

REPORT FOR THE NCERA-101 MEETING, April 9-12, 2017

Faculty: A.J. Both*, Harry Janes** (emeritus), David Mears (emeritus)

Staff: Jeff Akers, Joe Florentine, Tom Manning, David Specca, Claude Wallace

*Bioenvironmental Engineering, Department of Environmental Sciences

<http://aesop.rutgers.edu/~horteng>

**Department of Plant Biology

1. New Facilities and Equipment

None

2. Unique Plant Responses

Yuan Li (graduate student) has been working on the effects of Silicon amendments to the nutrient solution used for hydroponically grown leafy greens. He is presenting a poster about his preliminary findings at the meeting.

3. Accomplishment Summary

We continue to evaluate a variety of lamps for light output, light distribution and power consumption using our 2-meter integrating sphere and a small dark room. A variety of outreach presentations on high tunnel construction, greenhouse lighting, energy consumption, and electrical safety have been delivered at local and out-of-state venues. A \$50K travel grant was secured from the USDA to help support travel expenses of NCERA-101 members who attended the 5th International Controlled Environment Meeting (AusPheno) in September 2016 in Australia.

4. Impact Statement

Nationwide, Extension personnel and commercial greenhouse growers have been exposed to research and outreach efforts through various presentations and publications. It is estimated that this information has led to proper designs of controlled environment plant production facilities and updated operational strategies that saved an average sized (1-acre) business a total of \$20,000 in operating and maintenance costs annually. Greenhouse energy conservation presentations and written materials have been prepared and delivered to local and regional audiences. Greenhouse growers who implemented the information resulting from our research and outreach materials have been able to realize energy savings between 5 and 30%.

5. Published Written Works

Both, A.J. 2017. Consider evaluating the benefits of LED lighting for your crops. Greenhouse Grower online publication. March 17. (<http://www.greenhousegrower.com>)

Kubota, C., M. Kroggel, A.J. Both, J.F. Burr, and M. Whalen. 2016. Does supplemental lighting make sense for my crop? – Empirical evaluations. *Acta Horticulturae* 1134:403-411.

Wallace, C and A.J. Both. 2016. Evaluating operating characteristics of light sources for horticultural applications. *Acta Horticulturae* 1134:435-443.

Wallace, C. and A.J. Both. 2016. Putting lights to the test. *GrowerTalks*, June issue. pp. 60, 62, 64.

6. Scientific and Outreach Oral Presentations

Both, A.J. 2017. Electrical safety for farms and greenhouses (presentation). 62th New Jersey Agricultural Convention and Trade Show. February 8. Atlantic City, NJ.

Both, A.J. 2017. High tunnel construction (abstract and presentation). Proceedings of the 62th New Jersey Agricultural Convention and Trade Show. February 7. Atlantic City, NJ. pp. 62.

- Both, A.J. 2017. The latest in greenhouse LED research (presentation). Mid Atlantic Fruit and Vegetable Convention. January 31. Hershey, PA.
- Manning, T. and A.J. Both. 2017. Insulation, heating, cooling, and weatherization (presentation). Rutgers University Farm Energy Efficiency and Water Conservation Workshop. February 22. Pittstown, NJ.
- Wallace, C. and A.J. Both. 2016. Comparing key light ratios for plant growth and development (presentation). 5th International Controlled Environment Conference. September 21. Canberra, Australia.

7. Other Relevant Accomplishments and Activities

- Both, A.J., B. Bugbee, C. Kubota, R.G. Lopez, C. Mitchell, E.S. Runkle, C. Wallace. 2017. Proposed product label for electric lamps used in horticulture and plant biology (poster). 5th International Controlled Environment Conference. September 18-22. Canberra, Australia.
- International Committee for Controlled Environment Guidelines. 2016. Guidelines for measuring and reporting environmental parameters for experiments in greenhouses. 34 pp.

Pending publications

- Both, A.J., J.M. Frantz, B. Bugbee. 2017. Carbon dioxide enrichment in greenhouses. Submitted for publication in 'Light Management in Controlled Environments' (R.G. Lopez and E.S. Runkle, eds.) to be published by Meister Media.
- Both, A.J. and J.E. Faust. 2017. Light transmission: The impact of glazing material and greenhouse design. Submitted for publication in 'Light Management in Controlled Environments' (R.G. Lopez and E.S. Runkle, eds.) to be published by Meister Media.
- Both, A.J., B. Bugbee, C. Kubota, R.G. Lopez, C. Mitchell, E.S. Runkle, C. Wallace. 2017. Proposed Product Label for Electric Lamps Used in Horticulture and Plant Biology. Submitted (under review) for publication in HortTechnology.
- Fisher, P., A.J. Both, and B. Bugbee. 2017. Supplemental lighting technology, costs and efficiency. Submitted for publication in 'Light Management in Controlled Environments' (R.G. Lopez and E.S. Runkle, eds.) to be published by Meister Media.
- Johnson, M., T.S. Villani, J.E. Simon, A.J. Both. 2017. Effects of nitrogen, CO₂ and harvesting method on *Parachlorella kessleri* grown on a vertical attached growth system. Submitted (under review) for publication in the Journal of Applied Phycology.
- Li, Y., J.R. Heckman, C.A. Wyenandt, and A.J. Both. 2017. Applying Silicon to suppress powdery mildew in pumpkin. In preparation.
- Runkle, E. and A.J. Both. 2017. Delivering long-day lighting – Technology options and costs. Submitted for publication in 'Light Management in Controlled Environments' (R.G. Lopez and E.S. Runkle, eds.) to be published by Meister Media.