

Annual Meeting
University of Arizona
Tucson, AZ
March 26-28, 2015

Multistate Research Project
Annual Station Publications Report

PROJECT NUMBER: NE-1335

TITLE: Resource Management in Commercial Greenhouse Production

PROJECT DURATION: October 1, 2013 – September 30, 2018

EXPERIMENT STATION: Maine

PARTICIPANTS: Stephanie Burnett

REPORTING PERIOD: June 4, 2014 – March 30, 2015

REPORT DATE: March 23, 2015

PUBLICATIONS:

Dissertations, Theses (Published)

Foster, J.J. Effects of Light, Volumetric Water Content, and Soil Nutrition on Greenhouse Propagation of the Clonal Sub-Shrub *Linnaea borealis*. University of Maine, Orono, MS Thesis.

Villarino Pizarro, G. Transcriptomic analysis of *Petunia hybrida* in response to salt stress. Cornell University, Ithaca, PhD dissertation. 117 pages. (N. Mattson, special committee chair)

Books (Published)

Brumfield, R.G. 2014. Business Planning Workbook for Greenhouses.

Book Chapters (Published)

None

Refereed Journal Articles (Published)

Currey, C.J., R.G. Lopez and N.S. Mattson. 2014. Finishing bedding plants: a comparison of unheated high tunnels versus heated greenhouses in two geographic locations. HortTechnology. 24(5):527-534.

Mears, D.R., L. Okushima, L., S. Sase, T. Takakura, H. Moriyama, S. Furuno and M. Ishii. 2014. The cooling capacities of the greenhouses with the heat pump systems in Japan. *Journal of the Society of Agricultural Structures, Japan*, Vol.45, No.2, June, 2014. (In Japanese, English version online). http://www.naro.affrc.go.jp/org/nkk/soshiki/soshiki04-nouchi/04nougyoushisetsu/ceac_news/2014_HP_cool_paper_final.pdf

Okushima, L., D.R. Mears, 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*, Vol.43, No.3, September, 2012. (In Japanese, English version online). http://www.naro.affrc.go.jp/org/nkk/soshiki/soshiki04-nouchi/04nougyoushisetsu/ceac_news/2011%20HP%20heat%20paper%20final.pdf

Shahid, M.A., R.M. Balal, M.A. Pervez, T. Abbas, M.A. Aqeel, A. Riaz and N.S. Mattson. 2015. Exogenous 24-Epibrassinolide elevates the salt tolerance potential of pea (*Pisum sativum* L.) by improving osmotic adjustment capacity and leaf water relations. *Journal of Plant Nutrition*: 38(7):1050-1072. doi:10.1080/01904167.2014.988354

Zhen, S., S. Burnett, S.E. Burnett, M.E. Day, and M.W. van Iersel. 2014. Effects of substrate water content on morphology and physiology of rosemary, Canadian columbine, and cheddar pink. *HortScience* 49:486-492.

Symposium Proceedings Articles (Published)

Grossman M., J. Freeborn, H. Scoggins, J. Latimer. 2014. Effects of Application Time of Benzyladenine on the Branching and Growth of Herbaceous Perennial Liners. *Acta Hort* 1042:237-242.

Popular Articles (Published)

Cox, J.L., M. van Iersel, and S. Burnett. 2015. Precision irrigation: How and why? *Greenhouse Grower*. <http://www.greenhousegrower.com/structures-equipment/precision-irrigation-how-and-why/>.

Grossman, M., E. Lyons, M. Aiken, M.A. Hansen and J. Latimer. 2014. Tips for diagnosing impatiens necrotic spot virus (INSV). *e-GRO Alert Bulletin* 3(53):1-4.

Grossman M., E. Lyons, M. Aiken, J. Latimer. 2014. INSV on Echinacea. *e-GRO Alert Bulletin* 3(52):1-4.

Kang, J.G., M. van Iersel, R. Soranz Ferrarazi, S. Burnett, and S. Dove. 2015. Gain greater control of fertilizer with automated irrigation. *Greenhouse Grower* <http://www.greenhousegrower.com/production/crop-inputs/gain-greater-control-of-fertilizer-with-automated-fertigation/>

Latimer J. 2014. 2014 PGR Guide: Growth Regulators for Containerized Herbaceous Perennial Plants. 54 pp. GrowerTalks January issue.

