

Different combinations of light spectrum of LED and nitrogen affect the growth and yield of lettuce (*Lactuca sativa*)

ABSTRACT

Light emitting diode (LED) technology is regarded as an efficient source of energy in supplying photosynthetically active radiation for plants either used as the only source of light or as a supplement in a condition where natural irradiance is inadequate. Although initial cost is high, application of LED is considered cost effective on a long term basis. The growth of plants may vary when they are grown under varying irradiance levels and light spectrum, and therefore, they may respond differently to the varying levels of nutrient availability. A study was conducted to determine the effect of nitrogen (N) and different regimes of irradiance from LEDs on the growth and physiological characteristics of two cultivars of lettuce (*Lactuca sativa*) under a growth chamber condition. Plants continuously grown under the combination of red, blue, far red and white LEDs with the highest irradiance level ($266 \mu\text{mol m}^{-2} \text{s}^{-1}$) attained the heaviest fresh weight yield; 39% higher than those with the lowest fresh weight, which were grown under red and blue LEDs ($126 \mu\text{mol m}^{-2} \text{s}^{-1}$). The leaf yield of lettuce has increased with the addition of N. Increasing N supply through foliar application of $7.5 \text{ g urea L}^{-1}$ increased the yield by 38% over the plant grown without additional N. Variations in irradiance and N levels markedly affected major nutrient contents in leaves but not leaf net photosynthesis.

Keyword: Light emitting diodes; Nitrogen; Light spectrum; *Lactuca sativa*