2026 Image of Research
Union Art Gallery, March 16 to 27

The Image of Research competition gives students the opportunity to engage creatively with their research, share behind-the-scenes views of their research processes, or portray their academic study in visual form.

MISSISSIPPI STATE UNIVERSITY™
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WHERE THE FOREST MEETS THE WATER

A traditional fisherman leads a route through an Amazonian floodplain forest. This forest, which is seasonally flooded by the Amazon River and its lake systems, contains areas previously deforested for cattle ranching and selective timber extraction. The indigenous communities inhabiting this territory have noticed a decline in both the diversity and quantity of fish within their lakes. During the flood season, fish are drawn to swim under the forest by the abundance of food, as insects and fruits fall from the trees into the water. This research focuses on fruit-producing trees and their specific locations along the territory's elevation gradient. Identifying suitable areas for these tree species is essential for successful reforestation strategies, which aim to restore fish populations through these vital ecological interactions. Thus, ensuring the fisherman's route remains a path of plenty for generations to come.

Name: Adrian Mauricio Muñoz Veloza
Level: Master's
Department: Wildlife, Fisheries & Aquaculture

A LAND OF WAR: THE ENVIRONMENT IN MISSISSIPPI'S CIVIL WAR

The history of Mississippi during the Civil War is one of people, but also of the land. My research examines the significance of environmental factors and agricultural traditions to expand the understanding of Mississippi's Civil War experience. Particularly during events such as General U.S. Grant's Inland Campaign, from May 1 to 17, 1863, and the ensuing siege of the city, from May 18 to July 4, 1863, Mississippi's environment influenced how these armies conducted the war. While the agricultural abundance of Mississippi's fertile soil allowed Grant to "live off the land" during his Inland Campaign, the hilly landscape of the Vicksburg battlefield, depicted above, proved a hindrance in Union forces' assaults on the city on May 19 and May 22, culminating in a siege. While war is invariably a story of people, the environment remains a perpetual influence.

Name: Balaam Sherrod
Level: PhD
Department: History

WHERE SOIL MEETS SKY: MONITORING ECOSYSTEM CARBON DYNAMICS

Standing in the heart of the Mississippi Delta, beneath the intense midday sun and surrounded by a puddled rice field, I am calibrating an eddy covariance system to quantify the exchange of gases between the land surface and the atmosphere. The system includes a 3D sonic anemometer to measure wind velocity, an infrared gas analyzer (IRGA) to monitor CO_2 and water vapor concentrations, the LI-7700 open-path analyzer to detect methane emissions, and a data logger that records and processes high-frequency, real-time ground observations.My research integrates these field-based flux measurements with satellite image processing to remotely monitor carbon uptake and greenhouse gas emissions across agricultural landscapes. By linking ground-truth data with remote sensing products, I develop scalable geospatial and machine learning frameworks to estimate net carbon storage across Mississippi’s farmlands and to assess carbon dynamics under changing land use and climate conditions.

Name: Bipin Bastakoti
Level: PhD
Department:
Plant and Soil Sciences

WHEN WATER WINS: VISUALIZING WOOD DECAY

Delicate fungal fruiting bodies emerge from the surface of weathered wood, quietly illustrating the consequence of moisture intrusion. This image captures early-stage biological decay on wood, a process fundamentally driven by water ingress. Despite the long-standing use of creosote as a preservative for railroad crossties and utility structures, moisture remains the primary catalyst for deterioration when hydrophobic protection diminishes over time.My research, “Evaluation of Water Ingress into Various Retentions of Creosote Treated Gum (Liquidambar styraciflua) via Wetting Angle After Weathering,” investigates how different creosote retention levels influence surface wettability and long-term durability. By monitoring changes in wetting angle during weathering, we quantify how surface hydrophobicity degrades and how water begins to penetrate treated wood.This image represents more than decay—it represents the measurable threshold where protective chemistry yields to environmental exposure. Understanding that threshold is essential for improving service life prediction and optimizing preservative treatment standards for critical infrastructure

Name: Ershad Ahmmed
Level: PhD
Department: Sustainable Bioproducts

OUTWORKED BY THE BEES

After hours of lifting hive boxes and inspecting frames, I finally surrendered to gravity and learned an important lesson: bees have more energy than I do. This image captures a quiet moment in the apiary after a long day of working with honey bee colonies, for my research. My work focuses on studying and improving disease resistance in bees, which requires hands on fieldwork and careful colony management. Science is not always lab coats and microscopes; sometimes it's sunlight, hive tools, and a tired graduate student taking a break on the ground.