Latimer J., D. Close (content editors). 2015. 2015 Pest Management Guide: Home Grounds and Animals. Virginia Cooperative Extension 456-018.

Latimer, J. 2015. Phytotoxicity!! Relative humidity affects PGR uptake. e-GRO Alert 4(16):1-4.

Latimer, J. 2015. Checklist for Reducing Greenhouse Heating Costs this Winter. e-GRO Alert 4(09):1-4.

Lyons E., M. Grossman, M. Aiken, J. Latimer. INSV on Penstemon. e-GRO Alert Bulletin 3(51):1-3.

McClennan M., J. Latimer. Branching Out: More growers are using PGRs to enhance branching, Nursery Management, March 2014, pp. 34, 36-37.

Mattson, N., L.D. Albright, D. de Villiers, M. Brechner, R. Langhans. 2015. Top misconceptions about CEA. Inside Grower. February:32-34.

Mattson, N. 2014. Comparing substrate fertilizer amendments for spring bedding plants. Greenhouse Grower Magazine. 32(13):48-54.

Presentations (Papers)

Beeks, S. and Mattson, N. 2014. Temperature effects on tomato growth and nutrient release in substrates amended with organic and conventional fertilizers. Abstract and presentation 111th Annual ASHS Conference. Orlando, FL, July 28-31, 2014.

Burnett, S., S. Dove, R.S. Ferrarezi, J.G. Kang, and M. van Iersel. 2014. Automated fertigation and irrigation control based on measurements of substrate water content and pore water EC. July 28-31, 2014. Orlando, FL. American Society for Horticulture Science Meeting.

Brumfield, R.G. and B. Özkan. 2014. An international study abroad project to empower women farmers in Turkey. 2014 Annual Conference of the American Society for Horticultural Science (ASHS), Orlando, FL, July 28-31, 2014, p. 87, 2014 Annual Conference Program.

Brumfield, R.G. and B. Özkan. 2014. An international service learning project to empower women farmers in Turkey. Presented at the Women in Agriculture Educators National Conference. Indianapolis, IN, April 2-3, 2014.

Matthews, J., R.G. Brumfield, J.S. Carleo, A. Lippet-Faczak, M. Melendez, B. O'Neill, and N. Polanin. 2014. As seen online: Using webinar technology to reach women farmers. Poster presented at the 2014 Annual Meeting of the Northeast Region of the American Society for Horticultural Science. Philadelphia, PA, January 6-8, 2014.

Mattson, N. and M. Moyal Ben Zvi. 2014. Potassium silicate supplementation enhances heat tolerance of *Petunia x hybrida* 'Mitchell Diploid'. Abstract and presentation 111th Annual ASHS Conference. Orlando, FL, July 28-31, 2014.

Villarino, G. and N. Mattson. 2014. Transcriptome response of *Petunia x hybrida* to sodium chloride salinity using high throughput RNA sequencing. Abstract and presentation 111th Annual ASHS Conference. Orlando, FL, July 28-31, 2014.

Other Creative Works

Both, A.J. 2015. LED lighting (abstract). Proceedings of the 60th New Jersey Agricultural Convention and Trade Show. February 3-5. Atlantic City, NJ. pp. 89.

Both, A.J. 2015. High tunnel construction and operation update (abstract). Proceedings of the 60th New Jersey Agricultural Convention and Trade Show. February 3-5. Atlantic City, NJ. pp. 52.

Burnett, S., S. Dove, R.S. Ferrarezi, J.G. Kang, and M. van Iersel. 2014. Automated fertigation and irrigation control based on measurements of substrate water content and pore water EC. HortScience (Abstract).

Burnett, S. and M. van Iersel. 2014. Effects of low substrate oxygen content on plant growth. HortScience (Abstract).

Grossman M., E. Lyons, M. Aiken, M. Hansen, J. Latimer. Tips for Diagnosing Impatiens Necrotic Spot Virus (INSV) in Greenhouse Crops. e-GRO Webinars October 2, 2014. <https://www.youtube.com/watch?v=qVS3wnn3LoI>

Trader, B., B. Jackson, J.L. Buck, S. Burnett, T.A.O. Dougher, and R.D. Lineberger. 2014. An analysis of American public horticulture internship programs. HortScience (Abstract).

