrate metabolism, including citZ, citC, and citB, compared to the wildtype F2365 across all tested growth conditions. In contrast, genes related to glutamine and ammonium metabolisms, and virulence activities (prfA, plcA, inlB, hyl, and mpl) are notably downregulated in the ΔccpC in BHI. Under nitrogen-rich growth conditions, virulence genes and stress response genes show significant upregulation, indicating ccpC's intricate role in response to varying nutrient availability. Metabolomic analysis indicates higher concentrations of TCA metabolites (aconitic acid, citrate, isocitrate, and itaconic acid) in the ΔccpC strain compared to the wildtype F2365, while α-ketoglutarate and L-glutamic acids are lower. The study suggests that ccpC's crucial role in maintaining cellular homeostasis by regulating citrate metabolism. Upregulated genetic pathways, and elevated intracellular citrate and lactic levels may induce intracellular stress, that possibly triggers constitutive transcription of prfA resulting in significant defects on L. monocytogenes' growth and survivability under different nitrogen sources. The findings emphasize the importance of a balanced intracellular citrate pool for the physiological and metabolic well-being of L. monocytogenes. Further investigation of ccpC's involvement in other metabolic pathways is recommended to enhance understanding of its overall impact on the bacterium.



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: Comparative Study on Characterization and Adsorption Capacity of Pre- and Post-Modified MnFe2O4-RHBC for Pb(II) Sorption in Aqueous Medium

Abstract: Renewable agricultural wastes-based biochar produced via pyrolysis has demonstrated significant potential for contaminants removal in wastewater. Large specific surface area and porous structure are the contributing factors that characterized these adsorbents to be excellent for adsorption purposes. Research has also shown that the pristine biochar has certain limitations in their ability to attain higher efficiency of contaminants removal. In this study, pre- and post-modification of well dried rice husk (at 105 °C) by co-precipitation of 0.1mol MnCl2 and 0.2 mol FeCl3 with 0.8 mol NaOH were carried out. The slurry was left for 24 h, both pre- and post-modified adsorbent were pyrolyzed at 400 °C for 2 h, washed, and dried at 105 °C for 12 h. The modified biochar adsorbents were characterized using FTIR, EA, and XRD. The various peaks for MnFe2O4 nanoparticles were found in the XRD of the modified biochar. The clear difference in the data obtained for modified and unmodified confirmed the successful syntheses of the MnFe2O4-RHBC adsorbent. The pre- and post-modified MnFe2O4-rice husk biochar (MnFe2O4/RHBC) were used in adsorption experiment to test their sorption potential for Pb(II) ion from aqueous solution. Isotherm, kinetic, thermodynamic, and recyclability studies were carried out. Ionic strength, pH, and dosage affect adsorption.

Presenter: Emmanuel Oladejo

Presentation Session: MP2

Level of Study: PhD

Department: Animal and Dairy Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Shengfa Liao

Title: Oxidative stress alters intestinal microbiota in young growing pigs

Abstract:
The overproduction of reactive oxygen species (ROS) in pigs can damage intestinal physiology, which could further alter the intestinal microbiota homeostasis. This study investigated the effect of diquat-induced oxidative stress on the ileum microbiota composition in young growing pigs. Twenty barrows were randomly allotted to 2 treatment groups that received a basal diet. After 21 days of feeding, pigs were injected with either 10 mL saline (for Group 1: T1) or 10 mg/kg-BW diquat in 10 mL saline (for Group 2: T2). By day 29, pigs were euthanized and the ileum digesta samples collected. Full-length 16S rRNA gene amplicon sequencing was conducted using the nanopore long-read sequencer MinION. The sequencing runs generated FASTQ files which were analyzed for taxonomic annotation and relative abundance with the Emu database. Alpha diversity indices (i.e., number of species and Shannon index) were measured using a vegan package installed in R software. Beta diversity, the Bray-Curtis dissimilarity, was analyzed using the QIIME software with beta_diversity_through_plots.py. Linear discriminant analysis (LDA) and effect size (Lefse) analysis were conducted to determine the significant ranking of abundant taxonomic modules (phylum, family, genus, and species) between the two groups. There was no difference in the number of observed species (31.33 ± 2.81 vs. 22.56 ±2.81, P = 0.12) or Shannon indices (1.73 ± 0.17 vs. 1.24 ± 0.17, P = 0.15). The principal coordinates analysis (PCoA) based on the Bray–Curti's dissimilarity showed that the overall structure of the ileum microbiota was similar between the normal (T1) and oxidatively stressed (T2) pigs (P = 0.61). However, we identified specific bacterial taxa that were enriched in each treatment using the Lefse analysis. On the genera and species levels, the biomarkers indicating significant differences between T2 and T1 were Turicibacter and Pradoshia, and Clostridium saudiense, Clostridium disporicum, Clostridium saccharoperbutylacetonicum, Turicibacter sp. H121 and Pradoshia sp. D12, respectively. The relative abundance of these bacteria taxa was lowered in T2 when compared to T1. This study demonstrated that oxidative stress alters the composition of intestinal microbiota by lowering the population of certain beneficial bacteria in the ileum of growing pigs.

Presenter: Oluwaseyi Emmanuel Olomitutu

Presentation Session: MO5

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Michael J. Mulvaney

Co-Advisor: Jagman Dhillon

Title: Corn Response to Planting Speed in Mississippi

Abstract: Timely planting and uniform stands are prerequisites for optimal corn production in MS. However, narrow favorable weather windows limit actual corn planting acreage and speed planting might offer a potential solution. Moreover, new metering and seed delivery technology claims to allow faster planting (up to 19 kph) without sacrificing seed singulation or yield. Planting speed, among other factors, influences planter's ability to deliver seed into the furrow uniformly. Therefore, the objective of this study was to evaluate the performance of precision planter at varying speeds. The trial was conducted during the 2023 cropping season at two locations (Brooksville and Stoneville) in MS. A precision planter (John Deere® bar and MaxEmerge 2 row units retrofitted with Ag Leader® Sure speed and Sure force) was tested at 9.7, 14.5, and 17.7 kph actual ground speeds. A mechanical planter (John Deere® 1700 ground-driven mechanical planter equipped with eSet meter) was used as a check at 9.7 kph. The experimental design was a randomized complete block design, with each treatment replicated four times. Plots were 4.1 m (four rows) × 41 m and 7.7 m (eight rows) × 400 m in Stoneville and Brooksville, respectively. Corn hybrid DKC70-27 was planted at 81,800 seeds ha-1. Increased planting speed did not affect plant stand, in-row spacing variability, precision, and yield in the precision planter. The precision planter at 17.7 kph exhibited the same level of performance as the mechanical planter at 9.7 kph. The result suggests that we can increase planting speed in MS without detrimentally affecting spacing uniformity and yield.

Keywords: grain yield, planting speed, plant spacing variability, precision planter, seed singulation.

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

Title: Understanding Acceptance Capacity, and Intentions of Mississippi People to Participate in the Conservation and Management of Black bears in Mississippi: A dissertation proposal

Abstract: Understanding Acceptance Capacity and Intentions of Mississippi People to Participate in the Conservation and Management of Black Bears in Mississippi" is a comprehensive investigation aimed at illuminating crucial facets of wildlife management in the state. Through systematic review and empirical research, this study endeavors to provide insights into the acceptance capacity and intentions of Mississippi residents regarding black bear conservation and management.

The systematic review component of the study employs the SALSA framework to conduct a thorough examination of global literature on Wildlife Acceptance Capacity (WAC). By analyzing temporal patterns, collaboration dynamics, and thematic evolution, the review aims to elucidate the trajectory and current state of WAC research.

In addition to the systematic review, the empirical research component focuses on understanding the acceptance capacity and intentions of Mississippi residents, particularly landowners and households, towards black bear conservation and management. Through rigorous surveys integrating behavioral theories and demographic data, the study aims to identify factors influencing attitudes and intentions regarding black bear management.

Analytical techniques such as ordinal logistic regression and confirmatory factor analysis will be employed to analyze survey responses, enabling the identification of predictors of acceptance capacity and hunting intentions among Mississippi residents. By providing a nuanced understanding of acceptance dynamics and management intentions concerning black bears in Mississippi, this research seeks to inform evidence-based wildlife management strategies and promote sustainable coexistence between humans and wildlife in the region.

Presenter: Fenny Patel

Presentation Session: MP2

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

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

Co-Advisor: Dr. Larry A. Hanson, Professor, Department of Comparative Biomedical Sciences

Title: Comparative genomics analyses provide deep insights into the Edwardsiella genus diversity

Abstract: The Edwardsiella genus, a member of the Enterobacteriaceae family, encompasses five species known to infect a variety of organisms, including reptiles, fish, and humans. Particularly noteworthy is its impact on the farm-raised channel catfish industries across the United States, Asia, and Central America. Such widespread infectivity across diverse hosts underscores the considerable taxonomic diversity within the genus. Thus, this study aims to explore the genetic determinants driving this diversification within the Edwardsiella genus. To analyze the genetic factors contributing to this diversification, we sequenced the genomes of 22 Edwardsiella spp. and compared them with 52 genomes from the same genus, sourced from the NCBI. Employing techniques such as Average Nucleotide Identity (ANI) calculation and phylogenetic analysis of core genomes, we scrutinized the evolutionary divergence among Edwardsiella species. Our investigation uncovered variations in the presence of secretion systems, with all members encoding Type 1 and Type 5 Secretion Systems (T1SS and T5SS), while Type 3 Secretion System (T3SS) was notably absent in Edwardsiella hoshinae. Moreover, we noted that the majority of E. ictaluri genomes encoded Type 4 Secretion System (T4SS-type G), whereas T4SS-type F was prevalent across all Edwardsiella species. Additionally, differences in the distribution of CRISPR elements were observed, with E. ictaluri genomes containing fewer systems compared to other species. Furthermore, E. ictaluri genomes exhibited higher levels of insertion elements relative to other species. These findings shed light on the genetic mechanisms underpinning pathogenicity in members of the Edwardsiella genus, offering valuable insights that could aid in the development of improved diagnostic methods for species differentiation and facilitate vaccine development. In summary, this study advances our comprehension of the inherent pathogenic potential within the genomes of the Edwardsiella genus.

Presenter: Daniela Coral Patino

Presentation Session: AO2

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sol Pelaez, Classical and modern languages and literature

Title: The representation of nature in The Shrouded Woman by Maria Luisa bombal

Abstract: It analyzes the relationship between Ana María's voice in María Luisa Bombal's The Shrouded Woman and the representation of nature in the text, exploring the struggle of women to express themselves and obtain autonomy in a patriarchal society through ecofeminism, the literary and narrative resources used by the author are analyzed, as they construct and communicate Ana Maria's transformation, highlighting the symbolic connection with nature.

