

# GROWERTALKS

## Features

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## Shedding Light on Growth

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When thinking about the five factors of plant growth—temperature, water, nutrition, gas exchange and light—data is often used to inform production practices. Factors like day and night temperatures, fertilizer rate (in parts per million), and pH and EC are all measured and tracked regularly, but how often do you measure light levels?

All professional growers understand the importance of light for producing healthy, high-quality crops, but many don't have a thorough understanding

of the actual light levels in their greenhouse compared to the light levels required by their specific crops.

### Understanding PAR (and its importance)

Photosynthetically Active Radiation (PAR) refers to the spectrum of light between 400 and 700 nanometers, which plants utilize for photosynthesis. Unlike lumens or lux, which measure light perceived by the human eye, PAR focuses on the specific light that drives plant growth.

Measuring PAR allows growers to understand the light levels reaching their crops daily, which can be compared with published values considered optimal for plant growth. This ultimately enables production teams to make informed decisions about lighting strategies.

### Measuring PAR with light meters

PAR meters, also known as quantum sensors, are tools designed to measure the intensity of photosynthetically active light. These devices typically provide readings in micromoles per square meter per second ( $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ ), indicating the number of photons hitting a given area each second. This emphasizes the importance of sensor placement. Holding a PAR meter at eye level can give a drastically different measurement than when placed on a bench or on the floor. By placing the sensor at the crop canopy, growers can assess whether plants are receiving sufficient light levels.

Two critical measurements obtained from PAR meters are Photosynthetic Photon Flux Density (PPFD) and Daily Light Integral (DLI). PPFD measures the instantaneous light intensity, providing a snapshot of the current light conditions. This number can tell you whether light levels are too high or too low at a given time.

DLI calculates the total amount of PAR received over a 24-hour period, expressed in moles per square meter per

day ( $\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$ ). DLI is a valuable indicator of the cumulative light exposure plants receive, influencing growth rates, flowering and overall plant health.

Published values from Purdue Extension indicate that most greenhouse crops require a DLI between 12 to 18  $\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$  for optimal growth. Monitoring DLI helps growers determine if supplemental lighting is warranted, especially during shorter winter days or in northern regions with limited sunlight.

## Practical application

While many of you produce high-quality crops without measuring light levels, taking regular PAR measurements in the greenhouse offers several advantages:

- Optimizing supplemental lighting: By understanding the existing light levels, growers can fine-tune supplemental lighting schedules to maintain consistent DLI targets, reducing energy costs and preventing light stress on plants.
- Assessing light uniformity: Regular PPFD measurements across different areas of the greenhouse help identify uneven light distribution, allowing for adjustments in lighting placement or intensity to ensure uniform crop development.
- Evaluating greenhouse materials: Common glazing materials like glass, polycarbonate and polyethylene vary in their ability to transmit light. Material thickness and age also play important roles. Measuring light transmission through the glazing material or shade cloth enables growers to make informed decisions about crop placement, shading strategies and structural improvements.

When choosing a PAR meter, consider factors such as data logging capabilities over time and control system integration. Some sensors can be permanently installed in the greenhouse and integrated with environmental control systems, while other smaller handheld units can easily fit in your pocket or be placed in the crop canopy to collect light measurements over time. For the level of data you can collect, a PAR meter should be considered an essential component of every grower's toolbox. Regularly taking PAR measurements enables growers to better manage their growing environments to optimize plant growth and product quality with increased efficiency.

For a demonstration on using light meters, check out the Tech on Demand onsite video on YouTube, "[Measuring Light in the Greenhouse.](#)" GT

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