

**EVALUATION OF NUTRIENT FORMULATION ON GROWTH
AND YIELD OF LETTUCE IN A DEEP WATER CULTURE
HYDROPONIC SYSTEM**



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ABSTRACT

This study evaluated the impact of different nutrient formulations on the growth and yield of lettuce cultivated in a Deep Water Culture hydroponic system. Four treatments were tested: A&B Solutions (T1), Kodi (T2), Albert (T3), and Haifa (T4), with each formulation providing varying levels of macro and micronutrients. The experiment was conducted over four weeks using a Randomized Complete Block Design (RCBD) to minimize environmental variability. Growth parameters, including plant height, number of leaves and canopy diameter were measured weekly while, bottom leaf length, bottom leaf width, root length and fresh root weight were measured at the harvest. Yield parameters, such as fresh leaf weight and fresh plant weight were measured at the harvest. Results indicated that Haifa (T4) consistently outperformed the other treatments, achieving the highest mean plant height (20.33 ± 0.26) while, Kodi Mix (T2) recorded lowest height (17.70 ± 0.20) by the final measurement date. The superior performance of Haifa (T4) is attributed to its balanced nutrient composition, aligning with previous research emphasizing the importance of optimal nutrient management for lettuce growth. Albert (T3) also showed strong performance, particularly in root length plant (45.27 ± 3.18), likely due to suboptimal nutrient concentrations. Statistical analysis revealed significant differences ($p < 0.05$) in plant height over time, with Haifa (T4) and Albert (T3) outperforming A&B Solutions (T1) and Kodi Mix (T2) in later weeks. However, no significant differences were observed between treatments for canopy diameter, number of leaves, fresh weight parameters or bottom leaf dimensions at harvest. Additionally, a hedonic test assessed the sensory qualities of lettuce grown under each treatment, with Albert (T3) and A&B Solutions (T1) scoring the highest in taste ($T3 = 1.80 \pm 0.11$, $T1 = 2.00 \pm 0.23$) and firmness ($T3 = 1.33 \pm 0.06$, $T1 = 1.26 \pm 0.06$). This study shows that nutrients used in deep water culture hydroponic systems affect lettuce growth and quality. The Haifa (T4) formula boosted growth, and Albert (T3) and A&B Solutions (T1) made the lettuce taste and firmness better. This research underscores the critical role of nutrient optimization in enhancing lettuce productivity and provides valuable insights for optimizing cultivation practices in deep water culture hydroponic systems.

Keywords: Deep Water Culture, Growth Parameters, Hydroponic Lettuce, Nutrient Formulations, Nutrient Optimization

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