

## PP Systems 2023-2024 Station Report

NCERA-101: Committee on Controlled Environment Technology & Use

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### **New equipment**

- Lab space for plant cultivation in development for use in new PP Systems research initiatives. New updates will be forthcoming as this space is outfitted for 2024 experiments.
- Common lab and hydroponic equipment for use in controlled environment studies were collected in 2023 and 2024.
- Acquired six Arize Factor ML-300 fixtures. The fixtures themselves are dimmable LEDs appropriate for a range of research applications planned for 2024.

### **Activities and accomplishment summaries**

- 2024 marks the 40<sup>th</sup> year since PP Systems inception.
- In 2023, PP Systems hired John Ertle, Ph.D., as Plant Physiologist to develop an on-site research capacity with goals of investigating leaf-level physiological research, developing new features for existing portable gas exchange systems like the CIRAS-4, and advancing development of new instrumentation.
- In 2023, a cooperative partnership with local you-pick operation Cider Hill Farm was established to conduct leaf-level physiological research on the plants grown at this Massachusetts farm.
- In 2023, John Ertle conducted a preliminary field study at Cider Hill Farm investigating the equivalency of far-red photons (700 – 750 nm) to traditional PAR photons (400 – 700 nm) on five field-grown plant species (apple, corn, lettuce, strawberry, swiss chard). This project will be continued in 2024.
- In 2024, PP Systems joined the North Carolina State University Controlled Environment Agriculture Coalition (NCSU-CEA). Further updates will be forthcoming as partnerships and projects are established with those in this Coalition.
- PP Systems webinar series enters its 5<sup>th</sup> year, with 10 total publicly available webinars planned for 2024. Webinar topics share an underlying reliance on methods including leaf chlorophyll fluorescence or gas exchange of leaves or soils.
- Development of new Arabidopsis whole-plant chamber for gas exchange studies was developed and tested in 2023 and 2024. Ongoing testing is planned for Q2 2024 in collaboration with clients examining Arabidopsis physiology.
- James Bunce, Ph.D., Plant Physiologist with PP Systems identified that *Zea mays* daytime photosynthetic rate can be reduced by nighttime temperatures  $\leq 20$  °C. In the context of climate change, low nighttime temperatures in areas of corn production could severely limit the yield of this important crop.

### **Published Written Works:**

- Bunce, J.A. "Photosynthetic Acclimation to Temperature Is Affected by Night Temperature in *Zea mays*." *Photosynthetica* 62, no. 1 (February 22, 2024): 112–15.  
<https://doi.org/10.32615/ps.2024.008>.