Name: Gokul Dhanapati
Level: PhD
Department: Agricultural Science and Plant Protection

THE BIOLOGY OF TRUST | LINKING BEHAVIOR, MICROBIOME, AND WELFARE

Winnie, our Jersey cow leans into my arms as if she's choosing the moment, and that choice is the heart of my research. I study why individual animals respond differently to the same world: some seek contact, others avoid it, or how animals build perception: not with words, but with mental snapshots of environment, smells, and feelings. Each handling event becomes an internal "image" labeled safe, threatening, or rewarding. By linking observable behavior (approach, touch, curiosity) with physiology (stress markers) and underlying biology like neuroactive signaling (neurotransmitter pathways) and the gut microbiome, we aim to map what "well-being" looks like inside the system. This photo captures a hypothesis in action: repeated positive handling can shift an animal's internal state toward safety, shaping stress resilience over time. Insights from this work support sustainable systems by reducing fear-driven losses, improving health, and promoting efficient, humane production, for improved welfare and productivity.

Name: Himani Joshi
Level: PhD
Department: Animal and Dairy Sciences

SPECTERS OF THE PAST AT PROSPECT HILL

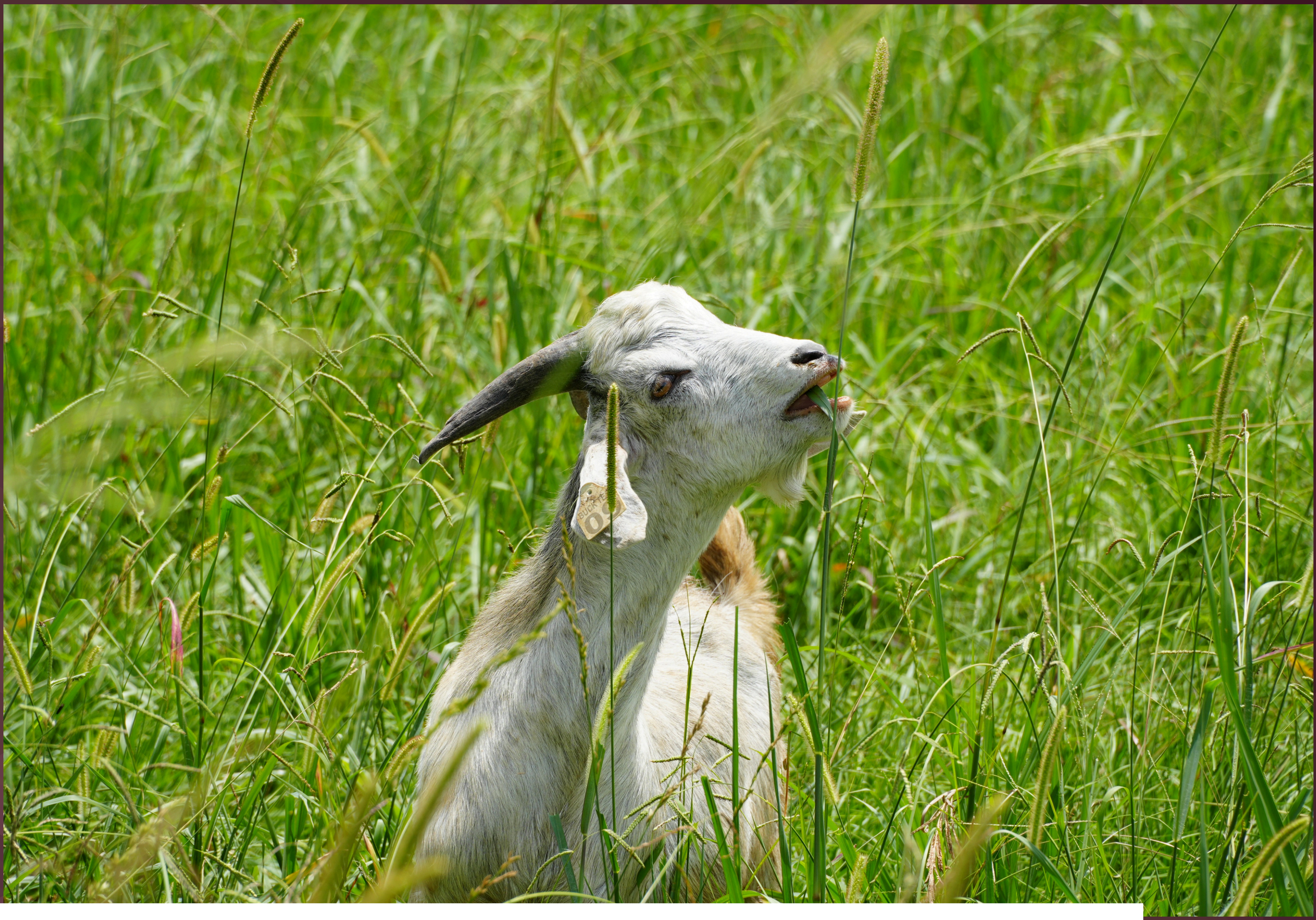
Founded in 1808 by Issac Ross Prospect Hill is an early nineteenth century enslavement site in Jefferson County Mississippi. My research focuses on the archaeological history of this site and the ways in which the past can be brought into the present. In this specific instance the term specter doesn't refer to ghosts in a literal sense but rather the lingering and often haunting sense of disquiet and discomfort that can manifest when the past seems to bleed into the present. This is particularly apparent in plantation sites such as Prospect Hill which are linked to historical traumas. Images such as this one can often act as vectors for this trauma and thus a spectre can be conjured even if an individual is not physically present at the site.

