

Annual Meeting
Portland, Maine
June 20-22, 2011

Multistate Research Project
Annual Station Accomplishments Report

PROJECT NUMBER: NE-1035

TITLE: Developing and Integrating Components for Commercial Greenhouse Production Systems

PROJECT DURATION: October 1, 2008 to September 30, 2013

REPORTING PERIOD: March 20, 2010 to May 1, 2011

REPORT DATE: September 20, 2011

PUBLICATIONS:

Dissertations, Theses (Published)

- Classen, M.A., 2009. *An Investigation into the Heats of Combustion for Selected Biomass and Heating Efficiency using a Simulated Biomass Furnace Model*, Unpublished Honors Thesis, University of Nebraska, Lincoln, NE.
- Frechen, Dan. 2011. The Implementation of LED Technology in Environmental Growth Chambers: Plant Responses, Energy Efficiencies and Practicality of Growth Chamber Retrofitting. M. Agr. Thesis, Horticulture, The Pennsylvania State University, PA. (Advisor(s) R.D. Berghage and W. Kenyon, Committee D. Decoteau
- Hawkins, G. 2010. Consumer interest and compost substrate management of organic and sustainable plants. MS Thesis. University of Maine
- Kamelian, H., 2010. *A Generalized Pattern Recognition System Using Fuzzy Clustering and Genetic Algorithm* Unpublished Honors Thesis, University of Nebraska, Lincoln, NE.
- Lee, Wee Fong. 2010. Cooling Capacity Assessment of Semi-closed Greenhouses. M.S. Thesis. The Ohio State University.
- Mabie, D.M., 2011. *Economic and Environmental Sustainability of using Biofuels for Heating Small Nebraska Greenhouses*. Unpublished Master's Thesis, University of Nebraska, Lincoln, NE
- Rivera, Dania. 2010. Accelerated Pot-in Pot Using Double-Cropped Retractable Roof Greenhouse Grown Tree Liners. Ph.D. dissertation, The Ohio State University.
- Villarreal- Guerrero, F. 2011. Enhanced greenhouse cooling strategy with natural ventilation and variable fogging rates. PhD Dissertation, University of Arizona, Tucson, AZ (Advisor: M. Kacira, Committee: G. Giacomelli, C. Kubota, Y.J. Son)
- Villarino Pizarro, G.H. 2011. Salt tolerance in floriculture species: characterization of salt tolerance and the cloning of a novel *Petunia* gene involved in trehalose sugar biosynthesis and evaluating its roles as a stress osmolyte in mutant yeasts. MS Thesis. Cornell University

Books (Published)

Proceedings

Book Chapters (Published)

- Mattson, N. 2011. Plant Mineral Nutrition. in Encyclopedia of Science and Technology. McGraw Hill, New York, NY. *In press*.
- Meyer, G.E. and G. DeBerg, 2010. *Flow Measurement*. In D.R. Heldman (Editor) Encyclopedia of Agricultural, Food, and Biological Engineering, Marcel Dekker, inc.

Refereed Journal Articles (Published)

