

Study of Light and Amino Acid Applications on Growth and Nitrate Uptake in Hydroponically-grown Lettuce

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Nowadays, the hydroponic system is a popular method for plant production. Oversupply of nitrogen fertilizer might affect too much nitrogen absorption in plants and leads to accumulation of nitrate in plant tissues. This situation could reduce plant quality in term of healthy food perspective. Therefore, it is reasonable to develop a practical method to control over-accumulation of nitrate in hydroponics system. It was previously found that the reduction of nitrogen fertilizer could reduce the accumulation of nitrate in lettuce (*Lactuca sativa*). Unfortunately, decreased nitrate accumulation in plant tissues also reduced growth and yield of lettuce since nitrogen is a macro-nutrient for plant growth & development. Regarding this problem, the study about methods that can improve plant growth while maintain low nitrate level in plant tissues is very important. Previously, application of some amino acids could improve plant growth and development. In addition, light is also considered to be crucial factor for plant growth and development. Light-emitting Diode (LED) lights at specific wavelengths can promote growth of many plants including lettuce. Therefore, the objectives of these studies are to improve the production of red oak lettuces by treated with two levels of nutrient strengths, 1x and 1/4x, and grown with 4 types of LED light treatments and green oak lettuce was also treated with amino acids by foliar applications. In summary, it was found that Red oak lettuce treated with combination of red light (620 and 660 nm), blue light (460 nm) with 1/4x nitrate in nutrient solution has the best overall growth and appearance. Meanwhile, glycine-treated green oak lettuce grown in 1/4x nitrate in nutrient solution showed the highest growth by monitoring growth parameters when compared to controlled planted treated with distilled water. In addition, foliar application of glycine-treated green oak lettuce caused the lowest nitrate accumulation in root and shoot of lettuce in 1/4x nitrate treatment. Therefore, these results provided the applications of growing lettuce in low-nitrate treatment while maintaining growth in hydroponic systems by foliar application of amino acids and specific LED light treatments.