Through an ecofeminist literary analysis, it investigates the linguistic and narrative resources used by Bombal to construct and communicate Ana María's transformation through her profound reconnection with nature, in addition, a link with ecofeminism is established, highlighting how the narrative reflects and criticizes patriarchal power dynamics and the relationship between women and nature. The central thesis argues that the dual narrative perspective allows for a unique enunciation of the female experience, exposing Ana Maria's lack of fulfillment as a woman in life. In contrast, nature emerges as an emancipatory force that enables its awakening, subjective reconstruction, and rebellion against patriarchal mandates in the work of María Luisa Bombal.

Bombal employs modernist and surrealist imagery, privileging sensory representations of nature to convey Ana Maria's journey towards the recovery of agency over her body and her destiny. Their eventual dissolution into nature signifies the merging of their awakened feminine consciousness with the creative power of the Earth, reclaiming women's expression, and identity beyond social confines. Thus, the analysis draws parallels between Ana María's transformation and ecofeminist perspectives that recognize nature as a facilitator of women's empowerment in the face of gender oppression.

Presenter: Rejane S. Paulino

Presentation Session: MP4

Level of Study: PhD

Department: Agricultural & Biological Engineering

Category: Engineering

Advisor: Dr. Vitor S. Martins, Professsor, Department of Agricultural & Biological Engineering (ABE)

Title: Atmospheric correction of Sentinel-3A/B images for mapping water quality parameters in Mississippi coastal waters

Abstract: Sentinel-3 (A/B) is a sun-synchronous satellite that focuses on ocean color applications and provides daily multi-spectral observations of the water surface at 300m moderate spatial resolution. The Ocean and Land Colour Instrument (OLCI) sensor on board of Sentinel-3 makes the dataset highly suitable for the monitoring of various watercolor features in coastal ecosystems, including chlorophyll levels, harmful algae bloom occurrences, turbidity measurements, and the concentration of organic matter. However, in order to effectively address a multitude of aquatic tasks, the accurate removal of atmospheric effects from satellite images is essential. The primary objective of this study is to remove the influence of the atmospheric absorption and scattering of light from satellite signal and retrieve the water reflectance values. In this particular study, two distinct atmospheric processors, ACOLITE and 6SV analytical model, were used to correct the Sentinel-3 images acquired over the coastal waters of Mississippi State. To validate the accuracy of the water reflectance values, in-situ radiometric data obtained in September 2023 along the Mississippi coast were utilized. The results indicated that the ACOLITE exhibited superior performance in comparison to the 6SV. Specifically, the ACOLITE showed a Bias of 24% and a Mean Absolute Error (MAE) of 47% across all spectral bands ranging from 400 to 865 nm. On the other hand, the 6SV demonstrated errors exceeding 100%. For both processors, the blue bands had lower accuracy. For the spectral bands dedicated to organic matter (blue), phycocyanin (orange), chlorophyll (red), and turbidity (red-edge), the accuracy differences between ACOLITE and 6SV were more than 100%, 17%, 23%, and 36%, respectively. Consequently, these findings suggest that the ACOLITE model is a potential method for the water reflectance retrieval within the context of the Mississippi coastal waters.

Presenter: Sujan Poudel

Presentation Session: AO3

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Morpho-physiological and Yield Responses of Cowpea to Drought Stress

Abstract: Morpho-physiological and Yield Responses of Cowpea to Drought Stress

Cowpea (Vigna unguiculata) is an economically important legume grown in arid and semi-arid regions. It is cultivated widely in many countries for food, animal feed, and green manure. Cowpea is popular for producing high-quality protein beans in dry, under-fertilized, and marginal lands. Climate change has resulted in frequent drought stress for a prolonged period that coincides with the cowpea growing season. The cowpea grown in rainfed conditions are exposed to prolonged drought, which is a significant abiotic factor for total production loss. Despite the sensitivity of critical growth and development stages to drought, the interaction between them and yield has received little attention. To shorten this literature gap, we quantified the impact of drought stress on different phenological stages by assessing physiology, pigment, and yield parameters in this study. Two cowpea genotypes (UCR 369 and EpicSelect.4) were subjected to drought stress at various growth stages: 2nd trifoliate leaf (V2), 4th trifoliate leaf (V4), early bloom (R1) and mid-pod set (R4) stages for 14 days. After drought treatment, pots were rewatered and maintained under non-stress control conditions until physiological maturity. Physiological traits, pigment content, morphology, and biomass accumulation were measured at each growth stage, whereas yield and quality parameters were measured after harvest. The study was set up in a split-plot design. Results showed that drought stress had a significant negative impact on transpiration, photosynthesis rate, and chlorophyll fluorescence parameters. This reduction led to decreased plant height, vegetative biomass, pod number, pod weight, seed number, and seed weight. Starch was negatively affected by drought. However, protein content increased with drought. EpicSelect.4 was more sensitive to drought stress during the vegetative stage, showing a higher reduction (32%) in seed yield than UCR 369 (27%). Overall, R1 was the most critical for moisture stress, which resulted in a maximum decrease in seed yield. These findings provide information on understanding the mechanisms of cowpea’s response to drought stress during different growth stages which can be valuable for future breeding efforts aiming to enhance drought tolerance.

Presenter: Sujan Poudel

Presentation Session: MP1

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Morpho-physiological and Yield Responses of Cowpea to Drought Stress

Abstract: Cowpea (Vigna unguiculata) is an economically important legume grown in arid and semi-arid regions. It is cultivated widely in many countries for food, animal feed, and green manure. Cowpea is popular for producing high-quality protein beans in dry, under-fertilized, and marginal lands. Climate change has resulted in frequent drought stress for a prolonged period that coincides with the cowpea growing season. The cowpea grown in rainfed conditions are exposed to prolonged drought, which is a significant abiotic factor for total production loss. Despite the sensitivity of critical growth and development stages to drought, the interaction between them and yield has received little attention. To shorten this literature gap, we quantified the impact of drought stress on different phenological stages by assessing physiology, pigment, and yield parameters in this study. Two cowpea genotypes (UCR 369 and EpicSelect.4) were subjected to drought stress at various growth stages: 2nd trifoliate leaf (V2) and early bloom (R1) stages for 14 days. After drought treatment, pots were rewatered and maintained under non-stress control conditions until physiological maturity. Physiological traits, pigment content, morphology, and biomass accumulation were measured at each growth stage, whereas yield and quality parameters were measured after harvest. The study was set up in a split-plot design. Results showed that drought stress had a significant negative impact on transpiration, photosynthesis rate, and chlorophyll fluorescence parameters. This reduction decreased plant height, vegetative biomass, pod number, pod weight, seed number, and seed weight. Starch was negatively affected by drought. However, protein content increased with drought. EpicSelect.4 was more sensitive to drought stress during the vegetative stage, showing a higher reduction (37%) in seed yield than UCR 369 (28%). R1 was the most critical moisture stress stage with a maximum seed yield reduction (47%). These findings provide information on understanding the mechanisms of drought response stress during different growth stages which can be valuable for future breeding efforts aiming to enhance drought tolerance in cowpea.

Presenter: Mohammad Abdus Shahid Rafi

Presentation Session: MO1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

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

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

Title: Performance assessment of crop line detection in corn field from unmanned aerial vehicle video.

Abstract: In recent times, precision agriculture, an approach that utilizes scientific and technological advancements and techniques for the enhancement of agricultural production, usually starts with the crop line detection procedure. Crop line detection helps precision agriculture with the mapping of the crop fields which is useful for agricultural resources (water, fertilizer, pesticides, etc.) management, crop yield estimation, autonomous harvesting and irrigation management, disease and pest control, weed detection, controlled monitoring by autonomous machines and so forth. Although the aim of crop line detection in this inquiry is weed detection, which can aid the farmers regarding the optimum usage of herbicides in the field, it can be extended to any precision agriculture study. Two different methods are employed for crop line detection: Hough transformation and Pixel/Frequency counting. The study was conducted on a 1.2-ha corn field through 2020 - 2023 that covers the crop period of corn (April ~ August). More than 7000 high-spatial-resolution RGB images are collected using a GoPro camera attached to a custom-made unmanned aerial vehicle. Around 10% of these images are randomly selected for this analysis. RGB image frames were extracted from the video files and organized according to their weekly growth timeline. Normalized Excess Green Vegetation Index are calculated for converting them into two-level binary images. 2D Fourier transform are used to find the average crop line angle. Comparing the crop lines detected from both procedures with the actual crop lines present in the respective image frame, confusion matrix information is constructed for the performance evaluation. The average accuracy of crop line detection found for Hough transformation is 87.79% and for Pixel counting is 95.71%, which can be promising choices to be employed for crop line detection. This approach holds the potential to be employed for automatic corn and weed labeling, eventually facilitating optimized weed detection, crop yield estimation, and resource management in cornfields.

Presenter: Mohammad Abdus Shahid Rafi

Presentation Session: AP1

Level of Study: PhD

Department: Electrical and Computer Engineering

Category: Engineering

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

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

Title: Automatic vegetation and weed labeling in Corn (Maize) field from unmanned aerial vehicle video.

Abstract: Precision agriculture leverages cutting-edge technology to improve agricultural production. A critical step involves automatic labeling of vegetation and weeds within fields. This labeling enables field mapping for continuous crop monitoring, accurate crop yield estimation, optimized water, fertilizer, and pesticide use, autonomous harvesting and irrigation management, weed detection and proactive disease-pest control etc. This study focuses on automatic corn and weed pixel labeling for reliable weed detection, a key factor in understanding crop yield limitations. This facilitates strategic herbicide application, allowing for targeted weed control and maximizing crop yields. A custom-built unmanned aerial vehicle (UAV) equipped with a GoPro camera in the payload was utilized for data collection that glided over the designated cornfield. The data consists of high-resolution RGB video covering the entire experimental cornfield during each flight. This configuration is efficient in terms of time, labor, and cost. Daily flights were carried out throughout the corn growing season (April ~ August) in the years 2020 to 2023 to capture a dataset of cornfield videos encompassing complete growth stages. Next, discrete RGB frames were extracted from three years data and categorized by week after planting. Two-level binary frames generated using the Normalized Excess Green Vegetation Index and 2D Fourier transform facilitate the isolation of vegetation from the background. The binary frames along with the average angle of the corn lines and the average distance between the corn lines aids the detection of crop lines through the application of the Hough transform (accuracy: 87.79%) and pixel/frequency counting (accuracy: 95.71%). Hough transform was chosen for accurate positions of crop lines compared to the straight crop lines identified through pixel counting. Detected crop lines and segmented superpixels of the RGB frames are employed to classify vegetation: superpixels spatially aligned with crop lines as "corn" and others as "weeds." To evaluate the performance of the automated labeling process, a ground truth dataset was manually generated using MATLAB's image labeler application. This approach holds the potential to be employed for automatic corn and weed labeling, eventually facilitating optimized weed detection, crop yield estimation, and resource management in cornfields.