- Brechner, M.L. L.D. Albright and L.A Weston. 2011. Effects of UV-B on secondary metabolites of St. John's wort (*Hypericum perforatum* L.) grown in controlled environments. *Photochemistry and Photobiology*. (In press)
- Burnett, S.E., N. Mattson, B. Krug, and R. Lopez. 2011. Floriculture sustainability research coalition: Bringing the latest sustainability research to the industry. *HortTechnology* (In Press).
- Gent, M.P.N and R.J. McAvoy. 2011. Water and Nutrient Uptake and Use Efficiency with Partial Saturation Ebb and Flow Watering. *HortScience* 46:791-798.
- Hawkins, G., S.E. Burnett, and L.B. Stack. 2011. Survey of consumer interest in organic, sustainable, and local bedding plants in Maine. *HortTechnology* (In Press).
- Kim, J., M.W. van Iersel, and S.E. Burnett. 2011. Estimating daily water use of two petunia cultivars based on plant and environmental factors. *HortScience* (In Press).
- Linker, R., M. Kacira, A. Arbel. 2011. Robust climate control of a greenhouse equipped with variable-speed fans and a variable-pressure fogging system. *Biosystems Engineering*. (In Press)
- Matsuda, R., C. Kubota, M. L. Alvarez and G. A. Cardineau. 2010. Determining the optimal timing of fruit harvest in transgenic tomato expressing F1-V, a candidate subunit vaccine against plague. *HortScience*. 45:347-351
- Savory, E.A., Granke, L.L., Quesada-Ocampo, L.M., Varbanova, M., Hausbeck, M.K., and Day, B. 2011. The cucurbit downy mildew pathogen *Pseudoperonospora cubensis*. *Molecular Plant Pathology* 12(3):217-226.
- Miller, C.T., N.S. Mattson and W.B. Miller. 2011. Fertilizer composition, concentration and irrigation method affect growth and development of *Oxalis regnellii* and *Oxalis triangularis*. *HortScience* 46:1110-1115.
- Shahid., M.A., M.A. Pervez, R.M. Balal, N.S. Mattson, A. Rashid, R. Ahmad, C.M. Ahhub and T. Abbas. 2011. Brassinosteroid (24-epibrassinosteroid) enhances growth and alleviates the deleterious effects induced by salt stress in pea (*Pisum sativum* L.). *Australian Journal of Crop Science*. 5:500-510.
- Song, J.-Y., N.S. Mattson and B.Y. Jeong 2011. Efficiency of shoot regeneration from leaf, stem, petiole and petal explants of six cultivars of *Chrysanthemum morifolium*. *Plant Cell, Tissue and Organ Culture*. DOI 10.1007/s11240-011-9980-0.
- Striemer, G.M., D. L. Story, A. Akoglu and M. Kacira. 2011. A node and network Level self-recovering distributed wireless sensor architecture for real-Time crop monitoring in greenhouses. *Transactions of the ASABE*. (In Press)

Zinati, G.M., J. Dighton, and A.J. Both. 2011. Fertilizer, irrigation and natural ericaceous root and soil inoculum (NERS): Effects on container-grown ericaceous nursery crop biomass, tissue nutrient concentration, and leachate nutrient quality. *HortScience* 46(5):799-807.

Symposium Proceedings Articles (Published)

- Baeza, E., J. P. Parra, J. C. López, J. C. Gázquez, M. Kacira, J. I. Montero. 2011. Validation of CFD simulations for three dimensional temperature distributions of a naturally ventilated multispan greenhouse obtained by wind tunnel measurements. *ActaHorticulturae*, 893: 571-579.
- Both, A.J., T.O. Manning, A. Martin, D.R. Specca, and E. Reiss. 2011. Operating a 250 kW landfill gas fired microturbine at a 0.4 hectare research and demonstration greenhouse. *Acta Horticulturae*. 893:397-404.
- de Villiers, D.S., H.C. Wien, J.E. Reid, and L.D. Albright. 2011. Energy Use and Yields in Tomato Production: Field, High Tunnel and Greenhouse Compared for the Northern Tier of the USA (Upstate New York). *Acta Horticulturae*. (In press)
- Fitz-Rodríguez, E., M. Kacira, and F. Villarreal-Guerrero. 2011. Neural network predictive control in a naturally ventilated and fog cooled greenhouse. *ActaHorticulturae*. (Accepted)
- Gent, M.P.N. 2011. Comparison of Diurnal Variation of Nitrate and Sugars in Lettuce and Predictions of a Model Based on Metabolism. *Acta Horticulturae* 893:739-745.
- Gent, M.P.N., W.H. Elmer, R.J. McAvoy. 2011. Rapid Watering to Achieve Partial Saturation of Root Medium on Flooded Floors. *Acta Horticulturae* 893:1065-1072.
- Hausbeck, M.K., and Harlan, B.R. 2011. Managing downy mildews. Pages 27-32 in: Proc. Pest and Production Management Conference, Society of American Florists, San Diego CA, Feb 24-26.
- Hausbeck, M.K., and Harlan, B.R. 2010. New products and good strategies to control diseases. Pages 2-7 in: Greenhouse VII: Insect and Disease Control Session Summaries, Proc. Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, MI, Dec 7-9. Online.
- Hausbeck, M.K., and Cortright, B.D. 2010. Managing cucumber diseases in the field. Pages 2-7 in: Pickling Cucumber Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo. Online.
- Hausbeck, M.K., and Cortright, B. 2010. Controlling downy mildew on cucumber. Pages 80-82 in: Proceedings of the 2010 Mid-Atlantic Fruit and Vegetable Convention, Hershey PA, Feb 2-4.
- Kacira, M., G. Giacomelli, L. Patterson, R. Furfaro, P. Sadler, G. Boscheri, R. Wheeler, C. Lobascio, M. Lamantea, and S. Rossignoli. 2011. System dynamics and performance factors of UA-CEAC lunar greenhouse prototype bioregenerative life support system. *ActaHorticulturae*. (Accepted)
- Kroggel, M., W. Lovichit, C. Kubota, and C. Thomson. 2011. Greenhouse baby leaf production in semi-arid climate: seasonal effects on yield and quality. *ActaHorticulturae* (submitted)
- Kubota, C., P. Chia, Z. Yang, and Q. Li. 2011. Applications of far-red light emitting diodes in plant production under controlled environments. *ActaHorticulturae* (submitted)
- Kubota, C. 2011. Environmental control technologies to improve greenhouse product quality. *ActaHorticulture* (submitted).

