

NCERA-101: Committee on Controlled Environment Technology and Use 2008 Station Report

Erik Runkle and Ryan Warner
Department of Horticulture, East Lansing, MI 48824
Phone: 517-355-5191
E-mail: runkleer@msu.edu (Erik) and warnerry@msu.edu (Ryan)

MICHIGAN STATE
UNIVERSITY



New Facilities and Equipment

In the past year, Michigan State University received 10 additional growth chambers, for a total of 151 growth chambers (3,892 sq. feet of growing space). Currently, we're at 99.95% capacity on a square foot basis. We have an additional 15 chambers waiting for installation. For more information, visit the MSU Growth Chamber Facility website at: <http://growthchamber.prl.msu.edu/all/home.php>.

Accomplishment Summaries

Researchers at Michigan State University determined the efficacy of compact fluorescent lamps relative to incandescent lamps to inhibit flowering of short-day plants and promote flowering of long-day plants grown in greenhouses. Low-intensity artificial lighting was provided to the floriculture crops for 6 hours at the end of a 9-hour truncated natural photoperiod (to create a 15-hour photoperiod) or for 2 or 4 hours during the middle of the 15-hour night. Responses to the long-day treatments varied by crop. In some crops, flowering was similar under the lamps types but in petunia, flowering was delayed when long days were delivered by compact fluorescent lamps.

In 2008, Michigan State University updated a greenhouse energy conservation and production efficiency website (www.hrt.msu.edu/Energy/Notebook.htm). Articles written by plant scientists, agricultural engineers, and industry leaders are available to commercial greenhouse growers on the topics of greenhouse light management, temperature and scheduling, energy-saving technologies, alternative fuels, and energy grant and loan opportunities.

Impact Statements

Compact fluorescent lamps are approximately 75% more energy-efficient than incandescent lamps, but their light spectrum contains little far-red light, which promotes flowering in some long-day plants. Our research results indicate that, in some crops, long days can be created successfully by fluorescent lamps, which could decrease electricity consumption by commercial greenhouse growers. However, in some crops, flowering is delayed significantly. For these crops, alternating incandescent lamps with fluorescent lamps can be used to achieve rapid flowering will still realizing some energy savings.

Published Written Works (*denotes peer-reviewed scientific manuscript)

- *Blanchard, M.G. and E.S. Runkle. 2008. Benzyladenine promotes flowering in *Doritaenopsis* and *Phalaenopsis* orchids. *J. Plant Growth Regul.* 27:141-150.
- *Blanchard, M.G. and E.S. Runkle. 2008. Container opacity and media components influence rooting of potted *Phalaenopsis* and *Doritaenopsis* orchids. *Acta Hort.* 788:115-120.

- *Blanchard, M.G. and E.S. Runkle. 2008. Increasing stem elongation and bract size of poinsettia 'Freedom Red' with gibberellins and benzyladenine. *Acta Hort.* 774:209-215.
- *Blanchard, M.G. and E.S. Runkle. 2008. Temperature and pseudobulb size influence flowering of *Odontioda* orchids. *HortScience* 43:1404-1409.
- Blanchard, M., R. Lopez, and E. Runkle. 2008. Getting results with a liner dip. *Greenhouse Grower* 26(13):68-74.
- *Lopez, R.G. and E.S. Runkle. 2008. Effect of temperature and pseudobulb maturity on flowering of the orchid *Miltoniopsis* Augres 'Trinity'. *Acta Hort.* 766:273-278.
- *Lopez, R.G. and E.S. Runkle. 2008. Low temperature storage influences morphological and physiological characteristics of nonrooted cuttings of New Guinea impatiens (*Impatiens hawkeri*). *Postharvest Biol. Technol.* 50:95-102.
- *Lopez, R.G. and E.S. Runkle. 2008. Photosynthetic daily light integral during propagation influences rooting and growth of cuttings and subsequent development of New Guinea impatiens and petunia. *HortScience* 43:2052-2059.
- Lopez, R., M. Blanchard, and E. Runkle. 2008. Comparing PGRs. *Greenhouse Grower* 26(12):38-44.
- *Oh, W., Y.H Rhie, J.H. Park, E.S. Runkle, and K.S. Kim. 2008. Flowering of cyclamen is accelerated by an increase in temperature, photoperiod, and daily light integral. *J. Hort. Sci. Biotech.* 83:559-562.
- Padhye, S., E. Runkle, M. Olrich, and L. Reinbold. 2008. Improving branching and postharvest quality. *Greenhouse Product News* 18(8):36-42.
- *Rapaka, V.K., J.E. Faust, J.M. Dole, and E.S. Runkle. 2008. Endogenous carbohydrate status affects postharvest ethylene sensitivity in relation to leaf senescence and adventitious root formation in *Pelargonium* cuttings. *Postharvest Biol. Technol.* 48:272-282.
- Runkle, E. 2008. Coming together. *Greenhouse Grower* 26(14):78-80.
- Runkle, E. 2008. Principles of light. *Orchids* 77(5):350-353.
- Runkle, E. 2008. Technically speaking: Calculating ADT. *Greenhouse Product News* 18(12):66.
- Runkle, E. 2008. Technically speaking: Extending holding time for crops. *Greenhouse Product News* 18(4):66.
- Runkle, E. 2008. Technically speaking: Fanning uniformity in the greenhouse. *Greenhouse Product News* 18(5):66.
- Runkle, E. 2008. Technically speaking: Greenhouse shading options. *Greenhouse Product News* 18(3):62.
- Runkle, E. 2008. Technically speaking: Installing infrared polyethylene film to save energy. *Greenhouse Product News* 18(7):94.
- Runkle, E. 2008. Technically speaking: LIP it! *Greenhouse Product News* 18(1):66.
- Runkle, E. 2008. Technically speaking: Overcoming New Guinea impatiens stall. *Greenhouse Product News* 18(2):62.
- Runkle, E. 2008. Technically speaking: PGRs on perennials. *Greenhouse Product News* 18(6):74.
- Runkle, E. 2008. Technically speaking: Strategies for growing mixed containers. *Greenhouse Product News* 18(10):74.
- Runkle, E. 2008. Technically speaking: The ABCs of PGRs. *Greenhouse Product News* 18(11):58.
- Runkle, E. 2008. Technically speaking: What is your photoperiod? *Greenhouse Product News* 18(9):58.

