

## 2<sup>nd</sup> International Webinar Conference

## Photoperiod Strategies for Annuals

Chris Currey, Iowa State University

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Sponsored by:




12:00 to 12:30 Eastern

### PHOTOPERIOD STRATEGIES FOR SPRING ANNUALS



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### Why do we want to manage photoperiod during production?

- There are two main reasons why we want to manage flowering:
  - 1) **Induce** flowering  
By getting our crops into flower, they are more appealing and marketable for sales
  - 2) **Inhibit** flowering  
We want plants to fill in containers and bulk them before they start flowering

### Juvenility

- **Juvenile**
  - The plant cannot flower even under inductive conditions
- **Mature**
  - The plant can flower in response to flowering stimuli
- Juvenility applied to seed-propagated crops
  - Breeding for shorter juvenile periods
- Does not apply to vegetatively propagated crops

### Juvenility

- How do you measure juvenility?
- Woody plants
  - Years
- Herbaceous plants
  - Leaf number

### Juvenility and Plug Size

*Cell size doesn't determine juvenility*

**HOWEVER...**

- A larger plug is “finished” at a larger size
- More leaves are unfolded

### Photoperiod

- Photoperiod refers to the duration of light hours in the day
- It is actually the duration of darkness that is the signal
- There are different flowering responses to photoperiod

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### Photoperiodic response groups

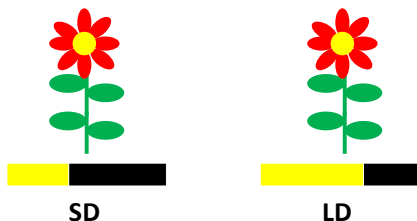
- Spring annuals can be classified into one of three common types of photoperiod response groups:
  - Day neutral plants (DNP)
  - Short-day plants (SDP)
  - Long-day plants (LDP)

### Day neutral plants

Flowering does NOT occur in response to any specific daylength



### Day neutral response

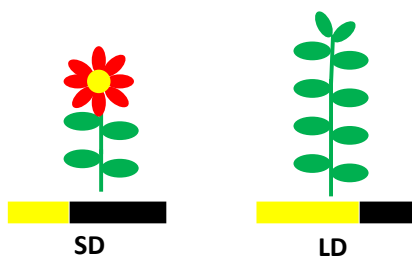


### Short-day plants

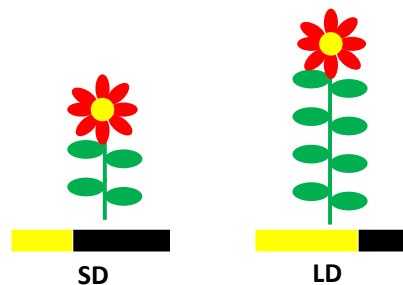
Flowering occurs in response to SHORT days and LONG nights



### Obligate SD response



### Facultative SD response



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*How can I provide "short days" in the greenhouse?*

### Natural short days

- Depending on the time of year and location, the natural photoperiod may a "short" day
- For spring annual production, this is generally going to be during propagation and early finishing
- If using natural short days, be sure to check there is no "light pollution" during the night

### Blackcloth



### Blackcloth

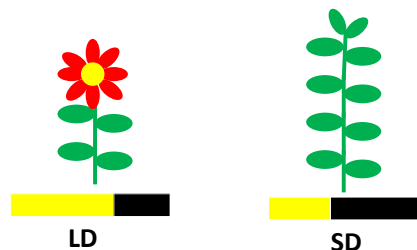
- Blackcloth, or blackout cloth, is used to shorten the day length
- Usually a synthetic, black fabric which may be aluminized on the outside
- This is pulled over a crop in the evening and then retracted in the morning
  - This excludes sunlight and make the dark period longer

### Long-day Plants

Flowers occurs in response to  
LONG days and SHORT nights



### Obligate LD Response

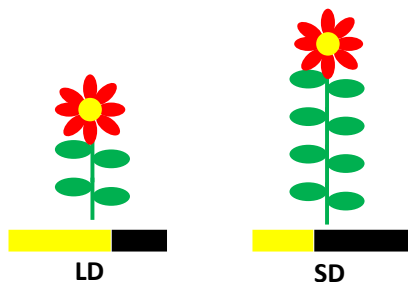


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### Facultative LD Response



*How can I provide "long days" in the greenhouse?*

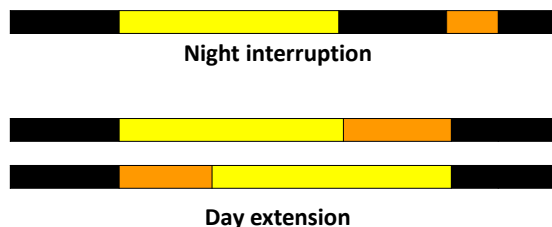
### Natural Long Days

- Natural long days can occur during the spring production season
- However, this occurs during the later part of spring annual production
- In the U.S., the earlier the season, the less natural long days occur

### Creating long days

- There are two strategies to creating long days in the greenhouse
- Day extension lighting
  - Lights operate at the before sunrise or after sunset to extend the day length
- Night interruption lighting
  - Interrupt the dark period between 10:00 pm and 2:00 am to interrupt the darkness

### Creating long days



### Incandescent lamps

- Incandescent are the most widely used type of light for photoperiodic lighting
- Cheap and easy to install
- Good balance of red (R) and far-red (FR) light
- Energy inefficient- lots of radiant energy produced