- Meyer, G.E., D.M. Mabie, F.J. Hay, S. Adams, T. Bartels, and J.B. Fitzgerald, 2009. *Improved Instrumentation and Controls for Biomass Heating and Impact on Greenhouse Profitability*. ASABE Paper Number 09-096884. presented at the 2009 ASABE Annual International Meeting, Grand Sierra Resort and Casino. Reno, NV., June 21–June 24, 2009
- Meyer, G.E., E.T. Paparozzi, E. Walter-Shea, S. A. Adams, 2010, *Use of Reflective PAR Mulches to Enhance Winter-time Greenhouse Strawberry Production*. ASABE Paper Number 10-09793 presented at the 2010 ASABE Annual International Meeting, David L. Lawrence Convention Center Pittsburgh, PA., June 20–June 23, 2010.
- Story, D., M. Kacira, C. Kubota and A. Akoglu. 2011. Morphological and textural plant feature detection using machine vision for intelligent plant health, growth and quality monitoring. *ActaHorticulturae*, 893: 299-306.
- van Iersel, M.W., S. Dove, and S. Burnett. 2011. The use of soil moisture probes for improves uniformity and irrigation control in greenhouses. *Acta Horticulturae* 893:1049-1056.
- Villarreal-Guerrero, F., M. Kacira, and E. Fitz-Rodriguez. 2011. Simulation of fixed and variable pressure fogging in naturally ventilated greenhouse, water and energy savings and stability of climate. *ActaHorticulturae*. (Accepted)

Popular Articles (Published)

- Burnett, S., and K. Garland. 2010. Growing high quality heuchera. *An Association of Horticulture Professionals (OFA) Bulletin* 923:17-18.
- Burnett, S., B. Krug, N. Mattson, R. Lopez, and Currey, C. 2010. Ten ways to heat your house. *Grower Talks*. 74:64-69.
- Elmer, W, M. Gent, R. McAvoy, J. Geremia. 2010. Partial saturation ebb&flow watering: Spread of disease. *Plugged In 2010-2011 Issue 2* pages 8-10.
- Garland, K. and S. Burnett. 2011. Consider drip irrigation for your garden. *Maine Home Garden News* (In Press).
- Hansen, Robert, Jeff Balduff and Harold Keener. 2010. Development and operation of a hydroponic lettuce research laboratory. *RESOURCE- Engineering & Technology for a Sustainable World*. ASABE: St. Joseph, Michigan. July/August issue... feature article with cover page photo of lettuce growing in our hydroponic lettuce laboratory.
- Hausbeck, M., and Harlan, B. 2010. Downy mildew on coleus. *Greenhouse Product News* 20(6):26-30. Online.
- Mattson, N. and B. Krug. 2010. Dealing with Boron deficiency. *GrowerTalks Magazine*. 74(8):32.
- Mattson, N.S. W. Miller and J. Bishop. 2010. Harvesting peat: from the bog to your operation. *Greenhouse Product News*. 20(10):20-24.
- van Iersel, M., S. Burnett, J. Lea-Cox, and P. Thomas. 2011. Improving irrigation – sensors can help. *GMPPro* (in press).
- Villarino, G.H and Mattson, N.S. 2011. Soluble salts: don't get burned part 2. *Greenhouse Grower Magazine*. 29(5).
- Villarino, G.H and Mattson, N.S. 2011. Salts in greenhouse crops: don't get burned. *Greenhouse Grower Magazine*. 29(4).