Runkle, E. and J. Faust. 2008. Technically speaking: Energy-efficient poinsettia production. *Greenhouse Product News* 18(8):73-74.

Scientific and Outreach Presentations

Blanchard, M. and E. Runkle. 2008. Temperature and daily light integral influence flowering of *Cosmos sulphureus* 'Cosmic Orange' and *Verbena hybrida* 'Obsession Lilac'. ASHS Annual Conference, Orlando, FL. *HortScience* 43(4):1122.

Faust, J., Runkle, E. and J. Erwin. 2008. Putting together temperature, light & photoperiod for scheduling crops (3-part series). International Plug & Cutting Conference. Orlando, FL.

Freeman, C., J. Faust, and E. Runkle. 2008. Managing stock plants for quality cuttings. International Plug & Cutting Conference. Orlando, FL.

Lopez, R. and E. Runkle. 2008. Photosynthetic daily light integral during propagation influences rooting and growth of cuttings and subsequent development of New Guinea impatiens and petunia. ASHS Annual Conference, Orlando, FL. *HortScience* 43(4):1089.

Oh, W., E. Runkle, and R. Warner. 2008. Daily light integral during the seedling stage influences transplant quality and subsequent performance in selected annual plants. ASHS Annual Conference, Orlando, FL. *HortScience* 43(4):1123.

Padhye, S. and E. Runkle. 2008. The influence of benzyladenine alone or with gibberellic acid on inhibition of postharvest leaf chlorosis of potted geranium, miniature rose, and gerbera daisy. ASHS Annual Conference, Orlando, FL. *HortScience* 43(4):1149.

Runkle, E. and M. Blanchard. 2008. Energy efficiency in greenhouse production I: Optimization of temperature and photosynthetic daily light integral. ASHS Annual Conference, Orlando, FL. *HortScience* 43(4):1062.

Runkle, E. and R. Warner. 2008. Advanced greenhouse lighting. Michigan Greenhouse Growers Expo, Lansing, MI.

Runkle, E. 2008. Advanced forcing techniques for orchids. New England Greenhouse Conference. Worcester, MA.

Runkle, E. 2008. Energy efficient crop production strategies. New England Greenhouse Conference. Worcester, MA.

Runkle, E. 2008. Greenhouse energy conservation – Adjusting crops, heat, and light for improved profits. Mid-Atlantic Fruit and Vegetable Convention & North American Berry Conference. Hershey, PA.

Runkle, E. 2008. Greenhouse lighting: Options and strategies. Mid-Atlantic Fruit and Vegetable Convention & North American Berry Conference. Hershey, PA.

Runkle, E. 2008. Heating and cooling options for greenhouse production. Mid-Atlantic Fruit and Vegetable Convention & North American Berry Conference. Hershey, PA.

Runkle, E. 2008. Improve your perennial production. BFG Hort Expo. Hoffman Estates, IL.

Runkle, E. 2008. Manipulating the environment and crop plans for energy-efficient greenhouse production. Farwest Show. Portland, OR.

Runkle, E. 2008. MSU research update and introduction to Virtual Grower. Michigan Plant Growers Cooperative Annual Meeting. Allendale, MI.

Runkle, E. 2008. Top 10 ways to reduce energy consumption. BFG Hort Expo. Columbus, OH.

Runkle, E. 2008. Top 10 ways to reduce energy consumption. BFG Hort Expo. Hoffman Estates, IL.

Tychonievich, J., J.F. Hancock, A.C. Cameron and R.M. Warner. 2008. Interspecific

hybridization in the genus *Salvia*. 10th International Society for Horticultural Science Symposium on Flower Bulbs and Herbaceous Perennials. Lisse, The Netherlands

Walworth A.E. and R.M. Warner. 2008. Analysis of cold acclimation ability in *Petunia* spp. Annual meeting of the American Society of Plant Biologists. Merida, Mexico

Warner, R.M. 2008. Managing crop inputs & environment: temperature - understanding and maximizing its role in crop production. OFA Short Course. Columbus, OH

Warner, R.M. 2008. New research on annuals: growth and flower control. OFA Short Course. Columbus, OH