

2012 NCERA-101 Station Report - University of Maryland

1. Impact Nuggets:

As previously reported in 2011, Maryland is leading a Specialty Crops Research Initiative (SCRI) Grant to investigate Precision Irrigation and Nutrient Management for Nursery, Greenhouse and Green Roof Systems, using Wireless Sensor Networks. The significant engineering effort put into the development of the advanced monitoring and control (nR5) node and supporting software (Sensorweb) in 2010-11, was implemented in a number of research situations and commercial operations during 2012. We are now actively monitoring and controlling irrigation in 12 different locations, including 6 commercial greenhouses and nurseries. The relatively flawless deployment of this advanced irrigation monitoring and control system has allowed us to achieve significant reductions in water use that are impossible to achieve without this technology. We have also seen that in some cases the cropping cycle can be drastically shortened, while plant/flower quality is improved. This can have a major economic impact on greenhouses and nurseries. This is possible because the system combines precision irrigation strategies with decision-support provided by a range of moisture sensors and models for various species. For example, the micro-pulse routine in Sensorweb allows for very short duration irrigation events within an irrigation scheduling “window” that has achieved demonstrated water savings when combined with sensor-based setpoint control. This “embedded intelligence” is just one example of the tools and irrigation strategies we are developing as part of this project. Full research and activity reports for years 1 - 3 can be accessed from <http://smart-farms.net/impacts>

Dr. Gerry Deitzer (Emeritus Professor, UMD) has been consulting with two lighting companies, LumiGrow (CA) investigating the effects of far-red LEDs on the growth and flowering of barley, and iGrow, Inc. (OH) who make several induction lamps that use RF frequencies to induce excitation of phosphors that they design. These have been installed in four Conviron BDR8 chambers in the PSLA Department at Maryland, which were retrofitted by Conviron with F48/T8/TL 841/HO fluorescent lamps in place of the F48/T12/Cool White/VHO fluorescents in all of the other chambers. We have run a number of experiments over the past two years that show that the TL841 fluorescent lamps are just as good, if not better, than the Cool White lamps, and use much less power. We have also found that the far-red LEDs are much better than incandescent lamps at stimulating flowering in the long-day plant barley. Surprisingly, the 2200 K induction lamp, which has no far-red and much less blue light was as effective as the far-red LEDs at promoting flowering in these plants. We believe that the blue light is inhibitory to flowering and is reversed by the addition of far-red light.

2. New Facilities, Equipment, Personnel Changes:

- Mr. Sydney Wallace has been appointed as the new Greenhouse Manager for the University of Maryland at College Park. Sydney can be contacted at swallac1@umd.edu; Tel: (301) 405-4375
- Shaun Faulkner remains as the Controlled Environment Facilities Manager at UMCP. Shaun can be contacted at ssfaulkn@umd.edu; Tel: (301) 405-6913
- No further changes or improvements have been made to the Greenhouse complex or CE facilities since the 2011 report was submitted for UM for the Sept., 2012 meeting in Norwich, UK.

3. Publications and Presentations

Refereed Papers

1. Hong, C.X., P. A. Richardson, W. Hao, S. R. Ghimire, P. Kong, G. W. Moorman, J. D. Lea-Cox and D. S. Ross. 2012. *Phytophthora aquimorbida* sp. nov. and *Phytophthora* taxon 'aquatilis' recovered from irrigation reservoirs and a stream in Virginia, USA. *Mycologia*. 104:1097-1108
2. Kong, P., J. D. Lea-Cox and C. X. Hong. 2012. Effect of electrical conductivity on survival of *Phytophthora alni*, *P. kernoviae* and *P. ramorum* in a simulated aquatic environment. *Plant Pathology* 61: 1179–1186
3. Solano, L., A. G. Ristvey, J. D. Lea-Cox and S. M. Cohan. 2012. Sequestering zinc from recycled crumb rubber in extensive green roof media. *Ecol. Engineering* 47: 284– 290.

Conference Proceedings

1. Lea-Cox, J. D. and B. E. Belayneh. 2012. Irrigation Complexities - Using Sensor Networks for Real-time Scheduling in Commercial Horticultural Operations. Technical Proceedings: 2012 Irrigation Tradeshow and Education Conference. Orlando FL. 9p. [Irrigation Assoc.](#) Falls Church, VA.
2. Majsztrik, J. M., E. Lichtenberg and J. D. Lea-Cox. 2012. A National Perspective on Irrigation Trends and Sensor Network Adoption in Ornamental Nursery and Greenhouse Operations. Technical Proceedings: 2012 Irrigation Tradeshow and Education Conference. Orlando FL. 7p. [Irrigation Assoc.](#) Falls Church, VA.
3. Starry, O., J. D. Lea-Cox, A. G. Ristvey and S. Cohan. 2012. Controlling for storm size when evaluating treatment effects in green roof runoff data. Proc. Mid-Atlantic Green Roof Symposium. 16-17 Aug, 2012. College Park, MD. 7p.