Presentations (Papers)

- Gent, M P N, W H Elmer, R J McAvoy. 2010. Water Use Efficiency with Rapid Watering of Potted Plants on Flooded Floors. (Abstract) Intl Horticultural Congress, Lisbon Portugal August 2010. S03.033
- Gent, M P N, M R Short. 2010. Managing a Simple System to Recycle Nutrient Solution to Greenhouse Tomato Grown in Rockwool. (Abstract) Intl Horticultural Congress, Lisbon Portugal August 2010. SM04.013

Presentations (Oral)

- Both, A.J. 2011. Efficient use of natural resources in greenhouses. Keynote speech at the GreenSys2011 symposium, June 5-10, Halkidiki, Greece.
- Burnett, S. Wildflower walk in the Orono Bog. July 23, 2011. Orono, ME.
- Burnett, S. Climate change in Maine gardens. Harpswell Garden Club Presentation. July 21, 2011. Brunswick, ME.
- Burnett, S. How to garden with peonies. Peony Society of Maine Presentation. June 18, 2011. Bangor, ME.
- Burnett, S. Instructor for Herbaceous Plant Identification Class for Penobscot County Master Gardeners. March 29, 2011. Bangor, ME.
- Burnett, S. Instructor for Herbaceous Plant Identification Class for underserved population at Maine State Prison in Warren Maine. February 17, 2011.
- Burnett, S. Instructor for Herbaceous Plant Identification Class for Hancock County Master Gardeners. April 22, 2011. Ellsworth, ME.
- Burnett, S., N. Mattson, R. Lopez, and B. Krug. Floriculture sustainability research coalition: bringing the latest sustainability research to the industry. March 10, 2011. Dallas, TX. National Floriculture Forum.
- Burnett, S. Top 10 tips for going organic. Maine Agricultural Trades Show. January 12, 2011. Augusta, Maine.
- Garland, K., Stack, L., Kirby, C., Watt, B., and Burnett, S. The good, the bad, and the bugly – a panel discussion for Penobscot County homeowners. June 28, 2011. Orono, ME.
- Gregory, M. S., D. Story, A. Akoglu, M. Kacira. 2010. A Node and Network Level Self-Healing Distributed Wireless Sensor Architecture for Greenhouse Based Plant Monitoring Systems. ASABE Paper No. 1009468. St. Joseph, Michigan.
- Hansen, R.C. 2010. OARDC hydroponic lettuce research project results and update. CropKing, LLC. Lodi, Ohio. Jan 20.
- Hansen, R.C., P.P. Ling, M.H. Klingman, M.J. Sciarini and H.M. Keener. 2010. Results from growing lettuce in a hydroponic research laboratory. Paper No. 10-09175. Presented at the ASABE Annual International Meeting, Pittsburg, Pennsylvania. June 20-23.
- Hansen, R.C., W.L. Bauerle, J.E. Altland, T. Demoline and H.M. Keener. 2010. Evaluation of commercially available Volumetric Water Content sensors and their capability for helping growers to decide "when and how much to irrigate" pot-in-pot container-grown trees. Paper No. 10-018. Presented at the Northeast Agricultural and Biological Engineering Conference, Geneva, New York. July 18-21.
- Hansen, R.C. 2010. Research updates from growing lettuce in a hydroponic lettuce research laboratory. CropKing Hydroponic Conference, Orlando, Florida. Nov 4-5.
- Hansen, R.C. 2010. Potential process improvement challenges for hydroponic lettuce production. CropKing Hydroponic Conference, Orlando, Florida. Nov 4-5.