Presenter: Abdur Rahman

Presentation Session: MO1

Level of Study: PhD

Department: Industrial and Systems Engineering

Category: Engineering

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

Title: Boosting Discriminability of Transferable Features in Unsupervised Domain Adaptation

Abstract: Unsupervised domain adaptation aims to learn feature representations that are both transferable and discriminative across different domains. However, most existing methods are centered around aligning the source and target domains using different discrepancy measures or through adversarial training, which may compromise the discriminability of the features in the target domain. In this study, we adopt the idea of Kernel Fisher Discriminant Analysis to enhance the inter-class separation and intra-class compactness of the features. We propose a kernel Fisher loss that regularizes the largest singular values obtained from the singular value decomposition of the ratio of between-class scatter and within-class scatter matrices. Such regularization helps to boost discriminability by not letting the largest singular values stand out which are mostly related to tranferability. We further propose a Bayesian Optimization-driven optimation procedure to balance the transferability and discriminability. Extensive experiments on two benchmark datasets demonstrate that our proposed method outperforms the state-of-the-art methods in terms of accuracy.

Presenter: Sabina Regmi

Presentation Session: MO6

Level of Study: Master's

Department: Agricultural Economics

Category: Agriculture and Life Sciences

Advisor: Dr. Ayoung Kim, Assistant Professor, Department of Agricultural Economics

Title: Willingness to Pay for Broadband in the United States: A Meta-analysis.

Abstract: Assessing consumers' willingness to pay (WTP) for broadband has become increasingly important due to the interest in its cost and affordability, one of the barriers to broadband adoption. Numerous studies have reported a heterogeneous range of WTP estimates after controlling for broadband attributes and consumer characteristics. To address this heterogeneity, we conducted a meta-analysis synthesizing findings from 16 previous studies on WTP for broadband in the United States, reporting 147 mean WTP estimates. We systematically analyze variation in WTP based on broadband attributes and consumer characteristics, study design and publication characteristics. Our preliminary result suggests a mean WTP of $95.38 (adjusted to 2023 USD). We employ weighted least square regression to account for heteroscedasticity. Interestingly, our results indicate that WTP estimates in peer-reviewed journal articles are likely to be estimated lower compared to non-peer reviewed survey reports and working paper. Regarding urban-rural status, rural residents are willing to pay less than urban residents. However, WTP of urban and rural residents is lower than studies covering both urban-rural areas. Studies focusing solely on broadband adopters or non-adopters tend to yield higher WTP estimates compared to those including both groups. Furthermore, higher download speed levels are associated with higher WTP. These findings can inform future research and policy endeavors to promote equitable broadband access and adoption in the United States.

Presenter: Jillian Ressler

Presentation Session: AP1

Level of Study: Master's

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

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Mark Wildmon, Professor, (CHEF-Counseling, Higher Education Leadership, Educational Psychology, and Foundations)

Co-Advisor: Mackenzie Sidwell, Professor, (CHEF-Counseling, Higher Education Leadership, Educational Psychology, and Foundations)

Title: Using a check-in/check-out + behavior report card intervention to increase appropriate social behavior in a self-contained classroom

Abstract: Check-in/Check-out (CICO) is an evidenced based Tier 2 intervention that has shown to decrease problem behaviors and increase academic engagement (Kittleman, et al., 2018). It is one of the most commonly used intervention in schools for students showing minor problem behaviors across multiple school settings. Research has been conducted in over 3,000 schools (Hawken et al., 2014). The CI/CO intervention is easy to implement and only requires four intervention components, 1. Meet with student and review expected classroom performance, 2. Observe student's behavior throughout session or class period, 3. Complete the data sheet/behavior report card, and 4. Meet with the student and review the report card/performance, deliver reward or give feedback to increase goal (Dart et al., 2012). There is also a fifth intervention component if access to adult attention is observed when the student engages in problem behavior. The firth component is a take-home component which includes sending home a daily summary report for the parent to review (Weber et al., 2019). Even with numerous empirical evidence provided on the CI/CO intervention in a variety of settings, there is little or outdated research conducted in the self-contained classroom on the effectiveness of this intervention. In this review, I will discuss the characteristics, presentation, features, and guidelines of the CI/CO intervention, as well as research and results of CI/CO conducted in the self-contained classroom in a rural public school in central Mississippi.

Keywords:CI/CO, Check-In/Check Out, behavioral interventions, self-contained classroom, younger population, intervention

Presenter: Catalina Revelo

Presentation Session: AO2

Level of Study: Master's

Department: Classical and Modern Languages and Literatures

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Sol Pelaez

Title: The Facets of Motherhood: Motherhood, Conflict and Deconstruction in the novel 'Esta Herida Llena de Peces' by Lorena Salazar Masso

Abstract: The novel "Esta Herida Llena de Peces" (2021) by Colombian writer Lorena Salazar Masso explores the complexity of motherhood in the context of the armed conflict in Colombia. The work narrates the journey of a white mother with her adopted black son, along the Atrato River, Chocó, in the department of Quibdó, Colombia, to reunite him with his biological mother, an Afro-descendant woman. Through this journey across a region marked by violence, precariousness, and state abandonment, the novel problematizes the dominant conceptualizations of motherhood and family. Salazar Masso constructs a multifaceted representation of motherhood, confronting deeply rooted binary categories such as biological mother/adoptive mother or white/black. The work offers a resignification of motherhood as a social construction subject to redefinitions, which confront traditional mandates on femininity and family. In this way, the aim is to examine the resignification of the maternal that the work operates beyond essentialist, normative, or deterministic notions. The analysis focuses on the deconstruction exercise of rigid maternal categories carried out in the work. It explores how the novel destabilizes dichotomous pairs such as biological mother vs. adoptive mother, motherhood as instinct vs. motherhood as a choice or blood ties vs. emotional bonds. signifying motherhood beyond its biological dimension, emphasizing its character as a social construction subject to redefinition. The novel allows a critical analysis of the social mandates on motherhood and problematizes the concept of the "traditional family" as a cultural construction. The study of this innovative literary representation contributes to the contemporary discussion on gender, race and motherhood in Latin America.

Presenter: Aleisha M. Reynolds

Presentation Session: MO8

Level of Study: Master's

Department: Anthropology and Middle Eastern Cultures

Category: Education, Arts and Sciences, and Business

Advisor: Molly K. Zuckerman

Co-Advisor: Anna J. Osterholtz

Title: The Hamann-Todd & the Heights of Academic Freedom: A Dissection of the Necropolitical Lives & Deaths of Medical Institutional Bodies

Abstract: Using the Hamann-Todd Human Osteological Collection in Cleveland, Ohio, as a focal point, this contribution explores the pluralities of experience and existence in life, death, identity, and identification in the construction of historically documented human skeletal collections. It delves into the historical foundations of Physical Anthropology and Bioarchaeology, examining how the remains of past peoples are used to understand human variation across time and space. Drawing inspiration from Achille Mbembe's "Necropolitics," this contribution raises questions about the spaces created for the institutionalized and anatomized body and the transformative power of interaction between the living and the dead. The paper also delves into the historical practices of medical education, where grave robbing was once an essential part of training, shaping the multidimensional nature of contemporary necropolitical landscapes. Furthermore, it analyzes the impact of anatomization on marginalized populations, emphasizing the denial of burial and recognition, resulting in a postmortem "unspeakable death." The Hamann-Todd Human Osteological Collection is representative of a literal death world where necropolitical violence extends to the bulldozing of personhood and community connections. The study concludes by highlighting the paradoxical interplay of professional identity built upon the bodies of the institutionalized, reflecting a complex pursuit in a world committed to denying death itself.

Presenter: Alaina M. Richardson

Presentation Session: MO5

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Paul Tseng, Associate Professor, Plant and Soil Sciences

Co-Advisor: Dr. Luis Avila, Associate Professor, Plant and Soil Sciences

Title: Cover Crop Allelopathy: A Sustainable Weed Management Strategy in Sweet Potato

Abstract: The Sweet Potato (Ipomoea batatas (L.) Lam.) has flexible uses as food, feed, and industrial product usage. There are over 27,000 acres across one-hundred and fifty farms in Mississippi and the state also ranks second and third in the nation in terms of acreage and production, respectively. Farmers to suppress weed species, enhance biodiversity, improve soil health, and minimize pests and diseases in plants have used cover crops for a long time. In sweet potatoes, there is a significant problem with weeds interfering with yields; reducing crop yield by up to 80%. A chemical approach is usually the most popular utilization, but it can lead to disadvantages with crop quality, intolerance, and in worse-case scenarios environmental toxicity. To overcome limited weed control options and preserve or improve sweet potato quality and yield for Mississippi growers, there is a great need to find a supplemental weed control strategy that can effectively reduce the weed pressure around the crop and, at the same time, protect the yield and quality of the storage roots. One solution is the utilization of cover crop allelopathy, an alternative method that is environmentally friendly, and organically favored.

This study aimed to assess the efficacy of five cover crop species (crimson clover, cereal rye, hairy vetch, wheat, and buckwheat) in controlling a troublesome weed species in sweet potato cultivation, namely yellow nutsedge. A comparative analysis with the control group revealed significant differences in weed suppression. Over the course of 42 days, wheat exhibited the highest reduction in yellow nutsedge height (24%), followed by crimson clover (18.4%), while rye had a modest impact (7%). Vetch and buckwheat showed the least reduction. Regarding biomass reduction of yellow nutsedge, cereal rye demonstrated the most substantial suppression, with shoot biomass reduced by 24% and root biomass by 22%. Clover achieved a 7% reduction in shoot biomass. Vetch and wheat caused the same reduction in the shoot biomass (4%). Rye, wheat, and vetch exhibited a 15% reduction in root biomass, while clover showed a 5% reduction. Buckwheat did not reduce the root and shoot biomass of yellow nutsedge. These results highlight that wheat is the most effective cover crop in reducing yellow nutsedge while cereal rye was most effective in suppressing both root and shoot biomass. Overall, wheat, rye, clover, and vetch emerge as highly effective, with buckwheat displaying the least efficacy against this specific weed species.

Keywords: weed suppression, sweet potato, organic, common weed species, allelopathy, cover crops

Presenter: Carlos Rivera

Presentation Session: MP3

Level of Study: Master's

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Ph.D. Esteban Galeano, Professor, Forest genetics

Title: Molecular Archiving of Stoneville and Other Eastern Cottonwood Clones

Abstract: Eastern cottonwood (Populus deltoides) is a model platform for engineering carbon fixation and storage, phytoremediation, water and nutrient use efficiencies, biofuel quality, and urban site tolerance. The US Forest Service Southern Research Station has had a significant increase in national and international demand for P. deltoides clones in the last decade, primarily driven by carbon sequestration applications for climate mitigation. Unfortunately, the molecular identity, origin of the material, and genetic structures are unclear. The objective of this project is to produce and archive molecular identities of the P. deltoides clones and their genetic diversity. As methods, we will collect leaves from 400 clones, in two populations (Clon Bank, and Breeding Orchard) in Stoneville, Mississippi. DNA extraction will be carried out at the Galeano Lab, Department of Forestry. Genotyping will be performed using targeted sequencing. Then, we will clean and select the most informative SNPs. Finally, we will create an open-access genetic data repository. We expect to: (1) identify mislabeled clones in the two fields and material from other origins, (2) recognize the relatedness and genetic diversity of the clones, (3) inform the public of the genetic identity of each clone for germplasm conservation purposes. As management implications, we will provide critical first steps to ecological genetics for restoration with P. deltoides under USDA programs and private, NGO programs.

