

Manipulation of light and nutrition in strawberry vertical farming Sasan Aliniaiefard^{1,2*}, Zakieh Mokhtarpour¹, Mahmoodreza Roozban¹, Soheil Karimi¹

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Abstract

Vertical farming in closed environments equipped with artificial light has been recently introduced for strawberry cultivation. To achieve more efficiency, it is necessary to use proper light spectrum and mineral nutrition protocols. This research was conducted to investigate the effect of light spectrum on yield and quality of strawberries. In addition, nano titanium was applied under each light spectrum in order to increase light use efficiency. The study was conducted based on a factorial experiment in a completely randomized design with 4 replications. The plants were exposed to three light spectra including: monochromatic red, red: blue (80:20), and red: blue: far-red (70:20:10), and treated with foliar application of three concentrations of nano titanium dioxide (0, 50, 100 mg/L). The results showed that the leaf biomass increased under monochromatic red light and decreased under red: blue: far-red light. The number of runners and the number of daughter plants increased under red: blue: far-red light and decreased under monochromatic red light. Root volume and fresh and dry weight increased by using titanium under red: blue: far-red light. The application of titanium under different light spectra increased the number and biomass of the fruit. Highest number of fruits was harvested in plants treated with 50 mg/liter titanium under monochromatic red light. In conclusion, the results showed that titanium decreased the magnitude of shade avoidance response under red: blue: far-red light. Application of titanium with a concentration of 50 mg/L on plants exposed to monochromatic red light improved growth and yield in strawberry under controlled environment condition.

Keywords: Light quality, Titanium dioxide, Nanoparticles, Biomass, Mineral nutrition