

**REPORT FOR THE NCERA-101 MEETING, April 12 -15, 2014**

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1. New Facilities and Equipment

A 2-meter diameter integrating sphere (LabSphere) was acquired through the USDA-NIFA funded SCRI-LED project. A dark-room test set-up was established for measuring the horizontal PAR distribution from various supplemental light sources (including LED lamps) that can be mounted at various heights above the sensor. Testing of equipment and lamps is underway.

2. Unique Plant Responses

None

3. Accomplishment Summary

Ariel Martin (PhD, 2013) developed a decision support system (DSS) to manage the electricity generated by a 250 kW microturbine driven combined heat and power system installed at the EcoComplex Research and Demonstration Greenhouse. Using an hourly cycle and based on a simple crop growth model and information about electricity prices, the DSS determines optimum use of the generated electricity: onsite (for supplemental lighting of a tomato crop), export to the utility grid (for additional income), or a combination of the two.

4. Impact Statement

Nationwide, Extension personnel and commercial greenhouse growers have been exposed to research and outreach efforts through presentations, publications and evaluation tools. It is estimated that this information has led to proper greenhouse designs and updated operational strategies that saved an average sized (1-acre) greenhouse 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, regional, and national audiences. 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

Ariel Martin. 2013. Development of a decision support system to operate the greenhouse lighting and shading systems powered by a distributed generator. PhD dissertation. Rutgers University Libraries.

Both, A.J. and T. Manning. 2013. Powering up: Utilizing solar and wind energy can help balance the costs of production in your greenhouse facilities. American Nurseryman Magazine. March issue. pp. 16-20.

6. Scientific and Outreach Oral Presentations

Both, A.J. 2014. Natural and supplemental lighting for plant production. Presentation for the short course: Hydroponic fruit and vegetable production, practical information for novice growers. EcoComplex, Columbus, NJ. March 7.

Both, A.J. 2014. Hydroponic lettuce production. Presentation for the Mid Atlantic Fruit and Vegetable Convention. Hershey, PA. January 29.

Both, A.J. 2013. Energy conservation in greenhouse production. Presentation for the NJNLA Greenhouse Growers Conference. EcoComplex, Columbus, NJ. June 20.

Both, A.J. 2013. Converting biologically derived methane gas to energy. Invited lecture at the South China University of Technology, Guangzhou, China. May 29.

Both, A.J. 2013. Efficient use of natural resources in greenhouses. Invited lecture at the South China Agricultural University, Guangzhou, China. May 28.

7. Other Relevant Accomplishments and Activities

Both, A.J. (Chair since 2004) International Committee for Controlled Environment Guidelines: Guidelines for Monitoring and Reporting Environmental Parameters for Experiments in Greenhouses.

Both, A.J. (since 2003) Associate Editor Transactions of the ASABE/Applied Engineering in Agriculture.

*Awards*

ASHS (American Society for Horticultural Science) Kenneth Post Award for Graduate Research in Floriculture for the 2012 paper by M.G. Blanchard, E.S. Runkle, A.J. Both, and H. Shimizu titled: Greenhouse energy curtains influence shoot-tip temperature of new guinea impatiens. HortScience 47(4):483-488. July 2013.

ASHS (American Society for Horticultural Science) Outstanding Extension Publication Award in the category Fact Sheets (9-30 pages) for the publication titled 'Greenhouse Energy Conservation Strategies' authored by E.S. Runkle and A.J. Both (MSU Extension Bulletin E-3160). July 2013.