Presenter: Krista Ruppert

Presentation Session: AO5

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

Title: Multispecies Occupancy Modeling of Amphibian Breeding Communities in South Alabama

Abstract: Alabama is a hotspot for amphibian biodiversity, with over 70 native species known to occur in the state. Of these, more than 40 can be found on the Conecuh National Forest in south Alabama, including the gopher frog (Rana [Lithobates] capito), a species of greatest conservation need. Gopher frog breeding wetlands are typically isolated, ephemeral ponds with minimal canopy and a lack of large predatory fish. We sought to further explore these breeding habitat associations via a community ecology lens, comparing the occupancy of amphibian species in varying wetlands across environmental conditions. To do so, we systematically conducted 210 call surveys and 125 dip net surveys at 24 ponds across the Conecuh National Forest from February through July of 2022 and 2023. Ponds included annual gopher frog breeding ponds (n=2), occasional gopher frog breeding ponds (n=7), and ponds identified as potential restoration sites (n=15). We then used a multi-species hierarchical occupancy modeling framework to assess the impacts of environmental covariates on species occupancy while accounting for imperfect detection. A total of 18 anuran and 4 caudate species were detected during surveys, with highly variable detection rates based on survey method and detection covariates. Species occupancy was less variable among species, with most individual species occupancy values aligning with community values for occupancy covariates, a pattern that extends to gopher frogs as well. For both gopher frogs and the entire amphibian community, occupancy was higher in ephemeral ponds with deeper water. These associations can help inform restoration and management efforts and suggest that improving breeding habitat for gopher frogs may benefit other amphibian species simultaneously.

Presenter: Saviz Saei

Presentation Session: AP1

Level of Study: PhD

Department: Industrial and System Engineering

Category: Engineering

Advisor: Dr. Nazanin Tajik

Title: On the Nexus of Topological Measures and Their Ability to elucidate Network Vulnerability Patterns

Abstract: This paper presents a nexus of network-level topological measures designed to illustrate, analyze, and model infrastructure resilience within the context of network vulnerability. We reviewed 88 research papers, from which we extracted 38 distinct network-level topological measures in the context of transportation, power, water, and community networks. We conducted empirical analyses on 15 topologies with different sizes in physical and social systems. The analyses illustrate the reciprocal relationships among these measures and their compound role in providing information on network topology. We also observed that information about topological characteristics is necessary but does not suffi ce to identify the network vulnerability unless combined with information on the disruption patterns across the network. We illustrate the triangular connection among topological measures, disruption patterns, and vulnerability in a network by developing a series of multivariate linear regression models. These models utilize topological measures as independent variables to capture the correlates of the network vulnerability magnitudes against disruption patterns.

Presenter: Jasmine Sahota

Presentation Session: AP2

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Shankar Shanmugam

Co-Advisor: Jagman Dhillon

Title: Characterizing Insect Frass-Associated Microbiome and their Metabolic Diversity Using Biolog Eco Plates

Abstract: Insect frass, a major residual stream from entomoculture for food and feed, holds the potential as a soil amendment. Insect frass-associated microbiota is a diverse community of microorganisms thriving in insect excrement. If applied as bio-fertilizers, they could play a pivotal role in nutrient cycling, soil health, and plant-microbe interactions. This microbiome's composition is intricately modulated by the originating insect species, its dietary intake, and the frass's processing state (either raw or processed). The nuanced impact of these factors on the frass's functional contributions to plant vigor remains largely underexplored in scientific literature. To bridge this gap in understanding, we have designed the present study to elucidate the composition and functional capabilities of the microbiome associated with insect frass, evaluating its role in sustainable agriculture. We have collected insect frass samples from various sources and industrial treatments, such as raw frass and air-dried frass, different feedstocks, and diet sources, for this study. We extracted genomic DNA from the frass samples using the QIAGEN DNeasy Power Soil Pro Kit. We will be performing Amplicon sequencing to target the 16S-V4 region (bacterial) and ITS2 (fungal), using Biolog Eco Plates, we studied variations in carbon source utilization patterns in microbial metabolic profiles among insect frass derived from different insect sources and those subjected to varying diets. This highlights the impact of insect species and dietary variations on the functional potential of the frass-associated microbiome. No significant differences were observed between raw and dry treatments, suggesting that the procedure methods do not substantially alter the metabolic diversity of the frass microbiome. Cricket exhibited the highest AWCD (average well-color development) value among insect treatments, while in the diet treatments, OWDA (organic waste and drying agent) showed the highest AWCD. Mealworm has the highest Shannon diversity index, whereas in diet treatments we found PCFW (pre-consumer food waste) treatments have superior value. This research contributes to our understanding of the ecological significance of insect frass and its microbial inhabitants. By combining high-throughput sequencing with Biolog Eco Plate analyses, we offer a holistic view of the insect frass microbiome's taxonomic composition and metabolic potential. Insights gained from this study have implications for nutrient cycling, soil health, and agricultural practices, emphasizing the importance of considering the frass microbiome in broader ecological contexts. Ongoing research aims to delve deeper into specific microbial taxa and their functional roles, providing a foundation for sustainable ecosystem management strategies.

Presenter: Apphia Santy

Presentation Session: MO5

Level of Study: Master's

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

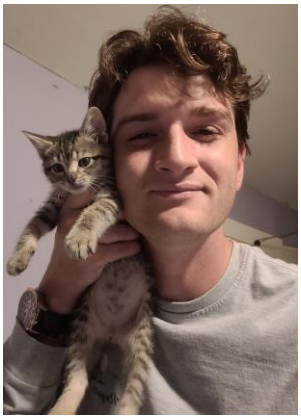
Advisor: Dr. Guihong Bi, Professor, Plant and Soil Sciences

Title: Testing different Raspberry cultivars for production in Mississippi

Abstract: Testing different Raspberry cultivars for production in Mississippi. Apphia Santy*, Guihong Bi, Tongyin Li, Richard Harkess, Eric T. Stafne, Raju Bheemanahalli. Department of plant and soil science, Mississippi state University, Mississippi State, MS 39762(as5152@msstate.edu)

The demand for raspberries has been steadily increasing in recent years, largely driven by their perceived health benefits. Many states in the US produce raspberries, however, most of the production is concentrated in three states: Washington, California and Oregon as most raspberry cultivars grow best in regions with cool summers and mild winters. However, newer cultivars have been developed that can endure higher temperatures and more sunlight. This has prompted local Mississippi growers to explore raspberry cultivation. However, there lacks research-based recommendations on raspberry cultivars suitable for Mississippi's climate. The objective of this study was to evaluate raspberry cultivars in terms of plant growth, heat and cold tolerance, pest and disease resistance, berry yield, quality, and fruiting season to identify the best-suited cultivars for Mississippi. The study followed a randomized complete block design with two types of fertilizer-organic and conventional fertilizer. Data collection included measurements of plant growth and performance, berry yield and quality and fruiting season. The first-year results showed that raspberry yield was influenced by fertilizer treatment. The fruit size, soluble solid contents, acidity, and fruit color were not influenced by fertilizer treatment. Raspberry yield was higher for “Polka”, “Encore”, “Heritage”, and “Latham” under conventional fertilizer, while “Anne”, “Crimson Night”, and “Crimson Giant” under organic fertilizer had lower raspberry yield. The fruit's soluble solid content was highest in “Heritage”, indicating a sweeter taste, and the acidity remained consistent across all treatments. Fruit color varied between cultivars, with differences in lightness, redness, and yellow coloration.

Presenter: Ethan Schuetzle



Presentation Session: AP1

Level of Study: Master's

Department: Mechanical Engineering

Category: Engineering

Advisor: Dr. Joonsik Hwang, Mechanical Engineering

Co-Advisor: Dr. Alta Knizley, Mechanical Engineering

Title: Melting Cycle of Phase Change Materials in Micro-Gravity

Abstract: Phase change materials (PCMs) have presented significant advantages in enhancing the capabilities of thermal energy storage (TES) systems for various applications in space, including on next generation spacesuits. When incorporated into a TES system, PCMs offer an improvement to the thermal management capabilities of that system due to the inherently high latent heat of fusion of PCMs, meaning they absorb and store large thermal loads during phase change from solid to liquid. In addition, PCMs are ideal for meeting weight requirements in space vehicles due to the high energy-to-weight ratio that they demonstrate. Although PCMs display desirable properties in the light of thermal energy storage, they suffer from low thermal conductivity. In this research, we investigate phase change process of PCM with enhanced heat transfer media, a 3D printed lattice structure to overcome technical challenge of low heat conductivity. Addressing the low thermal conductivity of the PCM is crucial because in micro-gravity conditions where the PCM will be operating, the lack of gravity reduces the effects of buoyancy that limits heat transfer within the PCM. The heat transfer mode is governed by conduction under micro-gravity condition. The high thermal conductivity of the lattice will allow the heat to propagate through the PCM more efficiently, making up for the lack of convective heat transfer. We gather data on the melting process of PCMs in microgravity conditions by developing an autonomous testing chamber to be taken on a series of sub-orbital flights. Thermal and optical cameras are used to gather temperature distribution and liquid volume fraction on the melting cycle of a PCM, and various sensors and actuators are utilized to control the experiment. After the flight, the data gathered will be analyzed and compared with numerical simulations of the melting cycle of the PCM under microgravity. By performing fundamental study on the effects of gravity level and lattice structure, we aim to develop a high-fidelity tool to be used to optimize various parameters of the lattice structure used to enhance heat transfer to the PCM without the need for high-cost experiment such as sub-orbital flight testing.

Presenter: Zoe Scott

Presentation Session: MP3

Level of Study: Master's

Department: Wildlife, Fisheries and Aquaculture

Category: Forest Resources and Veterinary Medicine

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

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

Abstract: Range-wide, the red-headed woodpecker (Melanerpes erythrocephalus; RHWO) has declined more than 50% since 1966, primarily driven by changes in forest structure including the reduction of critical nesting habitat in the form of snags. RHWO acts as a primary cavity excavator in forest bird communities, providing vital habitat for other cavity nesting species. The availability of snags is a limiting factor in these populations, with the presence of cavity excavating species directly influencing community diversity, especially in the managed pine forests of the southeastern U.S. RHWO nest site selection and success has not been well explored in these landscapes. The goal of this study is to identify local and landscape factors influencing nest site selection and nest success of RHWO in managed pine forests. Nest site selection and success will be monitored in four private working forests of the Tombigbee Forest Bird Partnership in central Mississippi and Alabama. Snag, cavity, and surrounding habitat characteristics will be compared to nest success data collected with a peeper camera to elucidate which factors are related to nest success. Artificial snags installed in 2023 and 2024 will be monitored for woodpecker use over the course of the study. The findings will help develop recommendations for snag management to promote RHWO conservation and avian community diversity in working forests. Preliminary results from a 2023 pilot study are in line with range-wide habitat preferences and indicate RHWO selection in managed pine for older decay class snags with greater height and larger diameter at breast height (dbh).

