



Cyclic Long-Day Lighting

Shortening the duration of darkness with night-interruption lighting can help some plants flower earlier.

By Erik Runkle

There are numerous bedding plants and herbaceous perennials that flower earlier when provided with long days. For many long-day floriculture crops, the photoperiod is naturally short until mid-April. Therefore, for early spring markets, low-intensity lighting can be used to accelerate flowering. In the January 2007 issue of *GPN*, I discussed the general options for delivering long days. This month, options for delivering cyclical lighting to long-day plants are discussed.

Flowering of plants that respond to photoperiod measure the duration of darkness at night, not the duration of the day. Therefore, to create a long day, the duration of the night needs to be shortened. To accomplish this, a popular option is to provide night-interruption (or night-break) lighting. Traditionally, incandescent lamps are turned on at 10 p.m. and turned off at 2 a.m.

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Cyclic lighting is delivered to plants intermittently (but not constantly) during the night. This can be accomplished in one of three ways: by periodically turning on incandescent lamps during the night; mounting high-intensity lamps on a boom that moves above crops during the night; or installing high-intensity lamps above crops that have a rotating reflector. The main advantage of cyclic lighting is that energy costs can be reduced compared to traditional four-hour "mum lighting" with incandescent lamps.

Cyclic lighting has been used for decades on short-day plants to prevent flowering and maintain vegetative growth. Research, including studies at MSU, has shown that cyclic lighting with incandescent lamps can also be used to induce long-day plants into flower. A suggestion is to operate incandescent lamps that deliver 10 foot-candles of light for about 25 percent of the time during a traditional four-hour night break. For example, lamps could be turned on for eight minutes every half hour or 15 minutes every hour, from 10 p.m. to 2 a.m. Therefore, the total amount of lighting is only about one hour during the four-hour period. This strategy is typically more effective than one continuous hour of lighting.

The primary advantage of cyclic lighting from incandescent lamps is the low cost to install a lighting system. The major disadvantage is the energy inefficiency of the lamp compared to other lamp types.

The incandescent bulb is the only practical choice for the cyclic lighting strategy; its life is not influenced by the number of on/off cycles. The life of other major bulb types used in floriculture is negatively influenced by the number of on/off cycles.

More recently, two other cyclic lighting delivery methods have been developed. One is a product that directs light from a high-pressure sodium lamp using a reflector that rotates 90 degrees on both sides. As the reflector swivels back and forth, it casts a beam of light on crops below. The lamp needs to be installed at least 10 or 12 feet above crops so that the light can reach plants 30 or 40 feet away, if not farther. We are currently researching the Beamflicker (from Parsource, a division of Hydrofarm) to determine its efficacy compared with traditional incandescent cyclic lighting. I have seen it used successfully in several commercial operations.

Another successful strategy to deliver cyclic lighting is to mount high-intensity lamps on a moving boom. The lamps are turned on for four to six hours during the middle of the night, moving back and forth above crops. Several growers who have installed their own lighting systems on irrigation booms, with two 400-watt lamps on each side of a boom, have reported success with most long-day crops. A suggestion is to operate the boom so that light reaches plants at least once every 20-30 minutes. However, very little research has been performed with this cyclic lighting strategy and more information is needed before recommendations can be made. Be extremely cautious when installing electrical items that may come in contact with water.

A few words of caution with cyclic lighting: In some crops, flowering is promoted most when night-interruption lighting is rich in far red and done continuously for four hours. Therefore, flowering may be more rapid when crops are provided with a continuous four-hour night break from incandescent lamps compared to cyclical lighting or light from other lamp types. Unfortunately, four-hour night-interruption lighting from incandescent lamps is energy intensive, and the high proportion of far-red light also promotes stem elongation. *GPN*

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