

**DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF
PORTABLE MILLING MACHINE FOR TOMATO
(*Solanum lycopersicum*)**

RENZON C. TADEO

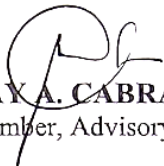
An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural
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for the Degree of

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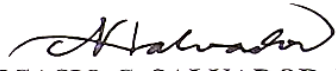
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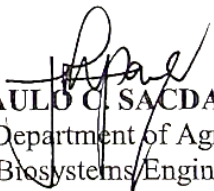
This undergraduate thesis entitled “**DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF PORTABLE MILLING MACHINE FOR TOMATO (*Solanum lycopersicum*)**,” prepared and submitted by **RENZON C. TADEO**, in partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AB Machinery and Power Engineering)**, is hereby Accepted:

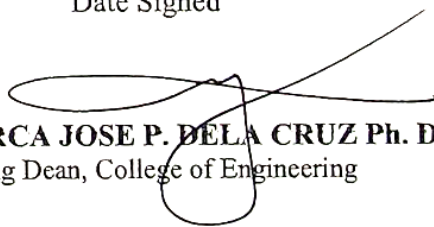

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BIOGRAPHICAL SKETCH

Renzon C. Tadeo was born on January 18, 2002, in Bagong Sikat, Science City of Muñoz, Nueva Ecija. He is the youngest child of Mr. Renato A. Tadeo and Mrs. Marites C. Tadeo. He completed his primary education at Bagong Sikat Elementary School, where he received academic awards. For his junior high school, he attended Muñoz National High School – Main, earning honors, and continued at the same school for his senior high school under the STEM (Science, Technology, Engineering, and Mathematics) strand, graduating with honors.

Renzon then pursued tertiary education at Central Luzon State University (CLSU) due to its strong agricultural programs. After passing the entrance examination, he enrolled in Agricultural and Biosystems Engineering. Inspired by his father, a farmer, and the agricultural challenges in the country, Renzon aimed to innovate and develop machinery to help farmers work more efficiently and increase their income. He specialized in AB Machinery and Power Engineering. Despite his busy schedule, Renzon enjoys spending time with his family and friends, playing basketball, and video games.

During his college years, Renzon Tadeo undertook his On-the-Job Training (OJT) at the National Irrigation Administration UPRIS Division VI. This experience immersed him in an environment dedicated to irrigation development and management. His OJT provided him with valuable practical experience. This exposure not only enhanced his technical skills but also deepened his appreciation for the important role of irrigation in agricultural productivity and sustainability.

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Mr. Renzon C. Tadeo expresses his sincere gratitude to all the people and institutions who have helped him succeed academically. Without their combined support, this important turning point in his academic career would not have been possible.

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His family's support has been a pillar of his journey. His parents, Mr. Renato A. Tadeo and Mrs. Marites C. Tadeo have been constantly source of guidance, moral and emotional support, believing in his capabilities, crucial for completion of his research. Moreover, his brother Remart C. Tadeo, for supporting his financial necessity.

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ABSTRACT

TADEO, RENZON C., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **JULY 2024, DESIGN, FABRICATION, AND PERFORMANCE EVALUATION OF PORTABLE MILLING MACHINE FOR TOMATO (*Solanum lycopersicum*)**

Adviser: NICASIO C. SALVADOR, M.Sc.

The global tomato market has faced a downturn in both consumption and production, leading to significant oversupply and subsequent food waste. Addressing this issue, the study aimed to design, fabricate, and evaluate a cost-effective, portable milling machine, adapted from an electric fan motor, to enhance tomato preservation. The machine, constructed with locally sourced materials, measures 255 mm x 150 mm x 560 mm (L x W x H) and comprises nine key components, including a grinding plate, hammer, chain, and disc blade. The machine's performance was assessed across multiple parameters: moisture content, particle size distribution, milling capacity, efficiency, and electrical consumption.

Statistically, results revealed that the hammer blade produced the most desirable particle size (0.295 mm), optimal for food seasoning, and achieved the highest milling capacity (30 g/min) and efficiency (72.93%). Comparatively, the chain blade demonstrated moderate efficiency (50.67%), and the disc blade showed the lowest efficiency (61.33%). The machine's operational cost was determined to be 316.70 Php per year, with a breakeven point at 22.71 kg/year and a payback period of approximately 1.03 years.

This study concludes that the portable milling machine is a viable, affordable solution for low-volume tomato milling, significantly reducing food waste and offering a cost-efficient require substantial investment and operational costs. The machine presents

an effective strategy for small-scale applications, ensuring the preservation and utility of excess tomato produce.

Keywords: Portable milling machine; milling capacity; particle size; electrical consumption

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