Presenter: Aditya Shah

Presentation Session: MO1

Level of Study: PhD

Department: Aerospace Engineering

Category: Engineering

Advisor: Dr. Rani W. Sullivan

Title: Manufacturing and Testing of a Stitched Sandwich Composite Main Landing Gear Door

Abstract: Lightweight sandwich composite structures exhibit high strength and bending stiffness and have been used in various load-bearing aerospace structures. This work focuses on the fabricating and structural testing of full-scale stitched sandwich composite main landing gear doors. The strut doors are constructed from carbon fiber non-crimp fabric facesheets and closed-cell foam core, with through-thickness modified lock stitching. This presentation details the fabrication and testing efforts of the MLG door.

Presenter: Tanveer Shaikh

Presentation Session: AO4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Nicholas Fitzkee, Professor, Department of Chemistry

Title: Engineering Biomimetic Protein Coronas for Precision Regulation of Nanoparticle Function

Abstract: Nanoparticles hold significant therapeutic potential, but their interaction with proteins in biological fluids creates a protein corona that affects their in vivo behavior. Predictive models of bio-nano interactions remain elusive, hindering the rapid development of effective nanotherapeutics. In this work, we investigated the mechanistic and biological aspects of corona formation on gold nanoparticles (AuNPs) by tracking the behavior of bovine serum albumin (BSA) in complex protein mixtures. The binding of BSA on AuNPs is confirmed by 1H NMR, UV-vis, and dynamic light scattering (DLS). Serum albumin was isotopically tagged to investigate its binding to AuNPs in the presence of other proteins using NMR. Transferrin (Tf) and Fibronectin (Fn) compete with BSA for binding, while Immunoglobulin G (IgG) does not displace BSA. The presence of Tf and Fn was confirmed by DLS, which also showed IgG aggregates in AuNP presence. A simplified mixture of BSA, Tf, Fn, and IgG produced similar spectroscopic behavior as complete serum, indicating competitive binding in complex mixtures at high protein concentrations. Rapid corona formation was observed using 19F NMR, while circular dichroism revealed altered protein secondary structure for mixtures in the presence of AuNPs. To comprehend the biological significance of protein corona formation on nanoparticle uptake, we explored the cellular uptake of these AuNPs. Surprisingly, AuNPs with engineered corona showed reduced macrophage uptake and increased cancer cell uptake compared to serum-coated AuNPs. These findings underscore the unique contributions of individual serum components to corona formation and suggest that a simplified mixture can effectively replicate aspects of adsorption observed in complete serum.

Presenter: Ramandeep Kumar Sharma

Presentation Session: AP2

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

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

Title: Machine Learning Algorithms for Yield Prediction of Corn and Soybean: A Systematic Literature Review

Abstract: Crop yield is one of the most important aspects of agriculture, capturing the interest of agricultural scientists, academicians, and researchers. Traditional crop yield prediction methods often rely on statistical models that are based on historical data and do not account for the complex interactions among environmental factors, soil, and crop genetics. Given the abundance of data accessible in agriculture, Machine learning algorithms can analyze large and heterogeneous datasets and identify patterns and relationships that traditional methods cannot capture. The main objectives of the review include: exploring machine learning and deep learning techniques used to predict the crop yield using various input parameters, evaluating the accuracy measures considered for measuring the performance of these techniques, examining the efficiency of these techniques, exploring the input parameters used for modeling, to compare the performance of algorithms for crop yield prediction and to explore the efficiency of hybridized models. In the current study, we performed a systematic literature review (SLR) to get insight into algorithms, input parameters, and evaluation parameters used in the relevant papers. The target crops for the study are corn/maize and soybean. We were able to identify 1859 related papers from four databases, out of which we selected 82 papers for further analysis after considering inclusion and exclusion criteria. The results of SLR show that the most popular machine learning algorithms among researchers of selected domains are Random forest, Artificial Neural Networks (ANN), Support Vector Machines, and XG Boost. Additionally, LSTM and CNN are the most widely used deep learning techniques for crop prediction. From the literature reviewed, it has also been shown that temperature, precipitation, crop historical yield, NDVI, and ph-value are the most considered input parameters by the researchers of the selected domain. The current review has also shown the inclination towards the hybridization of models for enhancing the model accuracy. The study also highlights the most influential input parameters. Temperature and precipitation were considered the most influential factors affecting crop yields. Apart from these factors, soil water-related variables, nutrients, and NDVI have considerable influence on crop yield. This analysis can be useful for academicians and researchers looking for futuristic directions in a given research domain

Presenter: Nishat Shermin

Presentation Session: MP4

Level of Study: Master's

Department: Geosciences

Category: Education, Arts and Sciences, and Business

Advisor: Dr. Narcisa Pricope, Professor, Department of Geosciences

Title: Mapping the luminous intrusion: A nationwide Emerging Bivariate Cluster analysis of nighttime light's intervention on bat habitats over 30-years

Abstract: Artificial nighttime lights can adversely impact animal behavior, particularly in nocturnal species. Evidence shows that bats can become inactive due to night lights and may avoid trees bathed in such light, consequently decreasing nocturnal pollination frequency. Although numerous biological studies have been conducted to understand the alteration in bat behavior due to artificial night lights, mapping the intrusion of nighttime light into bat habitats remains largely unexplored. In this study, we aim to visualize the intervention of nighttime light on bat habitats in the United States over the past 30 years. We are proposing a novel method known as the "Emerging Bivariate Cluster" which has the potential to pinpoint locations experiencing the most significant nighttime light intervention in bat habitats over time. Our results show that 0.63% of bat habitat in the United States has been consistently intruding by nighttime light, with an additional 1.4% persistently intervened over the years. These findings can aid biological scientists in identifying potential locations to further study the impact of nighttime light on bat habitats. Furthermore, the results can provide guidance on mitigation strategies to limit this intervention, ensuring a healthier ecology.

Presenter: Darren Shoemaker

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Leandro Miranda, Wildlife, Professor, Wildlife, Fisheries & Aquaculture

Title: Comparative Modeling of Reservoir Impairment from Climate Change Using Human Dimensions

Abstract: Reservoir decline due to aging is well documented and climate change may accelerate and intensify this decline. Predictive models suggest climate impacts will vary geographically and temporally. Because of this uncertainty, stakeholders need to identify how their systems are likely to be affected. Reservoirs are uniquely valuable because they serve a variety of ecological and societal functions, including water supply, fish conservation, and recreation. The global scale of the climate crisis necessitates national cooperation to conserve natural resources, including reservoirs, but conducting field surveys at this scale is resource-intensive and often infeasible. Field surveys are often focused on local conditions and are rarely standardized across large spatial scales. The fields of remote sensing, statistical downscaling, and human dimensions are being explored to meet this data need. Our project examines relationships between environmental conditions and climate using survey data collected by human dimensions researchers to evaluate reservoir impairment. A database which includes reservoir characteristics including size, depth, catchment, and land use for reservoirs across the United States was obtained from the Reservoir Fish Habitat Partnership. Estimates for 19 historic (1970-2000) bioclimatic indicators were obtained for each of the reservoirs from the climate database WorldClim at a 2.5-minute spatial resolution. Indicators are descriptors of temperature and precipitation commonly applied in ecological investigations. Ordinal classifications for 45 impairment metrics from 1090 reservoirs across the United States were obtained from a previous study. We applied three frameworks: conventional statistical testing, shallow learning, and deep learning to identify which reservoir characteristics are influenced by the 19 bioindicators. Each framework was evaluated with standard metrics to determine which was most appropriate for this nonconventional data structure. Shallow learning algorithms performed best, with mean accuracy of 0.49 and AUC of 0.67 across 45 impairment metrics. We present results and future research goals for examining reservoir impairment at the national scale.

Presenter: Samrat Sikdar

Presentation Session: AP2

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

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

Title: Fostering Farmer-Extension Relationships: Insights from Livestock Farmers, Innovation Brokers, and Extension Services in England's Technological Innovation System

Abstract: Precision Livestock Farming is one of the complex farm-based innovations that is receiving global attention in the contemporary period. We used a qualitative approach during this research which tried to investigate potential farm innovation brokers and their relationships with farmers. 15 respondents were interviewed using semi-structured interviews which includes the farmers as well as farm-innovation brokers from the Reading area in Berkshire (England) and a few nearby areas. After analyzing the data using the thematic analysis technique, several important farm-innovation brokers were identified such as vets, feed consultant, peer-farmers and various representatives of the agri-food companies. The farmers admired the honesty and empathy of the brokers, the long-term business relation they maintained and the authenticity of the knowledge they shared through advising. A credible reputation among the other peer farmers was also identified as a reason behind the farmers' trust in those innovation brokers. The farm-innovation brokers also put their efforts into establishing rapport with the farmers and always strive to gather & share proper, evidence-based PLF-based innovations. For example, the innovation brokers make an effort to gather holistic, appropriate and experiential knowledge before sharing it with their clients. They also provide support to the clients throughout the adoption process. Offering evidence-based solutions and demonstrating enthusiasm for the clients' farms are crucial aspects of successful PLF technology advising. The brokers make diligent efforts to maintain a positive performance-based relationship with the clients and fulfil their previous commitments. Similarly, the brokers aim to establish an informal and empathetic relationship with the clients as part of rapport building. Overall, this research study contributed to sharing lessons learned about what could help foster relationships between livestock farmers and the associated farm-innovation brokers (agents), particularly when it comes to adopting a complex farm innovation.

Presenter: Chamika A. Silva

Presentation Session: MP4

Level of Study: PhD

Department: Agricultural and Biological Engineering

Category: Engineering

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

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

Title: Rapid estimation of macro and micronutrients in fresh and dry plant leaf tissues using infrared spectroscopy

Abstract: The current agriculture relies on conventional laboratory-based methods to estimate the nutrient contents in plant tissues which involved hazardous chemicals and more prominently they are time-consuming and costly. This could delay the decisions for precise management of nutrients by several weeks which impacts the final yield; hence, a rapid solution is demanding. Attenuated total reflectance (ATR) and diffuse reflectance (DR) spectroscopic techniques are rapid, cheap, and non-pollutant analytical tools which can substitute the laboratory methods. This study used fresh cotton and maize leaf samples to evaluate the feasibility of using visible near-infrared (VisNIR) and mid-infrared (MIR) spectrometers to estimate eleven macro and micronutrients (N, P, K, Ca, Mg, S, Fe, Mn, B, Cu, and Zn). Spectra were collected using two portable and two benchtop spectrometers to compare the estimation accuracies between the two types of instruments. Samples were dried and ground after collecting spectra from fresh leaves and scanned again with all the spectrometers. From the dataset, 75% of the samples were used to calibrate the models using partial least square regression and validated on the remaining. The results revealed the high accuracy in predicting all macronutrients ($R^2 > 0.90$) except for K from both VisNIR and MIR instruments. Calcium showed the highest performance followed by S > N > Mg > P. Boron and Mn were predicted satisfactorily ($0.83 > R^2 > 0.62$) among other micronutrients. In general, the dry ground models outperformed the fresh scans but for many nutrients the fresh scans estimations were still accurate. There was no significant advantage of using ATR over DR mode. Our results further confirmed the accuracy of portable spectrometers on par with benchtop spectrometers, and this suggest the practical applicability of portable instruments for rapid field measurements.