Name: John Knapp Watts
Level: Master's
Department: Anthropology and Middle Eastern Culture

NEON WARNING SIGN

This cluster of bright pink spheres resembles an alien structure, but not one from another world. It is an egg mass from an invasive giant apple snail (Pomacea maculata), precariously deposited above the waterline on plant roots, where developing embryos are protected from aquatic predators. The vivid neon coloration serves as a biological warning: the eggs contain defensive toxins that deter predation, increasing the likelihood that over a thousand future snails will survive. As the embryos mature, some develop a bullseye-like appearance visible here, a striking reminder that these snails themselves can become targets for parasites—both native and invasive. Rapid increases in snail abundance can reshape parasite communities and create ripple effects for native wildlife and even humans. My research examines the parasites associated with invasive apple snails, particularly rat lungworm (Angiostrongylus cantonensis), a nematode capable of causing paralysis and death in humans and wildlife. The same color that protects developing snails also warns scientists that ecological and disease dynamics may already be changing.

Name: Jonah Nguyen
Level: PhD
Department: Comparative Biomedical Sciences



FORAGE SELECTION UNVEILED: "SPOON" CHOOSING QUALITY FIRST

In this photograph, "Spoon" stands quietly in a pasture of warm season forages, choosing his bite with remarkable precision. His focused expression captures a moment that challenges one of the most persistent myths in livestock management, the belief that goats will eat anything. This young buck demonstrates the opposite. With ease, he selects only the most nutritious portion of each leaf, exhibiting the highly selective foraging behavior central to my research on grazing performance in goats. His calm posture and deliberate movements reveal an herbivore deeply tuned to its environment, capable of distinguishing subtle differences in plant quality. This single frame highlights not only his individuality but also the sophisticated strategies goats employ to optimize nutrient intake, strategies often overlooked or misunderstood. By showcasing his instinctive ability to choose quality over quantity, the image visually reinforces the core findings of my work and invites viewers to reconsider assumptions about caprine behavior.

Name: Larry Leon
Level: PhD
Department: Animal and Dairy Sciences

JUST GO WITH THE FLOW

My research focuses on how stemflow affects the physiology of a tree. This image is a playful interpretation on some of the interactions between the environment and stemflow; the two are interconnected. The microbes are at work on the nutrients that were brought forth by the "water slide" of stemflow. The nutrients are then being converted into usable forms for the tree to uptake through it's roots.

