DEVELOPMENT OF SINGLE-ROW WEEDER-CULTIVATOR FOR SOYBEAN PRODUCTION

LYNELL G. DUQUE
LOUSE NICOLE V. PULINTAN

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ACCEPTANCE SHEET

This undergraduate thesis entitled **"DEVELOPMENT OF SINGLE-ROW WEEDER-CULTIVATOR FOR SOYBEAN PRODUCTION"**, prepared and submitted by **LYNELL G. DUQUE and LOUSE NICOLE V. PULINTAN**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB MACHINERY AND POWER ENGINEERING)**, is hereby accepted:

MARLON T. DELOS SANTOS, M.Sc
Member, Advisory Committee

01 | 19 | 2024
Date Signed

ROLDAN T. QUITOS, M.Sc.
Member, Advisory Committee

01 | 22 | 24
Date Signed

JOHN VINCENT A. NATE, M.Sc.
Chair, Advisory Committee

01 | 18 | 24
Date Signed

Accepted as partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB MACHINERY AND POWER ENGINEERING)**:

ELMAR M. VILLOTA, Ph.D.
Chair, Department of Agricultural and Biosystems Engineering

01 | 24 | 24
Date Signed

THEODY B. SAYCO, Ph.D.
Dean, College of Engineering

01 | 24 | 24
Date Signed

BIOGRAPHICAL SKETCH

The first researcher, Lynell G. Duque, was born on December 14, 2001 in Cabanatuan City, Nueva Ecija. She resides in Brgy. Cabu, Cabanatuan City, Nueva Ecija. She is the elder one between the two children of Mrs. Annalyn G. Duque, and Mr. Ronnel F. Duque. Lynell Duque completed her primary education at Cabanatuan East Central School, and secondary education at Honorato C. Perez Sr., Memorial Science High School, which she graduated with honors. Today, she is currently in the 4th year of her tertiary education at Central Luzon State University, pursuing Bachelor of Science in Agricultural and Biosystems Engineering. She is currently an active member of the Engineering Computer Club.

The second researcher, Louse Nicole V. Pulintan, was born on March 14, 2001 in Cabanatuan City, Nueva Ecija. She resides in Brgy. Abar 1st , San Jose City, Nueva Ecija. She is the elder one between the four children of Mrs. Monnette V. Pulintan and Mr. Jomer D.A Pulintan . Louse Nicole Pulintan completed her primary education at Abar 1st Elementary School, and secondary education which she graduated with honors (Junior High) at Saint John's Academy School and (Senior High) at Saint Joseph School . Today, she is currently in 4th year of her tertiary education at Central Luzon State University, pursuing Bachelor of Science in Agriculture and Biosystems Engineering. She is currently an active member of The Mechanics Organization (Photo-Journalist).

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ABSTRACT

Duque, Lynell G., and Pulintan, Louse Nicole V., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **February 2024, DEVELOPMENT OF SINGLE-ROW WEEDER-CULTIVATOR FOR SOYBEAN PRODUCTION.**

Adviser: ENGR. JOHN VINCENT NATE, M.Sc.

The demand for effective weed control mechanisms in soybean production has prompted the development of single-row weeder-cultivator to cater the needs of the production of the soybean. This study outlined the iterative process of designing, fabricating, testing, and evaluating, and cost analyzing a single-row weeder-cultivator tailored for optimizing weed management in soybean fields. The objectives encompassed the design and fabrication of a precision single-row weeder-cultivator capable of addressing weed proliferation within soybean rows. Experimental evaluations demonstrated promising outcomes. Weeding efficiency observations revealed a progressive trend: 90.85% at 1kph, 84.12% at 1.5kph, and 79.74% at 2kph. Statistical analysis confirmed significant differences among all treatments, advocating slower speeds of 1kph or 1.5kph to maximize weeding efficiency. Conversely, higher speeds correlated with decreased weeding efficacy, potentially compromising crop health. Simultaneously, percent plant damage assessments depicted values of 1.83% (1kph), 3.71% (1.5kph), and 7.47% (2kph). While 1kph and 1.5kph exhibited statistical equivalence in percent plant damage, significant disparities were noted when compared to the 2kph speed. This underscores the recommendation to operate the weeder-cultivator at slower speeds to minimize plant damage, aligning with acceptable thresholds. Fuel consumption findings revealed consumption rates of 1.13 li/hr (1kph),

consumption rates of 1.13 li/hr (1kph), 1.08 li/hr (1.5kph), and 0.91 li/hr (2kph). Statistical comparisons indicated no significant difference between 1kph and 1.5kph speeds but significant divergence when compared to the 2kph speed. This unexpected trend highlights the need for cautious consideration of operational speeds concerning fuel efficiency. Furthermore, the study delved into the economic viability of the single-row weeder-cultivator. Cost analysis revealed an investment outlay of Php 15,126.00, with operational costs calculated at Php 3,296.17/ha. An intriguing prospect emerged when considering the weeder's potential as a rental service, indicating a feasible payback period of 0.43 years or 48 working days, assuming 110 days/year operation. To maximize returns, collaborative rental schemes involving 15 one-hectare farms within a cropping cycle were proposed. The implications of this study underscore the substantial benefits the proposed weeder-cultivator offers to the soybean production industry. Its capacity to curtail labor costs, reduce labor intensity, and potentially augment soybean population underscores its potential significance.

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