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### Compact fluorescent (CFL)

- CFLs have a low energy consumption and longer lifespan than incandescent bulbs
- There is little to no FR light produced
- For some crops, if CFLs are used the impact may not be quite as effective as incandescent bulbs
- Alternating CFL and incandescent are a good solution



### Light-emitting diodes (LEDs)

- Low-intensity LEDs may be used very effectively for photoperiod management
- A blend of R and FR diodes can provide the spectrum needed for photoperiodic flowering
- Much longer lifespan and lower energy consumption than incandescent bulbs



### High-pressure sodium lamps

- HPS lamps, at a density used for supplemental/photosynthetic lighting, may be used for photoperiod management as well
- HPS lamps at a lower density (i.e. low light intensity) can be used
- A new HPS lamp with an oscillating reflector may also be used
  - Delivers low-intensity light to a large area

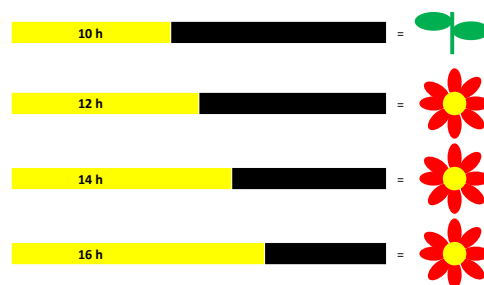


*What is a “long” or “short” day for my crops?*

### Critical daylength

- The critical photoperiod controls the transition to flowering
- The photoperiod at or below which induces flowering for short day plants
- The photoperiod at or which which induces flowering for long day plants

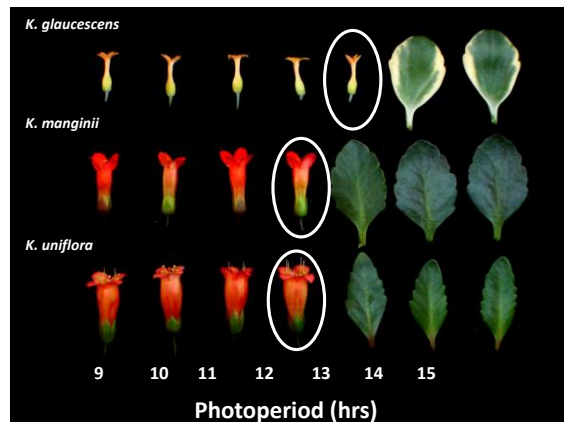
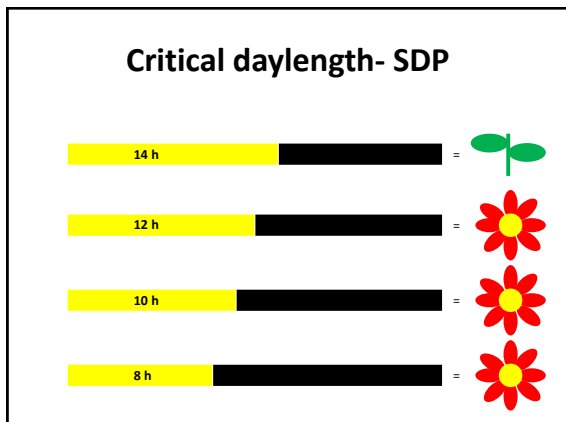
### Critical daylength- LD plant



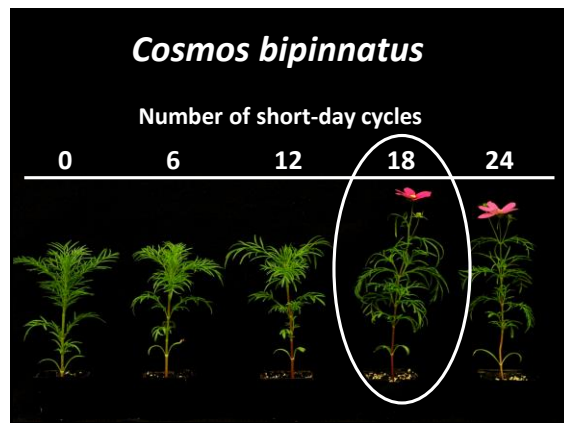
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- ### Critical cycle number
- The length of time that plants must be exposed to inductive photoperiods differs
  - The “critical cycle number” is somewhat similar concept to critical photoperiod
  - The minimum number of inductive cycles plants must be exposed to to induce flowering longer



- ### Bringing it all together
- Managing the photoperiod during annual production can improve crop quality
    - Have color on plants for sales
    - Bulk plants up in a vegetative state
  - Early in the season days are naturally shorter, while later in the season days are naturally longer
  - Plan ahead to successfully manage flowering!

Combinations

**PW**  
PROVEN WINNERS

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**e-GRO** Electronic Grower Resources Online

**Coming Up Next:**  
**12:30 to 12:55 Eastern**

**Lunch Break**

Time	Topic
12:55 to 1:00	Welcome Back/Questions
1:00 to 1:25	Don't Get Tripped By Thrips: Effective Thrips Management
1:30 to 1:55	Snow Princess Lobularia: Tips and Troubleshooting
2:00 to 2:25	Osteospermum: Fertilization and PGR Strategies
2:30 to 3:00	Managing pH Drift: Recognizing and Correcting High and Low pH Disorders