DESIGN OF MODULAR GROWING CABINET FOR MICROGREENS WITH SEMI-AUTOMATED CONTROL

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines in Partial Fulfillment of the Requirements for the Degree of

BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING
(AB Structures and Environment Engineering)

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ACCEPTANCE SHEET

This undergraduate thesis entitled **"DESIGN OF MODULAR GROWING CABINET FOR MICROGREENS WITH SEMI-AUTOMATED CONTROL"**, prepared and submitted by **PRINCESS KAYE I. FRANCISCO, MARY JOY F. SERADOY** and **RICO M. ZOMIL**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB STRUCTURES AND ENVIRONMENT ENGINEERING)** is hereby accepted:

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The author, Mary Joy F. Seradoy, was born on January 07, 2000, in Baler, Aurora. She is the eldest child of Mr. Joey P. Seradoy and Mrs. Mary Ann F. Seradoy. She entered Baler Central School in 2006 for her primary education. In 2013, she entered Baler National High School under the Science, Technology, and Engineering (STE) class at her Junior High School level and finished with honors. As a science class student, she had attended several seminars lecturing about science investigatory projects and research. In 2017, she studied at Baler Stand-Alone Senior High School under General Academic Strand (GAS) for her Senior high school level and graduated with honors. She took her higher education at Central Luzon State University in 2019, where she pursued a Bachelor of Science in Agricultural and Biosystems Engineering.

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ABSTRACT

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Urban farming offers an opportunity to provide urban communities with fresh and local produce products. The main objective of this study is to design a modular growing cabinet for microgreens using hydroponics and indoor farming concepts. The specific objectives included the design and fabrication of a modular growing cabinet, equipped irrigation, and artificial lights. Also, the study aimed to evaluate the performance of the growing cabinet in terms of temperature regulation, plant growth, and yield.

The performance of the cabinet was evaluated using arugula, bokchoy, and radish microgreens as affected by irrigation frequency and artificial light recipes. Irrigation frequencies of 2x,3x, and 4x a day in combination with red LED alone, blue LED alone and combined red and blue LED as artificial lighting were analyzed as their effect on microgreens using 3x3 factorial experiment in CRD.

Results showed that the two (2) factors (light recipe (red and blue combined light, blue light only, and blue light only) and irrigation frequencies (2x,3x, and 4x) were effective in sufficiently supplying the growth needs of the microgreens in terms of growth and yield. In addition, increasing the irrigation frequency and using the red and blue combined light increases the plant's height and yield.

Keywords: modular growing cabinet; microgreens; light recipe; irrigation frequency

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