- Jordan, M., S. Burnett, and J. MacRae. American Society for Horticulture Science Meeting. Selection of plants for use in sub-surface flow wastewater treatment in Dolce Vivir, Honduras. August 2-6, 2010. Palm Desert, California. 3rd Place in Undergraduate Student Competition.
- Kacira, M. 2010. Improving production quality and resource use efficiency by plant sensing and monitoring. Scholar in Residence Program, Johnson County Community College, Kansas City, KS, October 2010.
- Kacira, M. 2010. Engineering concerns and opportunities for sustainable greenhouse systems. Scholar in Residence Program, Johnson County Community College, Kansas City, KS, October 2010.
- Lea-Cox, J., van Iersel, M., Zheng, Y., and S. Burnett. Irrigation efficiency: Save water, fertilizer, and money. Southeast Color Connection. June 16, 2010. Greenville, SC.
- Lopez, R., Krug, B., Mattson, N., and S. Burnett. A guide to sustainable crop production. Southeast Color Connection. June 16, 2010. Greenville, SC.
- Mattson, N. 2011. Indiana Flower Growers Association Bedding Plant Conference, Westfield, IN. Chronic low-level ethylene exposure: identifying and solving this problem in your greenhouse, Feb. 16, 2011.
- Mattson, N. 2011. Indiana Flower Growers Association Bedding Plant Conference, Westfield, IN. Fertilizer cost comparison, and tips to save on costs, Feb. 16, 2011.
- Mattson, N. 2011. Indiana Flower Growers Association Bedding Plant Conference, Westfield, IN. Growing bedding plants and hanging baskets with no-heat? It may be possible in a high tunnel, Feb. 16, 2011.
- Mattson, N. 2011. Penn State Greenhouse Grower's Meeting Southeast Region, East Earl, PA. Plant nutrition, Jan. 27, 2011.
- Mattson, N. 2011. Penn State Greenhouse Grower's Meeting Southeast Region, East Earl, PA. Growing better crops under cold conditions, Jan. 27, 2011.
- Mattson, N.S. and F. Hulme. 2010. Northeast Greenhouse Conference, New England Floriculture Inc., Worcester, MA, Using Osmocote Plus in the greenhouse, November 4, 2010.
- Mattson, N.S. 2011. Capital district bedding plant conference and trade show, Latham, NY. Growing spring crops successfully with no heat February, 22, 2011.
- Mattson, N.S. 2011. Integrated Pest Management In-Depth workshop, CCE Tompkins County, Ithaca, NY, Exploring soil-less substrates, February 3, 2011.
- Mattson, N.S. 2011. Integrated Pest Management In-Depth workshop, CCE Monroe County, Rochester, NY, Exploring soil-less substrates, January 21, 2011.
- Mattson, N.S. 2011. Long Island Greenhouse and Floriculture Conference, Ronkonkoma, NY. Are you online? How to use the internet and social media as marketing tools January 18, 2011.
- Mattson, N.S. 2011. Long Island Greenhouse and Floriculture Conference, Ronkonkoma, NY. Tips and tricks for growing low energy annuals January 18, 2011.
- Mattson, N.S. 2011. Western New York Bedding Plants School, Eden, NY. Interesting trends and winning plants from the spring 2010 California pack trials. January 11, 2011.
- Mattson, N.S. 2011. Western New York Bedding Plants School, Eden, NY. Growing bedding plants with no heat. January 11, 2011.
- Mattson, N.S. 2010. Cornell Floriculture Field Day, Cornell Greenhouse Program Work Team, Ithaca, NY, beyond the blue horizon: alternatives to liquid fertilizers, July 20, 2010.

- Rodriguez, E. F., M. Kacira, F. Villarreal-Guerrero, C. Kubota, G. Giacomelli, R. Linker, A. Arbel. 2010. Dynamic Response and Environmental Uniformity of a Naturally Ventilated Greenhouse Cooled with a Variable-Pressure Fogging System. ASABE Paper No. 1009436. St. Joseph, Michigan.
- Rodriguez, E. F., M. Kacira, F. Villarreal-Guerrero. 2010. Comparison of a Dynamic Model and Neural Network Model for Predicting the Environment of a Naturally Ventilated and Fog-cooled Greenhouse. ASABE Annual International Meeting, Pittsburg, PA, June 13-16.
- Villarreal-Guerrero, F., M. Kacira, E. F. Rodriguez, R. Linker, A. Arbel, C. Kubota, G. Giacomelli. 2010. Developing a Control Strategy for Greenhouses Equipped with Natural Ventilation and Variable Pressure Fogging: Evapotranspiration Models and Simulated Comparison of Fixed and Variable Pressure Fog Cooling. ASABE Paper No. 1009388. St. Joseph, Michigan.

Presentations (Poster)

- Villarino, G.H. and N.S. Mattson. 2011. Plant adaptation to salt/drought stress: elucidating the role of trehalose in model organisms Yeast, Petunia and Arabidopsis. Poster at: 7th Symposium of plant biology; Genetics of Adaptations. Harvard University, Cambridge, MA. May 5.

