Impact Nugget
Michigan State University has identified how light duration and quantity influence flowering of range of ornamental garden plants grown in greenhouses. This information is being used by greenhouse growers to improve their scheduling of crops so that plants flower on time.

New Facilities and Equipment
In the past year, Michigan State University added 15 new growth chambers, for a total of 166 growth chambers. The basement of a plant science building expansion, which breaks ground in May 2010, is designed for 60 additional growth chambers. Plans are in place to submit proposals to fund these additional chambers in the next 12 to 24 months. For more information, visit the MSU Growth Chamber Facility website at: http://growthchamber.prl.msu.edu.

Accomplishment Summaries
Researchers at Michigan State University developed mathematical models that predicted the influence of photosynthetic daily light integral (DLI) on flowering of approximately 30 annual bedding plants grown in greenhouses. Experiments were performed over 3 years and plants were grown under four different mean DLIs that ranged from 3 to 20 mol·m⁻²·d⁻¹ using a 16-hour photoperiod. Flower development rate increased as DLI increased until saturation, which varied among species. For example, Petunia ‘Dreams Neon Rose’ had a saturation DLI of 10.6 mol·m⁻²·d⁻¹, while Verbena ‘Quartz Waterfall Mix’ had a DLI of 19.5 mol·m⁻²·d⁻¹. The estimated saturation DLI for flower development rate in most species studied ranged from 8 to 15 mol·m⁻²·d⁻¹.

A new Michigan State University floriculture website, http://www.flor.hrt.msu.edu, was developed and is now online. The website contains over 100 trade magazine articles written by MSU faculty and graduate students on the greenhouse production of ornamentals, including articles that focus on managing light and temperature. Additional website content includes greenhouse energy and floriculture marketing resources, as well information on MSU outreach activities such as the Michigan Garden Plant Tour and the Michigan Agriculture Environmental Assurance Program for greenhouses.

Impact Statements
We published a 12-part series of articles in Greenhouse Grower magazine that focused on temperature management of approximately 20 different popular annual bedding plants. Each article was circulated to 20,000 greenhouse employees, educators, and industry leaders. Articles are also available in electronic format. Research information was presented on how temperature and daily light integral influence crop timing and quality of representative cultivars. That
information was used with the Virtual Grower computer program to predict heating costs for each crop in seven different climates in the U.S. From that information, energy-efficient production temperatures were identified for different flowering dates and locations.

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


**Scientific and Outreach Presentations**


Runkle, E.S., Oh, W., Padhye, S. 2009. Use of compact fluorescent lamps to provide a long-day photoperiod to petunia and pansy. American Society for Horticultural Science Annual Conference (St. Louis, MO), July.

Bradford, E., J. Hancock and R. Warner. 2009. Temperature tolerance, not photoperiod insensitivity, is the primary factor controlling repeat flowering (remontancy) in strawberry. American Society for Horticultural Science Annual Conference (St. Louis, MO), July.


Runkle, E.S., Blanchard, M. 2009. Energy-efficient scheduling of bedding plants. OFA Short Course (Columbus, OH), July.

Runkle, E.S., Warner, R.M. 2009. Lighting: bedding plant plugs & liners. OFA Short Course (Columbus, OH), July.

Runkle, E.S., Padhye, S. 2009. The latest and greatest perennials: Production tips for success. OFA Short Course (Columbus, OH), July.


Runkle, E.S. 2009. Managing greenhouse temperature in an energy-efficient manner. 2009 MSU Garden Plant Showcase (East Lansing, MI), August.


Runkle, E.S., Blanchard, M. 2009. Putting the new Virtual Grower to use. Floriculture Research Alliance technical meeting (East Lansing, MI), September.

Runkle, E.S., Padhye, S. 2009. Forcing perennials into flower: Beyond the Basics. 2009 Perennial Production Conference (Buffalo, NY), September.

Runkle, E.S., Padhye, S. 2009. Taming the beasts: Strategies for perennial height management. 2009 Perennial Production Conference (Buffalo, NY), September.

Runkle, E.S. 2009. Flowering physiology of ornamental greenhouse crops. Beijing Forestry University, Dept. of Ornamental Horticulture seminar (Beijing, China), September.

Runkle, E.S. 2009. Flowering physiology of ornamental greenhouse crops. China Agricultural University, Dept. of Ornamental Horticulture and Landscape Architecture seminar (Beijing, China), September.