Presentations with Abstracts

1. Belayneh, B. E., J. Kim and J. D. Lea-Cox. 2012. Quantifying Root Zone Sensor and Substrate Volumetric Water Content Variability in Pot-In-Pot Tree Production. 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S206.
2. Kim, J., B. E. Belayneh and J. D. Lea-Cox. 2012. Daily Water Use of *Antirrhinum majus* in Hydroponic Greenhouse Production 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S182.
3. Kim, J., B. E. Belayneh and J. D. Lea-Cox. 2012. Considering the Variability of Capacitance Sensors Due to Placement in a Greenhouse Production Area. 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S208-209.
4. Lea-Cox, J. D. 2012. Pathogen risk mitigation with good system design and best management practices 7th International IPM Symposium, "IPM on the World Stage-Solutions for Global Pest Challenges," Memphis, TN. 27-29 March, 2012. http://www.ipmcenters.org/ipmsymposium12/27-2_LeaCox.pdf
5. Lea-Cox, J. D. 2012. Administering Grants—The Good, the Bad, and the Beauty of Having Funding. Graduate Student Workshop: Grant Writing and Beyond: How to Write a Grant and What to Do Once You Get It. 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S93.
6. Lea-Cox, J. D. and B. E. Belayneh. 2012. Environmental Sensors for Measuring Weather and Intra-canopy Conditions In: Symposium: The Use, Application and Analysis of Experimental and Field Sensor Data for Horticultural Applications. 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S80.
7. Majsztrik, J. M, E. Lichtenberg and J. D. Lea-Cox. 2012. A National Irrigation Management Survey for Greenhouse and Nursery Operations. 109th Annual American Society for Horticultural Science Conference. Miami, FL. *HortScience* 47(9): S207-208.

8. Majsztrik, J. M and J. D. Lea-Cox. 2012. Researchers Working with Regulators & Growers to Calculate Accurate Loading Rates. Symposium 1: Regulating Water Quality: Current Legislation, Future Impacts. 109th Annual American Society for Horticultural Science Conference. Miami, FL. HortScience 47(9): S73 .

Presentations without Abstracts

1. Lea-Cox, J.D. 2012. Establishing Monitoring Protocols – Challenges in Data Collection and Reporting. Mid-Atlantic Green Roof Science and Technology Symposium. August 16, 2012. College Park, MD.
2. Lea-Cox, J. D. 2012. Some Observations on Interdisciplinary Project Planning and Management. [In: Collaborative Research Projects Highlight the Economic Benefits of Agricultural Research.](#) Webinar organized by the Tri-Societies (ASA/CSSA/SSSA) and Council on Food, Agriculture and Resource Economics (C-FARE) for USDA-NIFA Program Leaders. 15 Oct, 2012.
3. Lea-Cox, J. D., O. Starry, A. G. Ristvey and S. Cohan. 2012. Progress in Developing a Mechanistic Water Balance Model to Predict Green Roof Performance and Efficiency. In: Quantification of Green Roof's Contributions to Building and Community Performance. [NASA-ESA International Workshop on Environment and Alternative Energy.](#) 4 – 7 Dec, 2012. NASA-Goddard Space Center, Greenbelt MD.

Workshops; Certification Classes

1. Lea-Cox, J.D. 2012. Today's Water Management - Issues and Updates. Chesapeake Green Conference. Maritime Institute, Baltimore MD. 10 Feb. 2012.
2. Lea-Cox, J.D. 2012. Advanced Applicator Training. 7 March, 2012. University of Maryland Greenhouse Complex, College Park MD.
3. A. G Ristvey and J. D. Lea-Cox. 2012. Grower Certification Training – Presentations, plan-writing sessions and certification exam. University of Maryland Extension and Maryland Department of Agriculture. June 7, 2012 and July 15, 2012.

Websites

1. Lea-Cox, J.D. and L. Monahan, 2012. Smart-farms Website and Knowledge Center Redesign: <http://www.smart-farms.net> and <http://www.smart-farms.net>

Impact Statements

1. Enabling Smart Decision-Irrigation for Nurseries and Greenhouses. *American Society for Horticultural Science: Center for Horticultural Impact Statements.* <http://ashsmmedia.org/?p=???>
2. Better Irrigation in Nurseries and Greenhouses Saves both Water and Money. *American Society for Horticultural Science: Center for Horticultural Impact Statements.* <http://ashsmmedia.org/?p=410>