

**OPTIMIZATION OF MICRO CLIMATIC CONDITIONS AND  
EVALUATION OF THE LIGHT QUALITY FOR LETTUCE  
(*Lactuca sativa*) VARIETIES IN INTERNET OF THINGS (IOT)  
BASED VERTICAL DRIP FERTIGATION SYSTEM**



**By**

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## Abstract

Elevated ambient temperatures and increased solar radiation have resulted led to rapid wilting and death of terrestrial plants. This environmental stress has particularly affected lettuce (*Lactuca sativa*), a crop with significant commercial potential and market demand. This study aimed to evaluate the impact of different light qualities on lettuce growth using two types of vertical drip fertigation systems: an automated system and a homemade system. The experiment utilized three lettuce varieties: 'Green coral', 'Crystal', and 'Red coral' under two distinct lighting treatments. The experimental design was a completely randomized design with three treatments, each replicated five times. The treatments were: T1 (Control), T2 (Horizontal LED Lighting), and T3 (Angled LED Lighting). Significant findings were observed for the 'Green coral' variety, which showed a statistically significant increase in plant height under the horizontal LED lighting treatment (0.018) The 'Crystal' variety, a significant difference was noted in wet weight under Treatment 2 (0.031), where horizontal LED lighting resulted in a markedly higher yield compared to the control and angled lighting setups. The 'Green coral' variety exhibited a significant increase in the number of leaves under the horizontal LED lighting after the third week of transplanting ( $P < 0.05$ ). The 'Red coral' variety, significant differences in plant height were observed three weeks after transplantation ( $P < 0.05$ ), with Treatment 2 showing substantial increases. The significance persisted into the fourth week ( $P < 0.05$ ), although the effect of increased LED illumination was not linear. The data suggests that two LED light strips provide optimal lighting conditions for promoting long-term growth in 'Red coral' lettuce. The results suggest that optimizing LED light configurations can significantly enhance both vegetative and yield traits of lettuce plants

**Key words:** *Lactuca sativa*, Vertical drip fertigation system, LED lighting

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