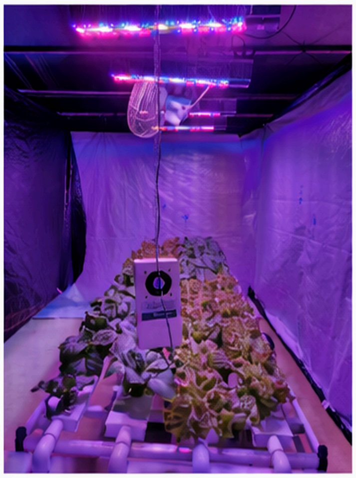
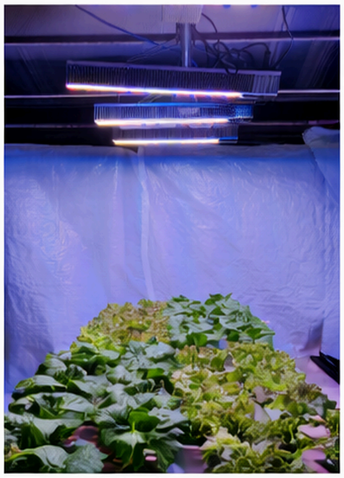
Name: Madison Lohwasser
Level: Master's
Department: Forestry

SHADES OF GREEN: AMAZON ALGAL BLOOM, A GLOBAL WATER WARNING

Before moving abroad to begin my PhD, I visited my family in the heart of Brazil's Amazon rainforest, where I grew up. I did not expect that, more than 5,000 km from the Ohio River, my current study area, I would encounter the same environmental challenge that now motivates my research: algal blooms. Under certain conditions, algae can proliferate rapidly, forming blooms that may release toxins harmful to both humans and wildlife. These occurrences are frequently associated with degraded water quality, particularly due to excess nutrients. While blooms were once primarily linked to slow or stagnant waters, they are now increasingly reported in rivers worldwide, signaling a global concern. My research examines the mechanisms that initiate riverine algal blooms, using hydrologic modeling and artificial intelligence to enhance prediction, monitoring, and prevention.

Name: Marionei Fomaca de Sousa Junior
Level: PhD
Department: Agricultural and Biological Engineering

