DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF VERMICOMPOST HARVESTER

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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 Machinery and Power Engineering)

DECEMBER 2023

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BIOGRAPHICAL SKETCH

Lean Ernestine O. Burbos, born on December 31, 2000, in Santiago City, Isabela, is a young and aspiring engineer. She is the daughter of Warlito and Rosecelle Burbos, and her two siblings, Ernest Andrei and Lucky Angelique, are actively engaged in their educational pursuits.

Lean's academic journey commenced at Galilee Integrated School, where she demonstrated exceptional aptitude. Graduating as the Class Valedictorian in the school year 2012-2013, she laid the foundation for her educational voyage with a notable achievement.

Continuing her quest for knowledge, Lean transitioned to Santiago City National High School for her secondary education. This phase marked another chapter of success, culminating in her graduation with Honors Award in the school year 2018-2019. Her unwavering dedication to academic excellence became increasingly evident, setting the stage for her future endeavors.

Now in the present, Lean is a young woman with a vision. She aspires to become a licensed agricultural and biosystems engineer, aiming to make a substantial contribution to the development of the agricultural sector in the Philippines. Her goal is to utilize her knowledge and skills to design and implement innovative solutions that address the challenges faced by farmers and rural communities.

Looking ahead, Lean harbors dreams of pursuing further studies and research in the field of agricultural and biosystems engineering. She believes that with hard work, passion, and dedication, she can achieve her goals and make a positive impact on society. The

journey of Lean Ernestine O. Burbos is not merely a chronological progression but a narrative of dedication, achievement, and a future poised for meaningful contributions to her chosen field and society at large.

BIOGRAPHICAL SKETCH

Abbygail R. Obispo was born in San Roque, San Leonardo, Nueva Ecija, on November 2, 2000. She is the eldest of three children to Mr. Alberto D. Obispo and Mrs. Gemma R. Obispo.

Her academic journey began at San Roque Elementary School, where she graduated as the Class Valedictorian in the school year 2012-2013. Transitioning to Juan R. Liwag Memorial High School, she maintained an impressive academic record, graduating with High Honors in both Junior and Senior High. These formative educational experiences laid the groundwork for her future pursuits in college.

In 2019, she enrolled at Central Luzon State University in the Science City of Munoz, pursuing a Bachelor of Science in Agricultural and Biosystems Engineering. Abbygail's passion for agriculture has been a guiding force since her early years, propelling her to explore diverse subjects and develop robust academic skills. Her aspiration to become an Agricultural and Biosystems Engineer is fueled by a desire to contribute to the advancement of the agricultural sector in the Philippines, aiming to positively impact the lives of farmers.

Continuing her journey as a student of Agricultural and Biosystems Engineering, Abbygail's interest in exploring innovative agricultural techniques grows. She envisions engaging in fieldwork soon, seeking to expand her knowledge further. Abbygail firmly believes that success hinges on dedication, acknowledging uncertainties but relying on her foresight and vision to achieve remarkable outcomes.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the following people who have contributed to the success of our thesis project.

To our beloved family, especially our parents, who supported us financially and emotionally throughout our academic journey. They have been our source of inspiration and motivation in pursuing our dreams.

To our friends, who have been with us in good and bad times. They have shared their insights, feedback, and encouragement in every step of our research process.

To our thesis adviser, Dr. Marvin M. Cinense, who guided us with his expertise and wisdom. He patiently mentored us and helped us improve our work. We also thank our panel members, Engr. Roldan T. Quitos and Engr. Marlon T. Delos Santos, for their valuable comments and suggestions.

To Dr. Maria Luisa T. Mason, the Center Director of RM Cares, for allowing us to conduct our preliminary testing on their facility. We also thank Kuya Noel for assisting us during the testing and sharing his knowledge on vermicomposting.

To Dr. Caro B. Salces, the Executive Director of Gene Pool in PCC National Headquarters, for permitting us to conduct our preliminary and final testing on their site. We also appreciate the help of Kuya Boy, Kuya Elmer, and Kuya Al, who facilitated the testing and provided us with useful information on vermicompost harvesting.

To Sir Renato Domingo, who skillfully fabricated our machine according to our design specifications. He also generously offered his advice and assistance in troubleshooting and improving our machine.

To Engr. Jerome Cabuloy, who was always ready to answer our queries and concerns regarding our machine. He also gave us constructive feedback and tips on how to optimize our machine performance.

And most of all, to the Almighty God, who blessed us with the strength, wisdom, and perseverance to complete this project. He has been our constant companion and protector throughout this endeavor.

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ABSTRACT

BURBOS, LEAN ERNESTINE O. and OBISPO, ABBYGAIL R., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, November 2023, **DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF VERMICOMPOST HARVESTER**

Adviser: **MARVIN M. CINENSE, Ph.D.**

The study was carried out to design, fabricate, and evaluate the performance of a vermicompost harvester in separating vermicast from the worms and coarse particles, hence, improving the quality and market value of the vermicompost product. The vermicompost harvester was fabricated based on the design plans and specifications, which included the five (5) main components: power source transmission system, cylindrical sieve, frame, inlet hopper, and slide chute. The design of the cylindrical sieve was a perforated metal sheet and screening holes that were 1/4 inch in diameter. It had an inner diameter and length of 0.6-meter and 1.22-meter, respectively. The performance of the vermicompost harvester was evaluated in terms of throughput capacity, sieving recovery, separation efficiency, purity, and energy consumption at different speeds (5 rpm, 10 rpm, and 15 rpm) and angles of inclination (5°, 8°, 10°) using 20kg of vermicompost for the treatment. Results showed that the highest throughput capacity (315.40 kg/hr) was achieved at 15 rpm and 10° angle, the highest sieving recovery were achieved at 15 rpm and 5° angle. The 15 rpm yielded for sieving recovery and sieving efficiency were 63.83% and 96.32%, respectively. Furthermore, the 5° AOI produced for sieving recovery and

sieving efficiency were 64.94% and 96.23%, respectively. The highest purity was achieved at 10 rpm and 8° angle, and the highest separation efficiency of worms (94.62%) was achieved at 15 rpm and 8° angle. The overall cost of the machine was Php 50,000, with a break-even weight of 39,755.80 kg/yr of vermicompost product at an operation cost of Php 0.42/kg, returning the investment in 0.43 years. Therefore, the developed machine was observed to increase the market value of the vermicompost and therefore, an economically viable developed technology.

Keywords: vermicompost harvester, vermicast, throughput capacity, sieving recovery, separation efficiency, purity, energy consumption.

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