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

Title: Characterization of root trait variability in soybean

Abstract: A robust root system helps plants efficiently uptake water and nutrients from the soil, manage stress, and withstand adverse conditions. Selecting and breeding genotypes with efficient root systems is important for increasing adaptation to specific environmental conditions. Therefore, exploring genetic variability in root traits and understanding the associations with above-ground characteristics is essential. This will help identify genotypes with optimal root traits to improve resource use efficiency in rainfed environments. A set of 227 diverse soybean germplasm accessions were phenotyped for shoot and root traits in specially designed root beds. Roots were separated from the shoot at harvest (35 d after planting) to record root system architecture traits. Significant ($p < 0.001$) genetic variability was observed in all the measured traits. The root volume ranged from 0.17 cm3 to 2.61 cm3, with an average of 1.20 cm3, and it had a strong positive correlation with root biomass ($r = 0.84$), projected area, surface area ($r = 0.94$), and root length ($r = 0.77$). The number of forks ranged from 465.3 to 9220, with an average of 3704, and it was highly correlated with root length and root length per volume ($r = 0.96$). Root crossings ranged from 57 to 1582, with an average of 443.1, with the highest correlation with forks ($r = 0.98$). Above-ground biomass production ranged from 0.66 g to 25.55 g, with an average of 8.9 g, while root biomass ranged from 0.04 g to 2.29 g, with an average of 0.79 g. In summary, soybean genotypes exhibit a large variability in root growth and branching traits, with a strong correlation between above-ground traits.

Presenter: Bala Subramanyam Sivarathri

Presentation Session: MP1

Level of Study: PhD

Department: Plant and Soil Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Raju Bheemanahalli, Department of Plant and Soil Sciences

Title: Influence of Biostimulants on Emergence and Seedling Vigor under Low and High Temperatures

Abstract: Abiotic stresses significantly impact germination and seedling vigor traits, which can lead to reduced crop yields. The germination process relies on temperature, moisture, and oxygen, and it plays a crucial role in achieving a better crop stand in the fields. Incorporating biostimulants into modern agricultural practices has been proposed as an excellent way of sustainable farming. Biostimulants help enhance soybean growth and development, improve nutrient use efficiency, and effectively mitigate the negative impact of abiotic stresses. Soybean seeds were treated with seven different biostimulants, both individually and in combination, and exposed to chilling (20/10 °C, day/night), optimum (30/20°C, day/night) and high (38/25°C, day/night) temperatures. Biostimulant-induced changes in emergence and growth of the seedlings were recorded. Our findings showed that the seeds treated with biostimulants had a shorter time to reach 50% emergence and demonstrated varying levels of increased biomass under both low and high-temperature stress compared to optimal temperature. Fertiactyl reduced the time to 50% emergence by 48 hours, which led to a 30% increase in biomass under chilling. Similarly, Biowake+Biofriendly reduced the time to 50% emergence by 33 hours and promoted biomass production by 17% under high temperature. Under optimal temperature, BioSa+Biofriendly+Polymer and BioWake improved biomass by 9% and 19%, respectively. Overall, the findings suggest that the application of biostimulants can greatly shorten the time needed for seedlings to emerge, which in turn helps them to adapt to low and high temperature conditions.

Presenter: Sawyer Wyatt Smith

Presentation Session: MO6

Level of Study: Master's

Department: Food Science, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. M.W. Schilling, Professor, Food Science & Technology

Co-Advisor: Dr. X. Zhang, Assistant Research Professor, Food Science & Technology

Title: Inhibiting Tyrophagus putrescentiae orientation to and reproduction on dry cured hams: The impact of acetic acid-treated ham nets

Abstract: Dry-cured hams are often infested by Tyrophagus putrescentiae (Schrank) (Sarcoptiformes: Acaridae) during aging. Recent studies have highlighted the potential for liquid smoke infused nets to control Tyrophagus putrescentiae infestations on dry-cured hams, as a potential alternative replacement to methyl bromide. This research aims to investigate acetic acid (CH3COOH), one of the three predominant components of liquid smoke, for its efficacy in mite control when applied to ham nets. Solutions with acetic acid concentrations ranging from 0% to 2% in 0.5% increments, and 1% xanthan gum (XG), were infused into nets, which were then applied to ham cubes. The two-choice orientation assay demonstrated that mites exhibited a preference for the untreated control ham cubes over any of the tested treatments ($P < 0.0001$). In the reproduction assay, all treatments reduced mite numbers in comparison to the untreated control ($P < 0.0001$). There was no significant difference ($P = 0.72$) among the treatments and the positive control, which was a net infused with 40% propylene glycol (PG), 1% carrageenan, and 1% propylene glycol alginate. The positive control with 40% PG had no living mites present after two weeks of incubation, demonstrating the complete inhibition of mite feeding and reproduction. The XG + acetic acid (0.5%–2.0%) treatments, which had no PG, resulted in mean mite counts ranging from 20 to 26. However, XG alone without acetic acid led to a similar small number of mites (16) ($P > 0.05$); indicating that addition of acetic acid was not needed to control mites. Scanning electron microscopy revealed that the liquid smoke treatment forms a more robust physical barrier than acetic acid treatments. The effectiveness in previous liquid smoke treatments is likely due to physical properties imparted by liquid smoke in conjunction with the components that make up liquid smoke.

Presenter: Maya Stratman

Presentation Session: MP3

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Agriculture and Life Sciences

Advisor: Dr. Eric Sparks, Professor, Director of Coastal and Marine Extension

Title: The potential for Conservation Grazing in Coastal Uplands

Abstract: The habitat restoration and management of coastal uplands is difficult due to the initial investment of resources, continued maintenance, specialized experience, equipment, and training required. Some common habitat management techniques include applications of prescribed fire, herbicide, mulching, and other mechanical treatments—each with varying levels of cost-effectiveness, intrusiveness, and strategy. Another practice that has been highly successful is conservation grazing. For example, pyric herbivory, the coupling of prescribed fire and accompanying grazing pressure, has been shown to create heterogeneity and diversity in vegetation communities and reduce occurrence of invasive species in grassland communities. While the potential benefits of incorporating livestock grazing into habitat management are evident, these practices require substantial knowledge of animal husbandry, ecological health, and logistical considerations. For example, grazing duration and intensity, livestock type, and timing of grazing activity during the year can drastically affect the success of a grazing strategy. Given the lack of research-based information in the northern GoM, this study aimed to determine the ideal frequency and duration of livestock grazing needed to achieve management goals. This study was conducted within 5mx5m plots with varying grazing frequencies and durations. The ideal frequency and duration of livestock grazing will be determined via understory vegetation surveys assessing diversity and density. It is expected that a low frequency and medium duration event will provide the most habitat benefits and be a highly effective tool in managing coastal uplands. This is because low frequency grazing allows for forage to recover between grazing events while medium duration grazing ensures over-grazing does not occur while allowing for woody understory to be cleared. The methods created in this study can be amended and implemented across the GoM to inform grazing plans and bridge the gap between conservation and management tools while answering the first of many questions in conservation grazing.

Presenter: Guyue Tang

Presentation Session: MO6

Level of Study: Master's

Department: Food Science, Nutrition and Health Promotion

Category: Agriculture and Life Sciences

Advisor: Dr. Xue Zhang, Assistant Research Professor, Food Science, Nutrition and Health Promotion.

Co-Advisor: Dr. Wes Schilling, Professor, Food Science, Nutrition and Health Promotion.

Title: Effects of ammonia stress on the growth performance and filet quality of channel and hybrid catfish

Abstract: Ammonia stress on catfish represents a significant concern within aquaculture. This study aims to investigate the physiological responses and product quality of channel and hybrid catfish under ammonia stress. Catfish were cultivated in experimental tanks for a period of 5 weeks. A split-plot arrangement in a randomized complete block design, with two replications, was conducted to determine the ammonia stress on the length and weight (n = 30/treatment), filet pH and color (n = 12/treatment), and filet sensory quality (n = 8 panelists) of channel (Ictalurus punctatus) and hybrid (♂I. furcatus x ♀I. punctatus) catfish. This design results in four treatments: channel control (CC), channel high ammonia (CA), hybrid control (HC), and hybrid high ammonia (HA). Results indicated that both the type of fish ($P<0.05$) and ammonia level ($P<0.05$) impacted the resulting catfish weight and length significantly and independently. Specifically, CC (332 g) was heavier than the other three treatments (177-259 g). CA and HC were not different ($P>0.05$) in weight but were both heavier ($P<0.05$) than HA. Regarding length, CC was longer ($P<0.05$) than the hybrid (HC and HA), while CA was longer ($P<0.05$) than HA. Descriptive sensory analysis was conducted on baked catfish fillets. HA had a more intense sulfur aroma ($P<0.05$) than CA, a grassier ($P<0.05$) aroma than the others, and more ammonia ($P<0.05$) than CC ($P<0.05$). CA had a fishier aroma ($P<0.05$) than the hybrid. For flavor, HC was more earthy ($P<0.05$) than the other treatments, and more bitter than CA ($P<0.05$). No differences ($P>0.05$) were observed among all four samples (CC, CA, HC, HA) in terms of fishy, ammonia, and sulfury flavors, salty and umami taste, juiciness, or astringent aftertaste. The fillet pH exhibited no difference ($P>0.05$) among all four samples. Regarding instrumental color (L*, a*, b*), hybrid catfish were redder ($P<0.05$) and yellower ($P<0.05$) than channel catfish. In conclusion, catfish subjected to ammonia stress exhibited reduced weight and length, although there was minimal impact on sensory quality. Gut microbiota of catfish will be investigated to better understand the mechanisms underlying the observed effects of ammonia stress on catfish.