Other Creative Works

- Burnett, S. Appeared on WVII Channel 7 to talk about peony gardening on June 17, 2011. NE produced an eight-minute video of the project, which was made available to over 11,000 farmers and growers (approx. 50% have viewed).

Undergraduate Research and Posters (UCARE)

- Andrew Anderson, Biological Systems Engineering Junior, UCARE (2009-2010). *Thermodynamic analyses of plants in greenhouses and controlled environments.*
- Hanieh Kamelian, Biological Systems Engineering Junior, UCARE (2009-2010). *Fuzzy logic image analysis of thermal images of crop plants.*
- Cameron Cuning, Biological Systems Engineering Junior, UCARE (2010-2011). *Monitoring controlled environments for crop water use and humidity levels.* Cameron Cuning (UCARE), G.E. Meyer, and E.T. Paparozzi. *Stomatal Response in Winter Grown Greenhouse Strawberries.* Poster presented at 2011 University of Nebraska Research Fair.
- Han Do, Agronomy and Horticulture Junior, UCARE (2010-2011), *Studying the performance of strawberry cultivars for winter-time greenhouse production.*

Patents

Extension Publications

- Frantz, J.M., J.C. Locke and N. Mattson. 2010. Research update: does silicon have a role in ornamental crop production? OFA Bulletin. (924):17-18.
- Harlan, B.R., and Hausbeck, M.K. 2011. Is coleus downy mildew here to stay? Michigan State University News for Agriculture: Floriculture, Feb 8. Online.
- Hausbeck, M. 2011. Downy mildew outbreak in southeast Michigan on cucumbers. Michigan State University Extension News for Agriculture: Vegetables, Jul 8.
- Hausbeck, M. 2011. Downy mildew on field cucumbers detected in Ontario. Jul 6.

- Hausbeck, M.K., Harlan, B.R., and Enzenbacher, T.B. 2011. Coleus downy mildew. Michigan State University News for Agriculture: Floriculture, Jun 20. Online.
- Manning, T., A.J. Both, and J. Rabin. 2010. Understanding on-farm utility costs and billing (Rutgers Cooperative Extension Fact Sheet FS1128).
- Mattson, N. and R. Lopez. 2011. USDA Rural Energy for America Program Grants (REAP) for greenhouse energy efficiency. OFA Bulletin. (925):23-24.

Nebraska produced a series of webinars with a live audience from 12 states in the North Central U.S. Each webinar averaged 40 to 80 participants:

1. State of the Industry: Corn and Cellulosic Ethanol, March 26, 2010.
2. Economics of Ethanol and the New Cellulosic Industry April 30, 2010.
3. Cellulosic Biofuel Logistics, May 28, 2010.
4. Agronomic Impacts of Cellulosic Material Harvest, June 25, 2010.
5. Contracts for Cellulosic Biomass Sept 24th 2010.
6. "Real Green from Real Green-Show Me Energy Cooperative, October 29, 2010.

Abstracts

- Granke, L., and Hausbeck, M. 2010. Influence of environment on periodicity and concentration of airborne *Pseudoperonospora cubensis* sporangia in commercial cucurbit fields. Abstr. Phytopathology 100:S43.
- Leatherwood, W.R., N.S. Mattson. And J. Dole. 2010. Silicon supplementation and regulated deficit irrigation improve poinsettia quality and postharvest performance. Abstract and presentation at 107th Annual ASHS Conference. Palm Desert, CA, August 2-5. HortScience 45(8):S47.
- Leatherwood, W.R. and N.S. Mattson. 2010. Long-term low-concentration ethylene exposure affects growth, flowering and development of 28 ornamental taxa. Abstract and presentation at 107th Annual ASHS Conference. Palm Desert, CA, August 2-5. HortScience 45(8):S95-96.
- Song, J.Y., Sivanesan, I., Mattson, N. and B.R. Jeong. 2010. Use of petal explants for successful transformation of Chrysanthemum x morifolium 'Orlando' mediated by Agrobacterium tumefaciens. Abstract and presentation at 107th Annual ASHS Conference. Palm Desert, CA, August 2-5. HortScience 45(8):S47.
- Paparozi, E. T., Adams, S. A., Meyer, G., Conley, M. E., Schlegel, V., Blankenship, E. and P. E. Read., 2010. *Selecting strawberry cultivars for winter greenhouse production*. HortScience 45(8):S230 (Abstr.).
- Quesada-Ocampo, L., Granke, L., Olsen, J., Gutting, H., Runge, F., Thines, M., Lebeda, A., and Hausbeck, M. 2011. The genetic structure of *Pseudoperonospora cubensis* global populations. Abstr. Phytopathology 101:S149.
- Villarino, G.H. and Mattson, N.S. 2010. Effects of sodium chloride on growth and morphology of two Petunia cultivars. Abstract and presentation at 107th Annual ASHS Conference. Palm Desert, CA, August 2-5. HortScience 45(8):S95.