Workshop Sponsor

Both, A.J. and D. Specca. Greenhouse Production Short Course, NJ EcoComplex. Columbus, NJ. March 2-3, 2015. R.G. Brumfield made a presentation on Greenhouse Marketing and Sales.

Brumfield, R.G., J. Matthews, M. Melendez, B. O'Neill, J. Carleo, and N. Polanin. Annie's Project NJ for Greenhouse Growers Program (January 14, 2014-February 27, 2014). R.G. Brumfield and A.J. Both made presentations.

Johnstonbaugh, E., D. Ciolokoz, G. Musgarve, G. Roth, C. Callahan, S. Hawkins, A.J. Both, Z. Helsel, T. Manning. Farm Energy IQ workshops (In-service training). Fairlee, VT (February 23-25, 2015), State College, PA (March 10-12, 2015), Columbus, NJ (April 8-10, 2015).

Latimer, J. 2015. Other Considerations for Using PGRs. e-GRO's PGR University. <https://www.youtube.com/watch?v=ZzIKWqaNUPk>.

Latimer, J. 2015. PGR Sprays and Liner Soaks. e-GRO's PGR University. <https://www.youtube.com/watch?v=1pG-2SyD4Do>

Latimer, J. 2015. Using Branching Agents. e-GRO's PGR University. <https://www.youtube.com/watch?v=ncAopU-6dFc>

Latimer, J. organizer. 2015. e-GRO's Biocontrol Webinar. Conducted on January 30, 2015. <http://e-gro.org/webinars.php>

Latimer J. organizer and presenter. 2014. "Greenhouse Energy Conservation Practices and Opportunities", Getting Started in the Greenhouse Business School, Southern Piedmont AREC, Blackstone, VA, Nov. 11-12, 2014. Audience industry and Extension agents.

Ling, P., A.J. Both, R. Brumfield, E. Buck, P. Davidson, G. Giacomelli, M. Kacira, C. Kubota, and P. McMahon. Controlled environment plant production engineering/technology education modules. Project overview and module demonstration presented at Cultivate'14, Columbus, OH. July 13, 2014.

Mattson, N. Seeley Summit. 2014. Water: Horticulture's Next Game Changer? June 22-24, Lisle, IL. 55 participants. Co-organizer.

Whipker, B. and J. Latimer (organizers and presenters). 2015. e-GRO's PGR University Webinar. Conducted on January 23, 2015. <http://e-gro.org/webinars.php>

Workshop Participant

Mattson, N. and S. Burnett. Organic substrates and fertilizers: Making the switch. Northeast Greenhouse Conference. Nov. 5, 2014. Springfield, MA.

Burnett, S. Growing cold: production strategies to reduce fuel. Maine Agricultural Trades Show. January 8, 2014.

Latimer, J. Identifying and Modeling Energy Efficiency in the Greenhouse (In-service training). A.J. Both made two presentations. Clarksville, VA. January 13-14, 2015.

Kubota, C. LED Symposium (organized as part of the USDA SCRI LED project). A.J. Both made a presentation. Tucson, AZ. February 20, 2015.

Refereed Journal Articles (Pending)

Aiken, M.G., H.L. Scoggins, and J.G. Latimer. 2015. Substrate pH impacts efficacy of ethephon drenches on growth of herbaceous perennials. HortScience (in review)

Both, A.J., L. Benjamin, J. Franklin, G. Holroyd, L.D. Incoll, M.G. Lefsrud, and G. Pitkin. Guidelines for measuring and reporting environmental parameters for experiments in greenhouses. Submitted for publication in Plant Methods.

Harris, W.K., J.R. Freeborn, J. Latimer and H.L. Scoggins. 2015. Overwintering Survival and Vigor of Container-Grown Fountain Grass: Influence of Protective Covers, Fertilizer Rate and Substrate Moisture Content. HortTechnology (HORTTECH#02994) (in review)

Mitchell, C.A., J.F. Burr, M.J. Dzakovich, C. Gómez, R. Lopez, R. Hernández, C. Kubota, C.J. Currey, Q. Meng, E.S. Runkle, C.M. Bourget, R.C. Morrow, and A.J. Both. Light-emitting diodes in horticulture. Submitted for publication in Horticultural Reviews.

Zhen, S. and S. Burnett. Effects of substrate volumetric water content on English lavender morphology and photosynthesis. 2015. HortScience (In Press).