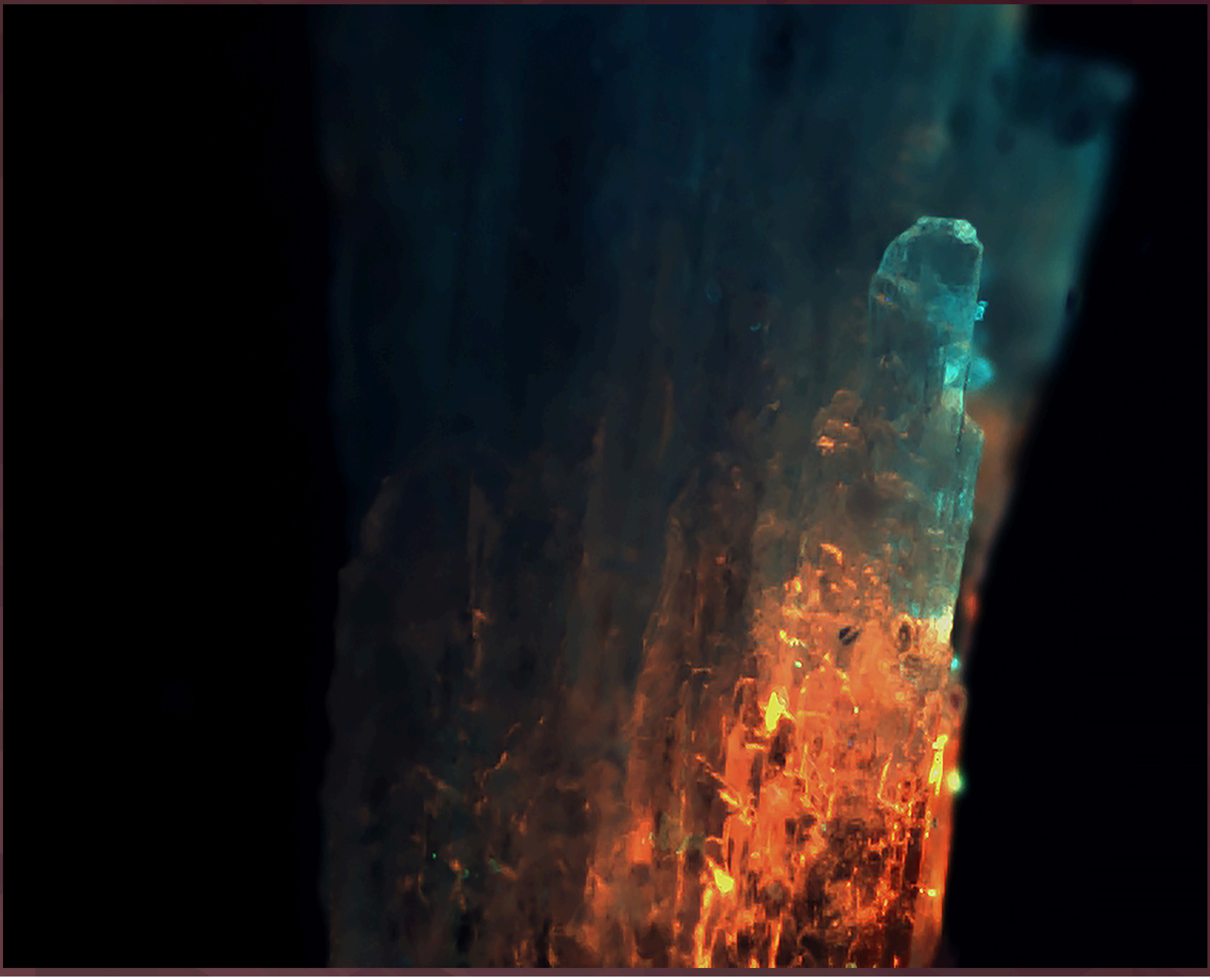



INFLUENCE OF LIGHT QUALITY ON WINTER GREENHOUSE LETTUCE PRODUCTION

The productivity of winter greenhouse lettuce is low due to shorter daylight and occasional snow events. Light plays a critical role in the success of crop production. Red and blue lights enhance plant photosynthetic capacity, which is responsible for plant growth and development. The image visually depicts the framework of my research: the influence of LED quality, composition, and application timing on winter greenhouse lettuce production. It