

LIGHT-EMITTING DIODE TECHNOLOGY TO PROMOTE GROWTH AND QUALITY OF LETTUCE

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Introduction

The greenhouse growers are interested in supplemental lighting to extend the photoperiod of the crops to increase yields. Novel LED (Light-emitting Diodes) lamps are a promising technology that has the potential to improve irradiance efficiency as a result of their reduced electricity consumption, improved quality of light, and the possibility for customization of the light spectrum for increased yields (Bourget, 2008; Morrow, 2008). In this experiment, we investigated the effects of different LED light wavelengths on growth and quality of lettuce.

Materials and Methods

The influence of 100% red LEDs, 100% blue LEDs, 70% red+30% blue LEDs and 100% white on growth and phytochemicals of 'Grizzly' lettuce (*Lactuca sativa* L.) was evaluated inside constructed LED incubators compared to the greenhouse conditions. Photon flux at 300 $\mu\text{mol m}^{-2} \text{s}^{-1}$, 16 h, and 25 °C/20 °C was provided by 120 LEDs set on a 60 cm× 60 cm sheet of aluminum platform and plants were grown under the light treatments for 30 d. The plants were weighted as fresh and then were dried and weighted again. Chlorophyll and carotenoids concentrations of plants were determined using Acetone extraction method. Data were analyzed according to completely randomized design using SAS statistical software.

Results and Discussion

Fresh weight per plant was significantly higher in plants grown under 100% blue and 70% red+30% blue LEDs compared to the other environments including greenhouse conditions. Chlorophyll and carotenoids concentrations in plants grown with 70% red+30% blue LEDs increased by 197% and 168% respectively, compared to those in the greenhouse conditions. Although the mechanisms of changes in growth and phytochemicals of lettuce under LED light are not well known, however, the results of this study demonstrated that LED light quality could be strategically used to enhance growth and nutritional value of lettuce in future greenhouse cultivations.

Keywords: LED technology; Lettuce; Carotenoids; Phytochemical

References

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