

Putri Fadilla Wulandari. 220311100146. Respon Lama Penyinaran dan Perbedaan Kadar pH Terhadap Pertumbuhan dan Hasil Tanaman Selada Merah (*Lactuca sativa* L. var. *Red Rapid*) Secara Hidroponik *Indoor*. Dibimbing oleh Bapak Fahmi Arief Rahman, S.P., M.Si dan Bapak Choirul Umam S.TP., M.T.

ABSTRAK

Selada merah (*Lactuca sativa* L. var. *Red Rapid*) merupakan sayuran daun bernilai gizi tinggi yang banyak dibudidayakan secara hidroponik *indoor*. Keberhasilan budidaya tanaman ini dipengaruhi oleh ketersediaan cahaya dan pH larutan nutrisi yang berperan dalam proses fotosintesis serta penyerapan unsur hara. Penelitian ini bertujuan menganalisis pengaruh lama penyinaran lampu LED, kadar pH larutan nutrisi, dan interaksi keduanya terhadap pertumbuhan dan hasil tanaman selada merah pada sistem hidroponik *indoor*. Penelitian menggunakan Rancangan Acak Kelompok (RAK) faktorial dengan dua faktor, yaitu lama penyinaran lampu LED yang terdiri atas lampu putih 12 jam (L0), LED biru 8 jam (L8), 12 jam (L12), dan 18 jam (L18), serta kadar pH larutan nutrisi yang terdiri atas pH 4,0–4,5 (S1), pH 5,5–6,5 (S2), dan pH 7,0–7,5 (S3). Parameter yang diamati meliputi tinggi tanaman, jumlah daun, luas daun, kerapatan stomata, kandungan klorofil, bobot basah, bobot ekonomis, bobot kering, dan kandungan vitamin C. Data dianalisis menggunakan analisis ragam (ANOVA) dan dilanjutkan dengan uji *Duncan's Multiple Range Test* (DMRT) pada taraf nyata 5%. Hasil penelitian menunjukkan bahwa lama penyinaran lampu LED berpengaruh nyata terhadap seluruh parameter pertumbuhan dan sebagian besar parameter hasil tanaman, sedangkan perlakuan pH 5,5–6,5 memberikan pertumbuhan dan hasil terbaik. Interaksi antara lama penyinaran dan pH terjadi pada tinggi tanaman, luas daun, kerapatan stomata, bobot basah, dan bobot ekonomis, tetapi tidak terjadi pada kandungan klorofil, bobot kering, dan vitamin C. Kombinasi perlakuan LED biru selama 18 jam dengan pH 5,5–6,5 (L18S2) merupakan perlakuan terbaik dalam meningkatkan pertumbuhan dan hasil tanaman selada merah pada sistem hidroponik *indoor*.

Kata kunci: Hidroponik Indoor, Lama Penyinaran LED, pH Larutan, Pertumbuhan, Selada Merah

Putri Fadilla Wulandari. 220311100146. The Effect of Irradiation Duration and pH Levels on the Growth and Yield of Red Lettuce (*Lactuca sativa* L. var. *Red Rapid*) in an Indoor Hydroponic System. Advised by Mr. Fahmi Arief Rahman, S.P., M.Si, and Mr. Choirul Umam, S.TP., M.T.

ABSTRACT

Red lettuce (Lactuca sativa L. var. Red Rapid) is a highly nutritious leafy vegetable that is widely cultivated using indoor hydroponics. The success of cultivating this plant is influenced by light availability and the pH of the nutrient solution, both of which play a role in photosynthesis and nutrient uptake. This study aims to analyze the effects of LED lighting duration, nutrient solution pH, and their interaction on the growth and yield of red lettuce in an indoor hydroponic system. The study employed a factorial randomized block design (RBD) with two factors: LED lighting duration, consisting of 12 hours of white light (L0), blue LED for 8 hours (L8), 12 hours (L12), and 18 hours (L18), and nutrient solution pH levels consisting of pH 4.0–4.5 (S1), pH 5.5–6.5 (S2), and pH 7.0–7.5 (S3). The observed parameters included plant height, number of leaves, leaf area, stomatal density, chlorophyll content, fresh weight, marketable weight, dry weight, and vitamin C content. The data were analyzed using analysis of variance (ANOVA) followed by Duncan's Multiple Range Test (DMRT) at a significance level of 5%. The results of the study showed that the duration of LED lighting had a significant effect on all growth parameters and most yield parameters, while the pH 5.5–6.5 treatment yielded the best growth and yield. An interaction between lighting duration and pH was observed for plant height, leaf area, stomatal density, fresh weight, and marketable weight, but not for chlorophyll content, dry weight, and vitamin C content. The combination of 18 hours of blue LED treatment with a pH of 5.5–6.5 (L18S2) was the most effective treatment for enhancing the growth and yield of red lettuce in an indoor hydroponic system.

Keywords: *Indoor Hydroponics, LED Illumination Duration, Solution pH, Growth, Red Lettuce.*