illustrates lettuce grown under red-to-blue LED supplementation during daytime and nighttime periods in a controlled environment during the winter season. We observed that a higher red-to-blue ratio at night doubled the yield. This experimental approach highlights precision lighting as a practical tool to enhance productivity in winter greenhouse systems. These strategies will help growers produce high-yielding, high-quality lettuce year-round.

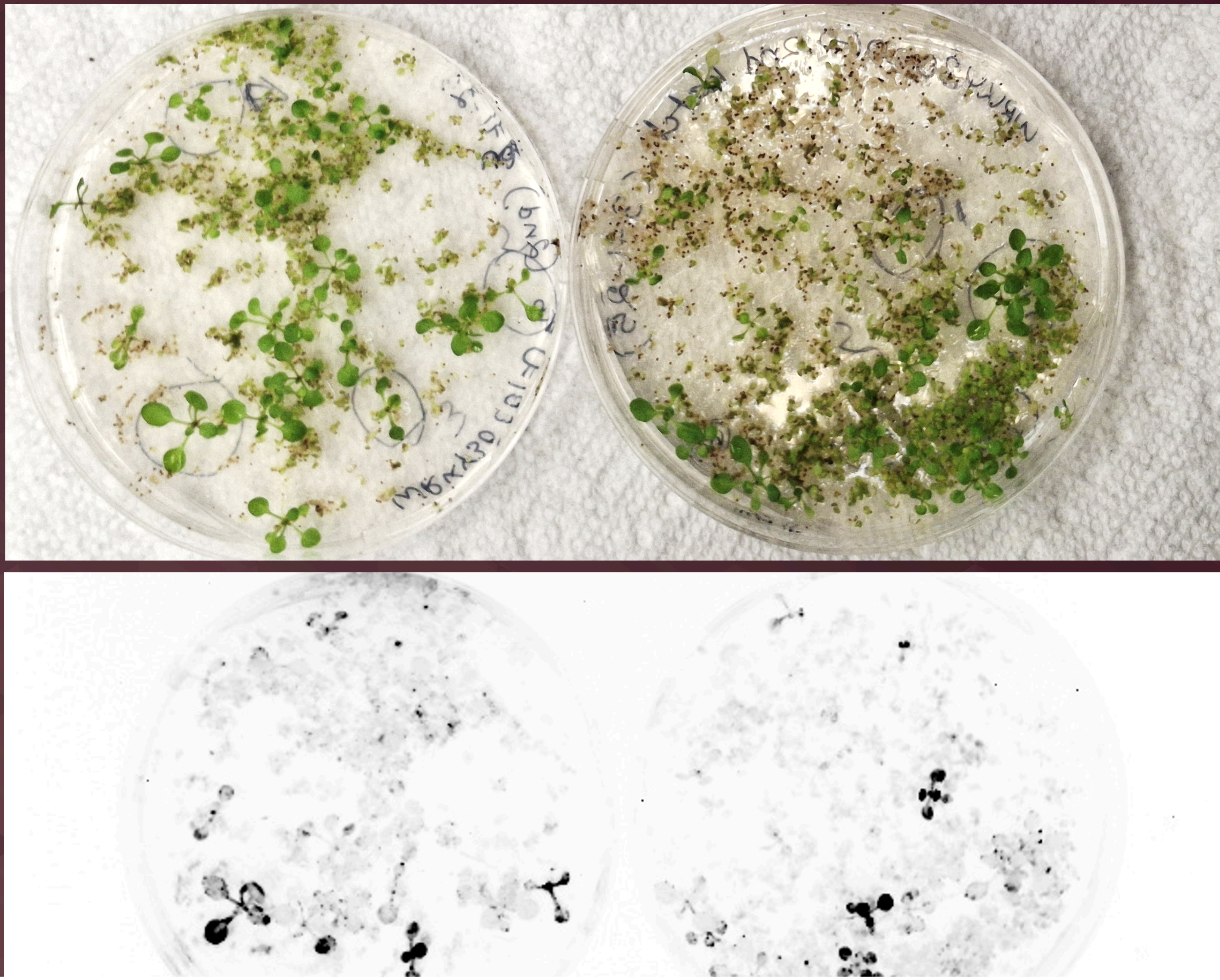
Name: Olugbenga Agunbiade
Level: PhD
Department: Plant and Soil Sciences



