# Percival Scientific, Inc. 2024 Station Report

## Short-Term Outcomes

- Eliminated condensation issues of 30% of lid area in plant-tissue culture environments using LED lighting by implementation of uniform infrared LEDs.

## Outputs

- Designed a compressed air dehumidification system to hit point thresholds in seed storage environments.
- New ultrasonic humidification system and sizing methods to optimize vapor pressure deficits to 1kPa within controlled environments.
- New mushroom chamber with high degree of humidity uniformity, and high color temperature for fruiting.
- New dual-channel white LED platforms along with white with supplemental red for efficient Circadian response adjustment and studies.
- Patent-pending PetriClear to address condensation issues in LED experiments.
- Refining 8-color platform.

## Activities

- Researching more advanced gas control.
- Nitrogen and ethylene monitoring for food ripening control and studies.
- Integrating hydroponics and rootzone system into controlled environment systems.
- Product verification studies for petriclear system.

## Milestones

- Percival has made plans to transition to keep up with the new regulations in refrigerants in the industry. These plans have hard deadlines in the industry at the beginning of 2025 and 2026.

## Impact Statement

- Percival has been involved in the ASABE X642.2 panel to help quantify lighting uniformity regulations. We've also been involved with the search for new viable refrigerant to meet new EPA energy efficiency and carbon guidelines.
- Improvement in humidification technology has been a central concern, with new humidification and dehumidification deisgns. This is important for seed storage and mycology research.
- Plant science interns Nathan Lewis and Isaac Bradford have helped us pioneer new hydroponics and root research into controlled enviroment chambers along with verification studies to improve and help eliminate condensation in plant tissue cultures.

## Published Works

Presentations

Imberti, D.. 2024. Balancing for Success: Optimizing CO2, Light, and Temperature. Indoor Ag Con, Las Vegas, U.S.. March 11.

Lewis, N., Bradford I., Imberti D., Imberti H., Kelley D.R., Walley J.W.. 2024. Lighting the Way to the Future of Agriculture: Optimizing LED Spectrums for Controlled Environment Agriculture. NCERA-101 (poster presentation)

Popular Articles

Lewis, N., & Bradford, I. 2023. Factors Affecting Petri Dish Condensation in Tissue Culture (CU) Chambers. Percival-Scientific. https://www.percival-scientific.com/wp-content/uploads/2023/10/Condensation-report.pdf

Imberti, D.. 2024. LED Spectra in Plant Growth. Produce Grower. https://www.producegrower.com/form/led-spectra-plant-growth-percival-whitepaper/ .