Technical Publications and Reports

- Foster, J.M., Glaspie, S.L., and Hausbeck, M.K. 2010. Evaluation of fungicides for control of downy mildew on pickling cucumber, 2009a. Dis. Management Rep. 4:V056. Online.

- Hansen, R.C., P.P. Ling and Natalie Bumgarner. 2010. Growing Plants Hydroponically with LED Lighting. Final research report presented to Green City Growers Cooperative, Donnell and Associates, Ltd. and The Cleveland Foundation. OARDC, Wooster, OH 44691. April 30.
- Hansen, R.C. 2010. Growth Responses of Hydroponically-grown Lettuce when Germinated and Grown in Five Different Polyurethane Growing Cubes. Final research report presented to Huntsman International, LLC. OARDC, Wooster, OH 4469. May 25.
- Harlan, B.R., and Hausbeck, M.K. 2011. Evaluation of fungicides for the control of downy mildew on coleus, 2010. Plant Dis. Management Rep. 5:OT018. Online.

Websites

- Leatherwood, W.R. and N.S. Mattson. 2010. Adding Silicon to the Fertilizer Program in Poinsettia Production: Benefits and Facts.
http://www.greenhouse.cornell.edu/crops/factsheets/silicon_poinsettia.pdf
- Mattson, N.S. 2011. Growing Bedding Plants and Hanging Baskets in an Unheated High Tunnel.
http://www.greenhouse.cornell.edu/structures/factsheets/high_tunnel_bedding_plants.pdf

Workshop Sponsor

- Both, A.J. 2011. Session organizer: New Technology. Atlantic Coast Ag Convention and Trade Show. Atlantic City, NJ. January 12.
- Farm energy workshop. Biglerville, PA. Session title: Conducting a Greenhouse Energy Audit. R.D. Berghage. (35 participants), May, 19, 2011.
- Greenhouse Crop Production and Engineering Design Short Course. Growing Solutions for Tomorrow: Urban Agriculture, Hydroponics and Aquaponics, April 4-8, 2011.

Workshop Participant

- NJ Farm Bureau and NJ Agricultural Experiment Station jointly organized three Electricity Rate Seminars during February and March 2011. Tom Manning presented lectures on 'Understanding the Electricity Infrastructure and Utility Costs' and 'Electricity Billing: Strategies to Manage Costs'. A.J. Both presented a lecture on 'Case Study: Landfill Gas Micro-Turbine'.

Refereed Journal Articles (Pending)

- Sase, S., **M. Kacira**, T. Boulard, L. Okushima. 2011. Determination of porosity parameters for tomato canopy: An experimental study in a wind tunnel. *Transactions of the ASABE*. (In Review)
- Story, D. and **M. Kacira**. 2011. Design and implementation of a computer vision guided crop diagnostics system: A case study with lettuce in floating hydroponics. *Biosystems Engineering*. (In Review)
- Villarreal-Guerrero, F., **M. Kacira**, E. Fitz-Rodríguez, C. Kubota, G.A. Giacomelli, R. Linker and A. Arbel. 2011. Comparison of three evapotranspiration models for a greenhouse cooling strategy with natural ventilation and variable high pressure fogging. *Scientia Horticulturae*. (In Review)
- Villarreal-Guerrero, F., **M. Kacira**, E. Fitz-Rodríguez, C. Kubota, G.A. Giacomelli, R. Linker and A. Arbel. 2011. Simulated performance of a greenhouse cooling control strategy with natural ventilation and fog cooling. *Biosystems Engineering*. (In Review)

- Villarino, G. and N.S. Mattson. 2011. Assessing tolerance to sodium chloride salinity in fourteen floriculture species. HortTechnology (In press)
- Waller, P., R. Ryan, **M. Kacira**, and P. Li. 2011. Algae raceway integrated design (ARID) for optimal temperature management. *Biomass and Bioenergy*. (In Review)