EFFICIENCY AND EFFICACY

Understanding Efficacy and Efficiency For Informed Comparison

LED Smart Inc., November 2022

Knowing the efficacy of LED grow lights is important as it is the best way to compare the energy efficiency of grow lights when deciding which one to purchase.

Grow lights with a high efficacy will be able to produce more light while using less electricity, saving cultivators money on energy.

Just as they sound, efficiency and efficacy are very much related terms. In LED grow lighting, "efficiency" measures how much power a light fixture can output per input power it receives (measured in watts). Efficacy, however, measures how many photons a light emits per input watt. Efficient plant growth is determined by the number of photons received, not by how "powerful" the light is in watts. Because of this, efficacy is the more relevant measurement in the indoor horticulture grow light industry. Knowing the efficacy is essential when you buy LED grow lights, as it is the best way to compare the energy efficiency of grow lights.

How Efficacy is Measured

Efficacy defines a grow light's ability to convert power (watts) into Photosynthetic Active Radiation (PAR) that crops can use. Essentially, how effectively a light fixture converts electricity into light which is used for photosynthesis. Today efficacy of an LED grow light is measured using photosynthetic photon efficacy (PPE). PPE describes how much light a grow light produces from its input power. The metric used to measure PPE is micromoles (µmol) per second per watt – which simplifies to µmol/J since a watt is a joule per second. Like miles per gallon (MPG) for an automobile, PPE is a general rating and may not represent actual results with equipment in the field.

PPE listed by a manufacturer for a grow light does not account for fixture arrangement, type of fixture, or the mounting height and distance from crops. Therefore, while PPE is an important metric for determining how your grow facility is/should be operating, it does not reflect how many fixtures a facility requires to reach a target PPFD.

DLC Listed Grow Lights

The Design Lights Consortium (DLC) is a non-

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profit organization that is dedicated to promoting the adoption of high-performance lighting products. They test horticulture lighting products and add them to their Qualified Products List (QPL) if they meet the guidelines for energy efficiency and build quality. One of the main advantages of purchasing a DLC-approved grow light is that most utility companies and local governments offer rebates for cultivators who implement fixtures that are on the QPL. Cultivators apply for these rebates prior to purchasing and installing DLC approved grow lights. Rebates can reduce the final cost of the lights anywhere from 20% to 60%, depending on your local guidelines. In addition, rebates are offered to promote the reduction of power consumption through the use of energy-efficient horticulture lighting and reduce the strain on the electrical grid. Energy savings has the added benefit of reducing the cultivators' environmental impact and the demand this power-hungry industry adds to their power grids.

Know Your Facts

Knowing the efficacy of LED grow lights is important as it is the best way to compare the energy efficiency of grow lights when deciding which one to purchase.

Grow lights with a high efficacy will be able to

produce more light while using less electricity, saving cultivators money on their energy bills.

Although efficacy is an extremely important characteristic when comparing indoor grow lights, other facts should also be considered before purchasing a grow light. Some other factors to consider include: light output, spectrum, desired DLI installation costs, operation and maintenance costs, fixture durability and warranties, utility rebates, and customer support structure.

Find out how GROW3™ can save you money and increase your production.

See other articles regarding "Defining the Color of Light" and "What is light?" in this series.

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