COMPREHENSIVE SEMESTRAL REPORT AT CENTRAL LUZON STATE UNIVERSITY - CENTER FOR RENEWABLE ENERGY AND TECHNOLOGY (CLSU-CREaTe)

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An Undergraduate Comprehensive Semestral Report 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 in Partial Fulfillment of the Requirements for the Degree of

BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL POWER, MACHINERY, AND RENEWABLE ENERGY)

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ACCEPTANCE SHEET

This undergraduate field practice manuscript entitled, "**COMPREHENSIVE SEMESTRAL REPORT AT CENTRAL LUZON STATE UNIVERSITY-CENTER FOR RENEWABLE ENERGY AND TECHNOLOGY (CLSU-CREaTe),**" prepared and submitted by **EDUARD C. CRUZ** as partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL POWER, MACHINERY, AND RENEWABLE ENERGY),** is hereby accepted:

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BIOGRAPHICAL SKETCH

Eduard Cortez Cruz was born on April 10, 1998 in Science City of Muñoz, Nueva Ecija. He is the Eldest Son of Mr. Eduardo Ayuste Cruz and Mrs. Delia Cortez Cruz. His sibling is Diane Cortez Cruz. He started his elementary education in June 2004 at Palusapis Elementary School, Palusapis Science City of Muñoz, Nueva Ecija, and graduated in April 2010. He continued his secondary education at CLSU-University Laboratory High School Palusapis, Muñoz, Nueva Ecija where he attained his high school diploma in March 2014. He entered College at Central Luzon State University in June 2014 as the only College Admission Test that he passed and took a Bachelor of Science in Agricultural and Biosystems Engineering major in Agricultural Mechanization and Renewable Energy.

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knowing that he has a good company who were continuously help him accomplish tasks and to become a better person.

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To his girlfriend, Kristine B. Ruiz, for always believing in him, cheering him on, being always there during the challenging times, and for ever supporting prayers. The author was deeply grateful for her constant presence and understanding

This hardship and enjoyable experience are dedicated to you.

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ABSTRACT

CRUZ, EDUARD C., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **May 2024, COMPREHENSIVE SEMESTRAL REPORT ON FIELD PRACTICE AT CENTRAL LUZON STATE UNIVERSITY - CENTER FOR RENEWABLE ENERGY AND TECHNOLOGY (CLSU-CREaTe)**

Adviser: **MARLON T. DELOS SANTOS, M.Sc.**

The field practice took place at the Central Luzon State University - Center for Renewable Energy and Technology (CLSU-CREaTe), Science City of Muñoz, Nueva Ecija. It occurred from October to December 2023 and from March to May 2023.

The objective of Field Practice Activity 1 was to evaluate the operation of a 250L semi-automated bioreactor utilizing both AC and solar power. The main goals of this activity were to: 1) evaluate a semi-automated bioreactor using both AC and solar power sources; 2) determine the fermentation efficiency of the semi-automated bioreactor using both AC and solar power sources; and 3) compare the power consumption between the AC and solar power sources.

The objective of field practice activity 2 was to design a bioethanol distiller with a tank capacity of 800 liters. The main goals of this activity were to: 1) ascertain the most favorable dimensions (area and height) for an 800L tank capacity bioethanol distiller; 2) identify the additional components required for the bioethanol distiller; 3) create a design layout for the bioethanol distiller; and 4) compile a bill of materials for the bioethanol distiller.

The objective of field practice activity 3 was to carry out more tasks. The primary aims of this activity were to: 1) carry out additional tasks as directed by the center

director, student-trainee supervisor, or any CLSU-CREaTe staff; and, 2) enhance the students' preparedness and adaptability in their chosen fields of expertise.

An evaluation was conducted on the fermentation efficiency of the 250L semi-automated bioreactor, utilizing both AC and solar power sources. The results demonstrated a fermentation efficiency of 81.7% and 83.5%, correspondingly. The AC supply consumed 6.25 pesos, while solar power saved more but was more expensive in terms of initial cost. Solar power delivers economic savings in the long run and environmental benefits, making it an attractive alternative for numerous applications.

The bioethanol distiller's design, which holds a capacity of 800L, has been adjusted to a bigger size. The design contains a tank, reflux column, primary condenser, slanted secondary condenser, vertical secondary condenser, and frame. The final dimensions were computed to assure the machine's efficiency and durability.

Moreover, the student-trainee acquired knowledge with numerous areas of renewable energy, including participation in events, executing machine evaluation tests, and partaking in equipment installation during field practice time frame.

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