



Lighting Plants with LEDs



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Horticultural Lighting Applications

	Photoperiodic	Supplemental	Sole-Source
Use or objective	Promote or inhibit flowering	Increase growth, harvestable yield, and plant quality attributes	Pronounced regulation of plant growth; consistency of product
Plants targeted	Photoperiodic crops	Young plants and high-value crops	Leafy greens, herbs, and young plants
Typical intensity	1–2 $\mu\text{mol m}^{-2} \text{s}^{-1}$	50–100 $\mu\text{mol m}^{-2} \text{s}^{-1}$	150–200 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Typical lamps used	Incandescent or R \pm FR LEDs	HPS or R + B/W LEDs	Fluorescent or R + B/W LEDs
When used	During the night from Sept. to Mar.	During the night and on cloudy days from Sept. to Mar.	Every day
Number of hours used per day	Usually up to 4	Usually up to 20	12–24
Control of morphology	Little to moderate	Little to none	Strong

Salvia 'Vista Red'

22 Days from seed sow at 73 °F
Grown under an average DLI of: ($\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$)

6

10

16



New Guinea Impatiens 'Harmony White'

Average DLI ($\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$):

1.3

2.1

4.0

5.7

6.3

10.8

Sunlight

Sunlight + HPS



8.0

14.5

30.0

35.5

48.5

55.5

Root dry mass (mg)

Photo taken after 16 days in propagation



Tomato 'Supersweet'

Greenhouse supplemental lighting from 6am to 10pm
at a PPFD (in $\mu\text{mol m}^{-2} \text{s}^{-1}$) of:

90

10

HPS

B₁₀R₉₀

B₂₀R₈₀

B₁₀G₅R₈₅

B₁₅G₅R₈₀

HPS



HPS = high-pressure sodium lamps. B=blue (peak=453 nm), R=red (peak=660 nm), G=green from white (peak=560 nm) LEDs. Values after each waveband indicate their percentage of the total PPFD in each treatment.

Photo taken after 21 days at 68 °F, DLI = 7.7 $\text{mol m}^{-2} \text{d}^{-1}$

Lamp Type Considerations

- Greenhouse dimensions, especially hanging height or position
- Reliability: Use trusted brands with warranties
- Fixture longevity and maintenance
- Light spectrum (for plants and people)
- Uniformity of intensity
- Hours of operation

Lamp Type Considerations

- Electrical supply available
- Cost of electricity
- Lamp efficacy: Photons per joule ($\mu\text{mol/J}$)
- Plants under HPS are typically 2-3 °F warmer than under LEDs
- Purchase and installation costs (including required accessories), availability of rebates, etc.

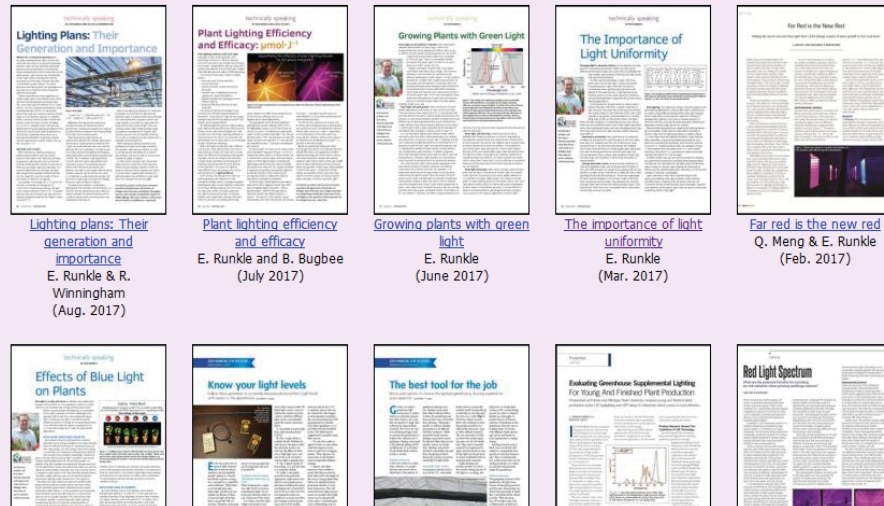
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For specific information on light responses of [annual bedding plants](#) or [herbaceous perennials](#), click on those topics.



More Plant Lighting Information

- Book contains 18 chapters with 20 chapter authors, edited by Lopez and Runkle
- Targeted audience is growers, lighting reps, and college students
- Updated and expanded from *Lighting Up Profits* book edited by Fisher and Runkle and published in 2004
- Available in print and digital versions through Amazon

