



# Providing Long Days

Crop development can be accelerated with the use of low-intensity lighting. Here are the answers to some common questions about photoperiodic lighting.

By Erik Runkle

There are two primary ways lighting can be used to accelerate greenhouse production of bedding plants and herbaceous perennials. In my last two columns, I discussed how the total amount of light for photosynthesis (called the daily light integral or DLI) can be measured and how it impacts crop growth and flowering. To increase the DLI, high-pressure sodium lamps are usually installed and operated for 12-18 hours per day during dark periods.

The other lighting strategy used to accelerate crop development is to provide low-intensity lighting to create a long day. When the natural photoperiod is short, many bedding plants and herbaceous perennials flower earlier when provided with artificial long days. Here, I will address several questions that I routinely receive about photoperiodic lighting.

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## When should I provide long days?

Many long-day plants flower faster when provided with a night length of less than 10 hours (when the day is at least 14 hours long). Therefore, in North America, long-day lighting should be used from around Sept. 1 to April 15.

## When should I have my lights on?

Long-day plants flower earlier when the length of the dark period is less than some period, i.e., less than 10 hours. Therefore, photoperiodic lighting is effective when delivered to extend the natural day or during the middle of the night. Day-extension lighting begins at sunset and ends once the total desired photoperiod is achieved. For example, if sunrise is at 7 a.m. and sunset is at 6 p.m., then a 15-hour photoperiod is delivered if the lamps run from 6 p.m. until 10 p.m. Night-interruption or night-break lighting is equally effective and usually delivered by turning lamps on from 10 p.m. to 2 a.m. If the supply of electricity is limited, then half of long-day crops could be provided with day-extension lighting from 6 p.m. to 10 p.m., and the other half could be provided with night-interruption lighting from 10 p.m. to 2 a.m.

## What types of lamps are effective at creating a long day?

Virtually all lamp types (incandescent, fluorescent, high-pressure sodium, mercury and metal halide) are effective if the minimum light intensity is 10 foot-candles (around 100 lux or  $2\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ ) at plant height. Thus, photoperiodic lighting requires only low-intensity lighting, whereas photosynthetic lighting to increase the DLI requires a much higher light intensity.

## What is cyclical lighting, and is it effective?

Cyclical lighting is provided when light is delivered to plants intermittently but not constantly during the night.

There are three common techniques to deliver cyclic lighting: Turn incandescent lamps on for 6-10 minutes every half hour during the desired lighting period, mount high-intensity lamps on a moving boom that runs back and forth above crops for at least four hours during the night or mount high-intensity lamps that have a rotating reflector (such as a Beamflicker, Parsource) above crops. I have seen all three of these cyclic lighting techniques used successfully in greenhouses.

## What crops respond to long days?

There is a long list of crops that flower earlier when provided long days, and some crops even require long days to flower. Common long-day crops include ageratum, blue lobelia, blue salvia, campanula, coreopsis, dianthus, gazania, hibiscus, leucanthemum, pansy, perennial garden phlox, petunia, rudbeckia, snapdragon, tuberous begonia and verbenas, but many others also exist.

## How many weeks do I need to run the lights before I can turn them off?

In most species, once a plant is induced to flower, the flowers will develop even under a non-inductive photoperiod. Therefore, once flower buds are visible (often about 3-4 weeks after the start of long days), lamps can be turned off and long-day plants will proceed to flower. However, some crops that require long days (such as some petunias) are more floriferous if provided with long days until shipping or April 15, whichever occurs first.

## What happens to short-day and day-neutral plants if they receive long days?

Plants that require short days for flowering (African marigold, chrysanthemum and poinsettia) will not flower if exposed to long-day lighting. Some of these short-day plants perceive light at 1 foot-candle or even lower, so be aware of light pollution. Plants that flower earlier when grown under short days (cosmos, dahlia and morning glory) will have delayed flowering if exposed to long days. There is no benefit or detrimental effect when long-day lighting is provided to day-neutral plants (aquilegia, delphinium, French marigold, geranium, impatiens, nepeta, thunbergia, vinca, wax begonia and others). 

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