Presenter: Rezwan Tanvir

Presentation Session: MO2

Level of Study: PhD

Department: Biological Sciences

Category: Agriculture and Life Sciences

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

Title: Taxonomically restricted QQS associated 1 (TRQA1): a regulator of plant metabolism controlling protein and starch content

Abstract: Arabidopsis thaliana orphan gene Qua-Quine Starch (QQS) and its interactor, Nuclear Factor Y subunit C4 (NF-YC4), are known to enhance leaf/seed protein levels, reduce starch content, and increase pest and pathogen resistance across various plant species while maintaining yield. Despite their great potential for crop improvement, their functional network is still elusive. Taxonomically Restricted QQS Associated 1 (TRQA1) is believed to be associated with QQS based on its expression profile. Analysis of RNA-Seq data revealed the suppression of QQS expression leads to a significant upregulation of TRQA1 expression. We have obtained Arabidopsis plants with overexpressed or suppressed (by RNA interference (RNAi)) TRQA1 expression and TRQA1 knockout to elucidate the impact of TRQA1 on plant metabolism. TRQA1 suppression can significantly increase plant protein content and decrease starch levels. Examination of TRQA1 promoter–GUS expression patterns under normal growth conditions reveals its ubiquity. Its expression was detected in virtually all plant organs throughout different developmental stages, consistent with publicly available RNA-Seq data. Specifically, TRQA1 exhibits exceptionally high expression along leaf veins and at root tips. TRQA expression was confined to the cytosol, and the TRQA promoter-coding sequence-GFP fusion protein was not detected in the nucleus nor plastids under normal growth conditions. Promoter motif analyses hint at TRQA1's potential involvement in diverse aspects of plant metabolism, stress resistance, and defense against pests and pathogens. These insights suggest TRQA1 may play a pivotal role in regulating carbon and nitrogen allocation, underscoring its applicability as a valuable tool for enhancing plant protein content. In summary, our research highlights the promising role of TRQA1 as a novel regulator of plant metabolism and fine-tuning protein and starch content while contributing to stress resistance and overall plant defense strategies.

Presenter: Caroline Teal

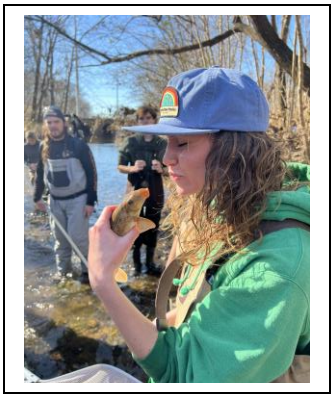
Presentation Session: MP3

Level of Study: Master's

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Michael Sandel, Assisant Professor, Wildlife, Fisheries, and Aquaculture



Title: Assessing Genetic Variation in Etheostoma lachneri

Abstract: The Tombigbee Darter (Etheostoma lachneri) is a small benthic fish endemic to the Black Warrior Waterway, Tombigbee Waterway, and the Tennessee Tombigbee Waterway (TTW). In an effort to decrease travel time for barges to the Gulf Coast, construction began in 1971. This led to destruction of habitat by dredging in some of the few places E. lachneri can flourish. There has been little to no new information on population distribution nor genetic variation since the description of the species by Suttkus and Bailey in 1994. It is thought that a percentage of the Mississippi E. lachneri population has been displaced from the population in Alabama due to the construction of the TTW. If a population is displaced, this could lead to interbreeding within a small group and cause differences in the genetic makeup of the darters. It is important to determine if populations of E. lacherni have become genetically isolated because this information can be used to inform conservation decisions. To assess the current status of E. lachneri in the TTW, we performed a population assessment at 40 sites within TTW tributaries in Mississippi. We chose sites where populations of the darter have historically been found as well as sites with potential suitable habitat. To assess genetic variation in these populations, we sequenced the mitochondrial cytochrome b gene and conducted phylogenetic analyses. Currently, occupancy models are in development. We plan to sequence the entire mitochondrial genome of E. lachneri and use that data to design species specific markers to detect E. lachneri presence in water using environmental DNA. The purpose of this study is to determine if there is genetic variation between E. lachneri populations.

Presenter: Ana Maria Valencia

Presentation Session: AO4

Level of Study: PhD

Department: Chemistry

Category: Education, Arts and Sciences, and Business

Advisor: Colleen Scott, Department of Chemistry

Title: Cationic Copolymerization of Styrene Derivatives for Degradable Alternatives

Abstract: Polystyrene (PS), like many of our commodity plastics, persists in the environment indefinitely after disposal, contributing to the waste accumulation problem. For this reason, there is a need to design degradable polymers to address the environmental pollution problem. Several functional groups, such as esters and amides, are incorporated into polymers to trigger degradation. Our approach is to use acetal groups that can undergo hydrolytic degradation under environmental conditions. Initial degradation of the polymers via the acetal group will allow for access of microbes for further digesting the polymer into smaller alcohols and aldehydes. This is an efficient method to confer degradability to the material.

In this presentation, we will report on the synthesis and characterization of PS derivatives, and their ability to undergo degradation under environmental conditions. Polymer degradation will be triggered by hydrolytic conditions, enzymes, or microorganisms. The degradation will be followed by 1H-NMR, GPC, and TGA, in order to study the time of degradation and the nature of the final degradation products.

Presenter: Jiaxin Wang

Presentation Session: MO3

Level of Study: PhD

Department: Forestry

Category: Forest Resources and Veterinary Medicine

Advisor: Heidi Renninger, Associate Professor, Department of Forestry

Title: Measuring stomatal and guard cell metrics for plant physiology and growth using StoManager1

Abstract: Automated guard cell detection and measurement are vital for understanding plant physiological performance and ecological functioning in global water and carbon cycles. Most current methods for measuring guard cells and stomata are laborious, time-consuming, prone to bias, and limited in scale. We developed StoManager1, a high-throughput tool utilizing geometrical and mathematical algorithms and convolutional neural networks to automatically detect, count, and measure over 30 guard cell and stomatal metrics, including guard cell and stomatal area, length, width, stomatal aperture area/guard cell area, orientation, stomatal evenness, divergence, and aggregation index. Combined with leaf functional traits, some of these StoManager1-measured guard cell and stomatal metrics explained 90% and 82% of tree biomass and intrinsic water use efficiency (iWUE) variances in hardwoods, making them substantial factors in leaf physiology and tree growth. StoManager1 demonstrated exceptional precision and recall (mAP@0.5 over 0.96), effectively capturing diverse stomatal properties across over 100 species. StoManager1 facilitates the automation of measuring leaf guard cells, enabling broader exploration of stomatal control in plant growth and adaptation to environmental stress and climate change. This has implications for global gross primary productivity (GPP) modeling and estimation, as integrating stomatal metrics can enhance predictions of plant growth and resource usage worldwide. Easily accessible open-source code and standalone Windows executable applications are available on a GitHub repository (https://github.com/JiaxinWang123/StoManager1) and Zenodo (https://doi.org/10.5281/zenodo.7686022).

Presenter: Jacob L. Wessels

Presentation Session: MO7

Level of Study: PhD

Department: Wildlife, Fisheries, and Aquaculture

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Raymond B. Iglay, Assistant Professor, Wildlife, Fisheries and Aquaculture

Co-Advisor: Dr. Melanie R. Boudreau, Assistant Research Professor, Wildlife, Fisheries and Aquaculture

Title: Seabird foraging ecology, habitat selection, and fitness along the Gulf Coast of Mississippi

Abstract: Species inhabiting coastal ecosystems face numerous threats from habitat and land loss, oil spills, and increased hurricane frequency. Beach-nesting birds are further threatened by disturbances exacerbated by human actions, such as predation from synanthropic wildlife and storm overwash. Previous conservation work in Mississippi has striven to steward colonies of beach-nesting seabirds including Least Terns (Sternula antillarum) and Black Skimmers (Rynchops niger). Stewardship has had some demonstrated positive effects on seabird reproductive success, and restoration efforts can create new nesting areas for these species. However, the natural histories of these seabird populations are poorly known, which may hinder conservation efforts. Specifically, there is limited information about where, when, and why these birds use specific areas for foraging, what characterizes colony sites, and how these factors translate to survival and reproductive success. To fill some of these knowledge gaps, I will examine Black Skimmer and Least Tern movements, habitat selection, survival, and reproduction. I will conduct field research on the Mississippi Gulf Coast from May to August annually, 2024 to 2026, alongside collaborators from the conservation nonprofit Audubon Delta. We will capture seabirds and deploy tracking devices on birds, as well as examine survival and reproduction metrics. We will also use remotely sensed data to characterize foraging and nesting locations. The results of this study will provide insight into conserving Black Skimmers and Least Terns in coastal areas of Mississippi, as well as informing design and implementation of restoration efforts.

Presenter: Derek Willis

Presentation Session: AP1

Level of Study: Master's

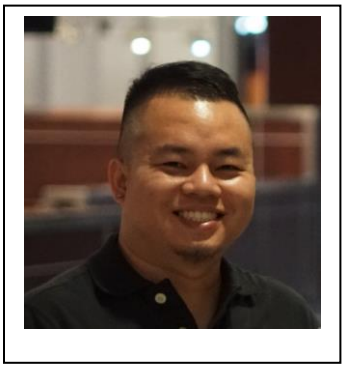
Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. J. Edward Swan II, Professor, Computer Science and Engineering

Title: Enabling Real-Time 3D Visualization in Augmented Reality: A Seamless Integration of R Language and Microsoft HoloLens 2

Abstract: Stereoscopic visualizations represent a paradigm shift going beyond the limitations of traditional two-dimensional representations. Drawing on contemporary cognitive research, three-dimensional perspectives show significant benefits, notably in improving our ability to mentally manipulate objects, an important aspect of spatial cognition. This research attempts to overcome a common constraint within the R language, namely that the existing framework restricts the visualization of 3D models to a two-dimensional framework. Our proposed method calls for a seamless connection in which the immersive high-definition stereoscopic images of the Microsoft HoloLens 2 work in tandem with the extensive analytical capabilities built into the R language. The major goal is to enable users to easily interact with and visualize 3D models from within the familiar R environment. This could allow users to acquire dynamic control over R models in real time, with immediate changes shown on the immersive 3D head-mounted display. Our aim is to improve the comprehension and interpretation of three-dimensional models by leveraging the capabilities of augmented reality. Furthermore, the research aims to simplify the complex processes of exporting, optimizing, and manually loading models into the HoloLens environment. The tangible manifestation of this goal takes the form of a purpose-built R package, precisely developed to improve the overall user experience inside this groundbreaking academic convergence of data analytics and augmented reality.



