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USU Researchers Find That Lighting Efficiency for Plant Growth has doubled in Six Years

In a recently published study, Utah State University researchers found that lighting efficiency for plant growth has almost doubled in the past six years.

The study, published in the academic journal PLOS ONE, <http://dx.plos.org/10.1371/journal.pone.0099010> was co-authored by Jacob A. Nelson, a graduate student, and Bruce Bugbee, a professor in the College of Agriculture and Applied Sciences, who said their goal was to aid growers in selecting the most cost effective lighting fixtures for greenhouse and indoor plant growth.

“We started doing this work at the request of growers who were confused by the extravagant claims being made by manufacturers about the efficiency of electric lights,” Bugbee said.

Nelson and Bugbee compared the efficiency of 22 lighting fixtures and found that the best light emitting diode fixtures—commonly known as LEDs—and the best high pressure sodium fixtures—often used in street lamps—are equally efficient. These two types of fixtures, however, provide optimum light for plants in significantly different ways.

“Most LEDs are like spotlights,” Bugbee said. “They are excellent at focusing light in a small area, but are less efficient at lighting big areas.”

For larger growing areas, such as greenhouses, where aisles are small and plants are uniformly spaced, the broad, even light distribution from HPS fixtures is most efficient.

“As the area covered by plants increases, the need for focused radiation decreases,” Nelson and Bugbee wrote.

They discussed the common misconception that light quality can be altered to significantly increase plant growth, and emphasized that light quality has a much smaller effect on plant growth rate than light quantity.

The researchers found that, per unit of light, the initial cost of LED fixtures is six to ten times more than standard lamps.

The researchers note that it is still expensive to grow food without sunlight. Providing a summer’s worth of sunlight would cost \$400,000 dollars per acre, but for about \$8 per month, a home gardener can buy enough light to grow lettuce and herbs in an area the size of a small dining room table.