"WHEN A CRYSTAL FINDS IT SECOND LIGHT"

Light often reveals stories hidden deep within materials. This image shows a manganese (Mn2+)- doped hybrid perovskite crystal under ultraviolet light, where a single structure begins to express two distinct colors at once. Before doping, the crystal emitted only blue light. Introducing Mn2+ subtly changed how energy moves through the lattice, allowing a warm orange glow to emerge alongside the original emission. Through fluorescence microscopy, these dual-emission regions become visible across the crystal, transforming invisible electronic processes into a striking visual experience. For me, this image captures the moment when chemistry becomes visible - when small atomic changes create entirely new ways for light to exist. Understanding and controlling these transformations helps guide the design of next-generation luminescent materials for optoelectronics and photonic technologies, while also revealing how scientific discovery can unexpectedly create images that feel both artistic and alive.

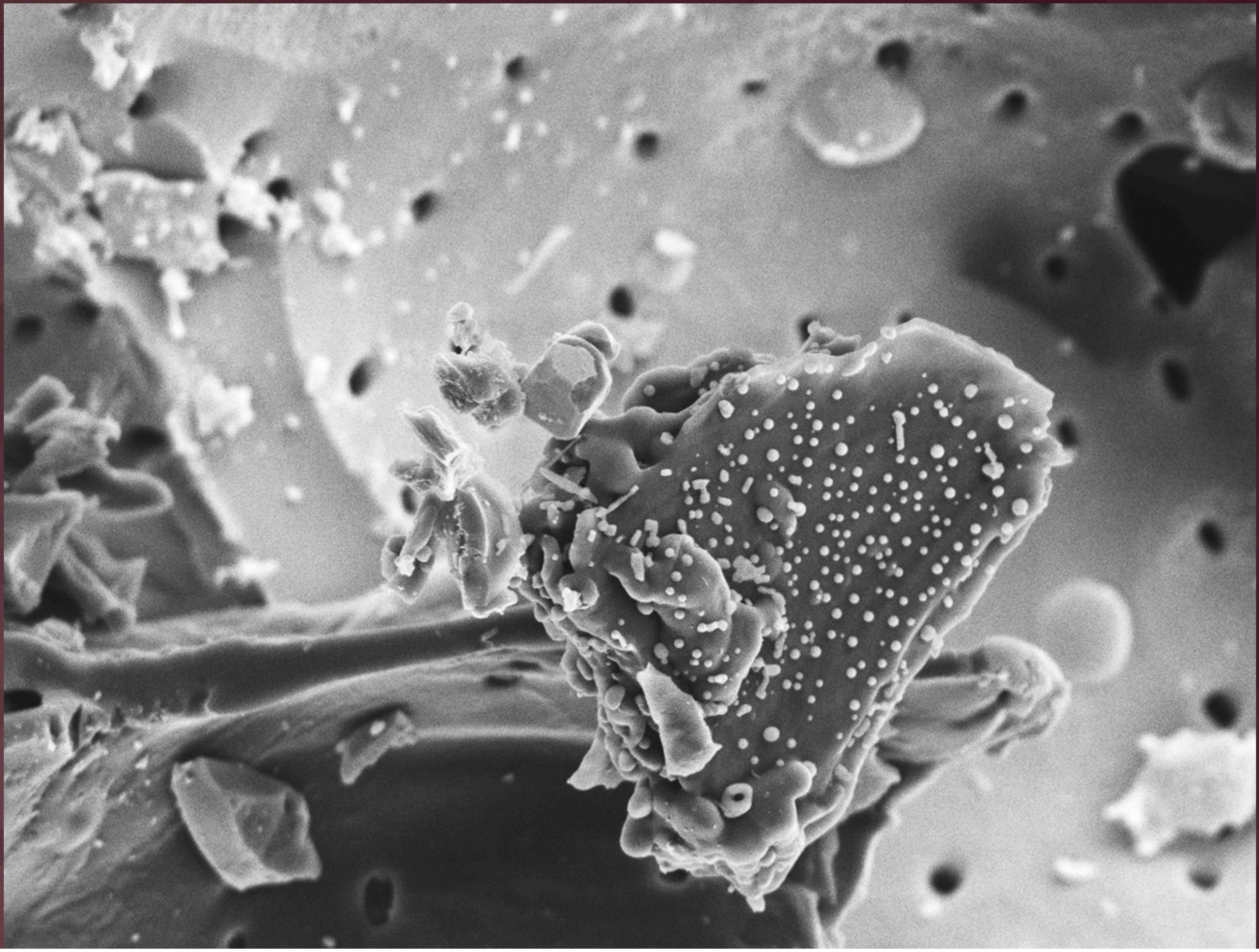
Name: Palani Ganesh Karthikeyan
Level: PhD
Department: Chemistry



ENGINEERING PLANTS TO GLOW: REAL-TIME IMMUNITY IN ACTION

This image demonstrates how plant defense gene activity can be visualized in real time. In Arabidopsis, a widely used model plant in research, the promoter of a defense gene was fused to the luciferase (luc) reporter, the same gene that makes fireflies glow. Promoters control when genes are turned on or off, so plant seedlings glow whenever the defense promoter is active. The top panels show plant seedlings growing in media containing hygromycin. Only seedlings carrying the promoter–luc construct survive. The bottom panels show the same plates after luciferin spray, imaged with the iBright system. Glowing seedlings indicate where the defense promoter is active, providing a direct, real-time indicator of plant immunity. By applying molecular cloning, researchers can monitor immune responses in living plants, turning invisible molecular events into visible light. This approach offers a widely applicable real-time tool for studying plant biology, defense signaling, and immunity mechanisms.

Name: Rezwana Rahman Setu
Level: PhD
Department: Biochemistry, Nutrition, and Health Promotion



BEYOND THE MONOCHROME: SEM IMAGING OF BIOCHAR-IRON NANOCOMPOSITES

This image shows biochar embedded with tiny iron particles, captured using Scanning Electron Microscopy (SEM), a technique that allows scientists to visualize materials at extremely small scales. Although the image appears black and white, it reveals important structural details that are invisible to the human eye. The bright white specks represent iron nanoparticles distributed across the surface, while the dark holes or cavities are pores within the biochar, a material formed through the thermal conversion of plant-based biomass. These pores and the characteristics of the biochar surface itself help anchor the iron particles and enhance the material's effectiveness. Materials like this are being developed to help clean polluted water by removing harmful contaminants. Studying their structure enables researchers to better understand how to design safer and more efficient materials for environmental protection.

Name: Samadhi Nisansala Nawalage
Level: PhD
Department: Sustainable Bioproducts