VERTICAL FARMING MODULE FOR URBAN DWELLING FOR LETTUCE CULTIVATION

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BIOGRAPHICAL SKETCH

The author, Alexis Russel T. Pangilinan, was born on May 24, 2002, in San Miguel, Bulacan. He is the only child of Mr. Allan C. Pangilinan and Mrs. Rossvy T. Pangilinan. Although he was born in Bulacan, he was raised and grew up in the Science City of Muñoz.

He received his primary education at Salacot Elementary School. He took his secondary education at San Sebastian School. During his stay in high school, he became part of the Math Club. Aside from academics, he is also engaged in extracurricular sports activities like badminton, archery, and arnis.

Currently, the researcher passionately pursues his tertiary education in Agricultural and Biosystems Engineering at Central Luzon State University. He is dedicated to his studies and continues to strive for a better version of himself.

Beyond his academic pursuits, Alexis Russel is enthusiastically improving his 3D modelling skills.

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BIOGRAPHICAL SKETCH

The researcher, Dencel Ashia M. Fajardo, was born on July 6, 2002, in Cabanatuan City, Nueva Ecija. She is the second eldest of the four children of Dennis P. Fajardo and Maricel M. Fajardo, who have been her constant source of support and inspiration.

She attended Blessed Hope Christian School for her primary and secondary education where she actively represented the school in various academic competitions, particularly in the fields of science and mathematics. Dencel has been a consistent honor student. Her passion shone through as she also represented the school in various art competitions. She was also a member of the student leadership organization.

For her Senior High School education, the researcher studied at PHINMA Araullo University in Cabanatuan City. Where she achieved academic excellence in science and graduated with high honors.

Currently, the researcher passionately pursues her tertiary education in Agricultural and Biosystems Engineering at Central Luzon State University. Her dedication to her studies is evident as she continued to excel academically. Beyond her academic pursuits, Dencel runs a clothing brand with her partner.

DENCEL ASHIA M. FAJARDO

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ABSTRACT

FAJARDO, DENCEL ASHIA M. AND PANGILINAN, ALEXIS RUSSEL T., Department of Agriculture and Biosystems Engineering, College Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, March 2024, **VERTICAL FARMING MODULE FOR URBAN DWELLING FOR LETTUCE CULTIVATION.**

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To address the food insecurity brought by diminishing areas for cultivation and limited water supply for production, vertical tower gardens (VTGs) aimed to increase the crop yield per unit area footprint. However, current designs of VTGs are fixed and suffered from several problems such as non-uniform light demonstration and water inefficiency. This study is conceptualized to address the above-mentioned problems and aimed to contribute in solving the food security issues. A rotating vertical module for lettuce production was designed and evaluated, with the aim to help urban dwellers and farmers produce more food per square meter of space. The nutrient solution utilized was Nutriblend A&B, purchased from Mikai Agri Trading, specifically formulated for lettuce cultivation. The water parameters for the nutrient solution were maintained as follows: the total dissolved solids (TDS) ranged from 800 ppm to 1000 ppm, the pH level was kept between 5.5 and 6.5, the electrical conductivity was maintained between 1.5 and 2.5 dS/m, and the temperature was controlled within a range of 22 to 31 degrees Celsius. Two factors are considered: the layer factor, consisting of the top (T1), middle (T2), and bottom layer (T3), and the irrigation factor, with irrigation frequencies of 20 minutes per hour (A1) and 15 minutes per hour (A2). The harvest period was set at 20 days after transplanting. The first run (A2) recorded a higher mean temperature of 28.2 degrees Celsius than the second run,

which had a mean temperature of 27.5 degrees Celsius. However, the humidity in the first run was lower than in the second run, with mean values of 68.5% and 71.4%, respectively. The gathered data were analyzed using analysis of variance and Tukey's test for comparison among means. The implementation of A1 within Vertical Farming Modules yielded favorable outcomes for parameters such as area (120.654 cm^2), weight (23.875g), height (18.571cm), and leaf count (7 leaves), while A2 resulted in longer root length (9.105cm). Moreover, the layer factor significantly influenced the height, weight, and area, with notably larger values observed in the bottom and middle layers compared to the top layer, except for root length. The number of leaves did not show significant differences among the treatments. The inclusion of a rotational mechanism within the module is significant for efficiently dispersing sunlight, especially in instances where the module is situated in shaded areas. Vertical Farming Modules can grow significant quantities of lettuce within limited space when compared to traditional farming methods. Additionally, the researcher showcased the viability of lettuce thriving in indoor settings using vertical farming modules equipped with grow lights. However, further research is advised.

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