

# Researchers test effects of LEDs on leaf lettuce

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In the life cycle of plants, most developmental processes are dependent on light. Significant biological processes such as germination, shade avoidance, circadian rhythms, and flower induction are all affected by light. Recent advancements in the use of LED lighting in plant and vegetable production systems has researchers looking for insights into the effects of these artificial lights on the growth and yield of crops. Scientists from the Department of Horticultural Science at Chungbuk National University published a study in *HortScience* that sheds some light on the advantages and challenges of LEDs in lettuce cultivation.

The increased use of LEDs in environmentally controlled closed-type plant production systems allows crop production throughout the year, regardless of external weather conditions. According to authors Ki-Ho Son and Myung-Min Oh, LEDs have some advantages over traditional lighting sources in plant cultivation. "LEDs have the advantages of high light-conversion efficiency with low radiant heat output, semipermanence, and small mass," they noted. "In addition, LEDs are available in a variety of narrow wavebands; hence, it is possible to optimize light quality to improve both crop yield and quality." They explained that blue and red LEDs are usually used for [plant growth](#) because chlorophyll a and b efficiently absorb wavelengths in the blue and red ranges.

The research design used red and green leaf lettuce subjected to six LED lighting treatments. The scientists examined growth characteristics including the fresh and dry weights of shoots and roots, shoot-to-root

ratio, total leaf area, and chlorophyll content. Chlorophyll fluorescence, antioxidant capacity, phenolic concentration, and flavonoid concentration were also measured in the study. "The growth characteristic results for the two lettuce cultivars grown under various ratios of blue to red LEDs confirmed that red LED serves as a major light source that improves lettuce growth rate," the authors said.

The experiments confirmed that both blue and red LEDs have a positive effect on the accumulation of antioxidant phenolic compounds and lettuce growth, respectively. "Red light irradiation in the absence of blue [light](#) was effective at stimulating the biomass accumulation of [lettuce plants](#); however, this lighting alone induced abnormal leaf shape and had a negative effect on polyphenolics and antioxidant levels," the scientists said. They recommended a mixture of blue and red LEDs to enhance lettuce crop quality and yield in closed-type plant production systems.

**More information:** [hortsci.ashspublications.org/content/48/8/988.abstract](https://hortsci.ashspublications.org/content/48/8/988.abstract)

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