Presenter: Haiye Xie (Justin)

Presentation Session: AP1

Level of Study: Master's

Department: Center for Advanced Vehicular Systems

Category: Engineering

Advisor: Dr. Sungkwang Mun, Assistant Research Professor, Center for Advanced Vehicular Systems

Title: Enhanced Predictive Modeling in WA-DED with Physics-Informed Neural Networks

Abstract: Wire Arc Directed Energy Deposition (WA-DED) is the metal 3D printing process by depositing metal layer-upon-layer to fabricate near net shape metal parts [1]. Accurate temperature prediction in WA-DED is crucial, ensuring the controlled microstructure of fabricated metals [2]. One approach that can effectively monitor the temperature is Physics-Informed Neural Networks (PINN). PINN enhances model accuracy by employing physics equations, such as heat equations, into conventional Artificial Neural Networks (ANN) [3]. In PINN, we compared two types of neural networks: Feedforward Neural Network (FFNN) and Residual Neural Network (ResNet). FFNN is a common type of neural network that allows information to flow in one direction through each layer with multiple computational nodes or neurons to capture underlying non-linear relations. ResNet is a neural network that differs from FFNN in its structure. It uses residual blocks where the input not only passes through multiple layers but also bypasses to the output of the layers within the block. This aids the flow of information from earlier layers to later layers, enabling the network to learn shallow and deep features effectively. This study employs a small substrate (4*4*1 cm) where a heat source is directly applied to the center of its y-axis and moved along the x-axis, simulating the heating process of the substrate in 3D metal printing. After tuning the hyperparameters in PINN, it accurately predicts temperature details at various coordinates within the substrate. ResNet predicts the temperature history more accurately than FFNN compared to high-fidelity finite element analysis (FEA) simulation. Furthermore, when testing ResNet with various random initial states regarding the neural network weights and sample locations from the simulation domain, the predictions are more consistent than those of FFNN.

Presenter: Lizzie Raquel Zaldivar

Presentation Session: MO6

Level of Study: Master's

Department: Food Science, Nutrition and Health Promotion

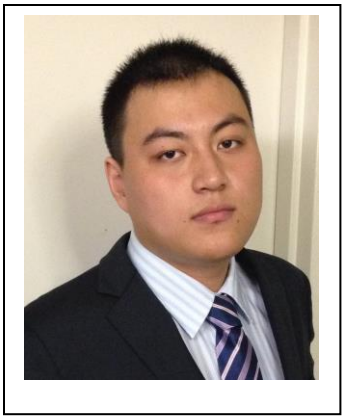
Category: Agriculture and Life Sciences

Advisor: Dr. Wes Schilling, Professor, Food Science, Nutrition and Health Promotion

Co-Advisor: Dr. Xue Zhang, Assistant Research Professor, Food Science, Nutrition and Health Promotion

Title: Identification of bacterial species composition and diversity of chicken breast meat during processing

Abstract: Poultry meat spoilage is primarily due to the growth of bacteria that have survived from processing, which later contributed to the spoilage during storage. Detailed information on processing efficiency in controlling bacteria and the specific types of bacteria that remain on chicken after processing are crucial for addressing spoilage issues. In this study, the bacterial profile of chicken breast throughout processing was determined using the Oxford Nanopore amplicon sequencing technique in conjunction with traditional plating methods. Chicken breast samples from 8-week-old broilers were collected at various processing steps (before antimicrobial wash, after antimicrobial wash/pre-chill, post-chill, post-deboning, and pre-packaging) from a poultry processing plant on three separate occasions. The samples from each processing step (n = 8) were swabbed with sterile sponges and stomached in sterile buffered peptone water. The resulting homogenate filtrate was used for enumeration of bacteria. The homogenate filtrate was also centrifuged, and the pellet was collected for microbial genomic DNA extraction. The full-length 16S rRNA was amplified, and the barcoded DNA libraries were sequenced on a MinION R10.4.1 flow cell. Results indicated that the processing successfully reduced the counts of aerobic bacteria, E. coli, Coliform, and lactic acid bacteria. In comparison to Step 3 (Post-Chill), Coliform and LAB counts exhibited an increase ($P<0.05$) after Step 4 (Post-deboning), followed by a subsequent decrease ($P<0.05$) after Step 5, potentially due to the human interaction during deboning process. Samples from steps 3 and 5 exhibited a decrease ($P<0.05$) in alpha diversity. The reduction in bacterial counts and diversity was attributed to the chilling process at step 3 and the final PAA (peroxyacetic acid) washing before step 5. Utilizing nanopore sequencing, we successfully classified bacteria down to the species level. Notably, throughout the processing stages, three thermophilic bacteria including Anoxybacillus contaminants, Neobacillus thermocopriae, and Anoxybacillus flavithermus, emerged as the top three most predominant species found on chicken breast. The presence of these bacteria underscores the need for improvement in hygiene practices and temperature control measures throughout poultry processing. Additionally, their potential impact on the quality of chicken breast during storage should be evaluated.



Presenter: Zonghan Zhang

Presentation Session: AO1

Level of Study: PhD

Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. Zhiqian Chen, Assistant Professor, Computer Science and Engineering

Title: Multiple-Source Localization from a Single-Snapshot Observation Using Graph Bayesian Optimization

Abstract: Due to the significance of its various applications, source localization has garnered considerable attention as one of the most important means to confront diffusion hazards. Multi-source localization from a single-snapshot observation is especially relevant due to its prevalence. However, the inherent complexities of this problem, such as limited information, interactions among sources, and dependence on diffusion models, pose challenges to resolution. Current methods typically utilize heuristics and greedy selection, and they are usually bonded with one diffusion model. Consequently, their effectiveness is constrained.

To address these limitations, we propose a simulation-based method termed BOSouL. Bayesian optimization (BO) is adopted to approximate the results for its sample efficiency. A surrogate function models uncertainty from the limited information. It takes sets of nodes as the input instead of individual nodes. BOSouL can incorporate any diffusion model in the data acquisition process through simulations. Empirical studies demonstrate that its performance is robust across graph structures and diffusion models. The code is available at https://github.com/XGraph-Team/BOSouL.

Presenter: Zijian Zhang

Presentation Session: AO1

Level of Study: PhD

Department: Computer Science and Engineering

Category: Engineering

Advisor: Dr. Zhiqian Chen, Assistant Professor, Computer Science and Engineering

Title: (As a Co-author) Multiple-Source Localization from a Single-Snapshot Observation Using Graph Bayesian Optimization

Abstract: Due to the significance of its various applications, source localization has garnered considerable attention as one of the most important means to confront diffusion hazards. Multi-source localization from a single-snapshot observation is especially relevant due to its prevalence. However, the inherent complexities of this problem, such as limited information, interactions among sources, and dependence on diffusion models, pose challenges to resolution. Current methods typically utilize heuristics and greedy selection, and they are usually bonded with one diffusion model. Consequently, their effectiveness is constrained.

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Presenter: Lisa Ziegler

Presentation Session: MP2

Level of Study: PhD

Department: School of Human Sciences

Category: Agriculture and Life Sciences

Advisor: Dr. Donna Peterson, Extension Administration/ School of Human Sciences

Co-Advisor: Dr. Lori Staton, School of Human Sciences

Title: Growing young minds: Integrating child mental health support within 4-H STEM education

Abstract: In response to the recent surge in child mental health challenges, there has been a growing interest in prevention programs and strategies to promote social and emotional development in childhood. Research indicates that social and emotional skills in childhood are linked to academic performance and set the foundation for health across the lifespan (Robson et al., 2020). Considering the limited emphasis placed on social-emotional learning in K-12 educational settings, research-based, emotion-centered programs have become a priority in view of the concerning trends in child mental health (Hoover & Bostic, 2021). To address the need for social-emotional learning programs and prevention resources in Mississippi, MSU Extension developed a 4-H curriculum integrating social-emotional learning and STEM education into an existing state-wide 4-H LEGO engineering program targeting children aged 5-7. Grounded in the experiential learning model, the six lessons comprised by the curriculum are designed to provide school-aged children in 4-H with program opportunities to develop emotional awareness and skills to identify emotions, and cope with distress. A three-hour curriculum instructor training was conducted to prepare Extension agents to successfully deliver the learning activities in all 82 counties in the state. This presentation aims to examine the curriculum design and implementation process focused on the integration of social-emotional learning into STEM education. Emphasizing Mississippi's increased child mental health needs, the lessons learned from the curriculum design and implementation process have implications for future research and practice.

Presenter: Saida Zinnurine

Presentation Session: MO4

Level of Study: PhD

Department: Comparative Biomedical Sciences

Category: Forest Resources and Veterinary Medicine

Advisor: Dr. Mark Lawrence, Professor, Department of Comparative Biomedical Sciences

Title: Characterization of RTX and Chitinase-deficient mutants of virulent Aeromonas hydrophila

Abstract: OBJECTIVE: Aeromonas hydrophila is a Gram-negative motile, mesophilic species that causes Motile Aeromonad Septicemia (MAS), which is characterized by a destructive systemic infection in channel catfish. In 2009, an emergent clonal group of A. hydrophila strains referred to as virulent A. hydrophila (vAh) was responsible for the loss of 5.5 million pounds of market-size fish in the US, and it remains a major threat for the catfish aquaculture industry. Our comparative genomic analysis indicated that genes encoding several putative secreted enzymes, including chitinase and RTX (repeats in toxin) family proteins, are unique to vAh. Chitinase is a glycosyl hydrolase encoded by chiA that hydrolyzes chitin. The vAh RTX toxin is encoded in an operon consisting of two genes (rtxC and rtxA) that encode cytolysin-activating lysine-acyltransferase and membrane-damaging MARTX multifunctional-autoprocessing repeats-in-toxin holotoxin, respectively. The objective of this study was to decipher the role of chitinase and RTX toxin in virulence of vAh in catfish.

Methods: In this study, construction of the vAhΔchiA, vAhΔrtxC, vAhΔrtxA, and double deletion vAhΔrtxA-C mutants was accomplished by an in-frame deletion method. Growth kinetics, hemolysis of 1% catfish and sheep red blood cells, and biofilm formation for each of the mutants was compared to parent wild-type strain. Virulence and live attenuated vaccine potential of mutants were evaluated by intraperitoneal injection in channel catfish.

Results: There was no difference in growth kinetics between the wild-type vAh and mutants. vAhΔrtxC and vAhΔrtxA-C mutants showed significantly decreased hemolytic activity ($p \leq 0.05$) compared to parent strain vAh in hemolyis of 1% catfish RBCs. RTX toxin cytolysin-activating lysine-acyltransferase significantly contributed to vAh biofilm formation at 24 and 72. RTX toxin demonstrated a highly significant ($p \leq 0.001$) role in the virulence of vAh in channel catfish. Furthermore, vaccination of catfish with three attenuated mutants (vAhΔrtxC, vAhΔrtxA, and vAhΔrtxA-C) provided significant ($p \leq 0.001$) protection against experimental infection with the virulent wild-type strain at 21 days post-vaccination. Catfish vaccinated with vAhΔrtxC, vAhΔrtxA, and vAhΔrtxA-C had 0% mortalities after experimental infection with 5*10^6 CFU vAh compared to 47.5% mortalities in sham vaccinated catfish.

Conclusion: These findings demonstrated that chitinase and RTX toxin contribute to hemolytic activity and biofilm formation of vAh. Chitinase has no significant role in the virulence of vAh. Importantly, RTX toxin plays a significant role in vAh virulence in catfish, and the deletion mutant has vaccine potential for protection against MAS caused by vAh.


The GSA and Graduate School congratulate all Spring 2024 participants on their contributions to research!
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