

REPORT FOR THE NCERA-101 MEETING, March 9-12, 2013

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1. New Facilities and Equipment

Work has started on a supplemental lighting testing facility (e.g., light intensity, distribution, spectral quality, electricity consumption) as part of the multi-institutional Specialty Crop Research Initiative LED project.

2. Unique Plant Responses

None

3. Accomplishment Summary

We continue to work through operating and maintenance challenges associated with our landfill gas fired microturbine installation at the 1-acre NJ EcoComplex Research and Demonstration Greenhouse. A doctoral student (Ariel Martin) is developing an operational decision support system to manage the electricity generated: use onsite (supplemental lighting for greenhouse tomatoes), export to the utility grid (additional income), or a combination of the two. Our work on energy monitoring & auditing and the use of alternative energy sources for agricultural operations is continuing through outreach activities and publications. Resulting from continued collaborations with colleagues in Japan, additional work was done on using heat pumps for greenhouse heating.

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

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.

Blanchard, M.G., E.S. Runkle, A.J. Both, and H. Shimizu. 2012. Greenhouse energy curtains influence shoot-tip temperature of new guinea impatiens. HortScience 47(4):483-488.

Both, A.J., R. Hansen, and M. Kacira. 2012. Hydroponics give growers control. Article is part of the Water Wisely series in Greenhouse Grower Magazine. May issue.

Mitchell, C.A., A.J. Both, C.M. Bourget, J.F. Burr, C. Kubota, R.G. Lopez, R.C. Morrow, and E.S. Runkle. 2012. LEDs: The future of greenhouse lighting! (feature article) Chronica Horticulturae 52(1):6-12.

D.R. Mears, L. Okushima, S. Sase, T. Takakura, H. Moriyama, S. Furuno and M. Ishii. 2012. Capacities for heat pump heating systems for greenhouses in Japan. Journal of the Society of Agricultural Structures, Japan 43(3), September issue. (In Japanese, English version online at:

http://www.naro.affrc.go.jp/org/nkk/soshiki/soshiki04-nouchi/04nouguyoushisetsu/ceac_news/2011%20HP%20heat%20paper%20final.pdf).

Okushima, L., D.R. Mears, S. Sase. M. Ishii and H. Moriyama, 2011. Thermal condition in a compact sunroom for fresh vegetables production. International Journal of Sustainable Energy 30(5):277-288.

6. Scientific and Outreach Oral Presentations

Both, A.J. 2013. Water treatment for nurseries. Presented at the *Topics in Nursery Production* meeting in Millville, NJ. February 20.

Both, A.J. 2012. Population growth and greenhouse production. Invited presentation as the Robert Langhans Visiting Scholar at Cornell University, Ithaca, NY. November 12.

Both, A.J. 2012. Greenhouse guidelines. Presented at the *Controlled Environments: Technology and Practice* meeting in Cambridge, England. September 9-12.

7. Other Relevant Accomplishments and Activities

Both, A.J. 2012. Served as thesis advisor for Tom van Zundert, M.S. student at Wageningen University. Thesis topic: Life Cycle Assessment (LCA) of the Dutch greenhouse tomato production system.

Both, A.J. Sabbatical leave: August 2011-July 2012, Wageningen University, the Netherlands.

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.