ACTIVATED CARBON FROM CORN (*Zea mays*) COBS AS BIOFILTER FOR PIGGERY WASTEWATER

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(Agricultural Bioprocess Engineering)

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ACCEPTANCE SHEET

This undergraduate thesis entitled "**ACTIVATED CARBON FROM CORN (*Zea mays*) COBS AS BIOFILTER FOR PIGGERY WASTEWATER**", prepared and submitted by **MARIA THERESA R. COSTALES** in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING (AGRICULTURAL PROCESS ENGINEERING)** is hereby approved:

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BIOGRAPHICAL SKETCH

Maria Theresa R. Costales who was born on the 18th of October, 1997 at San Nicolas, Villasis Pangasinan. She is the fifth of the six children of Mr. Centenielo Rizal R. Costales and Mrs. Susana R. Costales. Her peers also call her Thea and her family calls her Pats.

The researcher accomplished her primary school at San Nicolas, Villasis Pangasinan on 2010 and garnered the 4th place in their class. She finished high school at Urdaneta City National High School under the Special Science Curriculum. She was the head of the Social Sciences section and one of the contributors of literary pieces in the English Publications of their school. She also competed for both Regional and National Science and Technology Fair 2013 and won second place on DepEd Intel Philippines Science Fair with the research entitled, "Improvised Carbon Monoxide and Hydrocarbon Filtering Device". She was awarded as the researcher of the year in her batch.

She passed the College Admission Tests for both Central Luzon State University and Saint Louis University, Baguio City with an Accountancy course but her path took her to CLSU and pursued Bachelor of Science in Agricultural and Biosystems Engineering as her first course choice and majored in Agricultural Bioprocess Engineering. She was the first one who took up an engineering course from her family. With her background in science and mathematics from her secondary education, the researcher was determined to take up this course because she was motivated that the agricultural sector is one of the highest contributor to our country's economy and that through engineering and technology research, hope of more yield and productivity will be given to the farmers.

On her first year of college, she was given an opportunity to study under the assistance of Department of Agriculture – Agricultural Competitiveness Enhancement Fund (DA-ACEF) that helped her financially, by shouldering all the fees and allowances. She resided at Ladies Dorm 9 and within her college career, she was a dean's lister three times.

As a student, the researcher participated to some of the trainings and seminars such as "Symposium on Current Trends in Food Safety and Quality Assurance" held on August 30, 2014 at the University Gymnatorium, Central Luzon State University, "AE Planting Festival" held on April 15, 2018 at the College of Engineering, Central Luzon State University, "Wise Up: Training Services on Solid Works Operation" held on April 13, 2016 at the Audio-Visual Room, College of Engineering, Central Luzon State University, "Smart Farming: Engraining the Future" held on April 11, 2018 at the College of Engineering, Central Luzon State University, and "Startup: Innovation and Technology Entrepreneurship Forum" held on March 7, 2019 at the RET Amphitheater, Central Luzon State University.

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Mr. Centenielo Rizal R. Costales, her father, eventhough he's not around anymore, this study is dedicated to him as the inspiration to do well and endeavor success;

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ABSTRACT

COSTALES, MARIA THERESA, R., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines, **May 2019, ACTIVATED CARBON FROM CORN (*Zea mays*) COBS AS BIOFILTER FOR PIGGERY WASTEWATER**

Adviser: CAROLYN GRACE G. SOMERA, M.Sc.

Contamination of water from the discharge of wastes from piggery farms is one of the main sources of pollutants found on surface waters such as rivers, lakes and so forth. In the Philippines, agricultural by-products such as corn cob contributes to the large amount of waste generated and hence there is a need to utilize this waste.

Corn cobs as the natural precursor for the production of activated carbon were carbonized using the rice husk kiln, crushed to granular form and sieved to 6mm mesh. Phosphoric acid (H_3PO_4) was used for the thermo-chemical activation at 500°C for 1hr.

The activated carbon was characterized by their physico-chemical properties (% moisture, % ash and bulk density). The average bulk density, moisture and ash content were 5.89%, 11.06% and 0.320g/mL, respectively, all attained the desirable standard. The surface morphology test was used to compare the size and structure of the pores developed on corn cob charcoal and activated carbon.

The slowest recorded operating time and filtration process was from Treatment 3 with 15 cm activated carbon height for 4.26 hr and 1.22 L/hr respectively and the rapid filtration was from Treatment 1 with 5 cm height for 1.68 hr and 0.47 L/hr filtering capacity.

Based on the results of the analytical laboratory, 15cm thickness TSS adsorption gained the highest efficiency at 80.37% and the lowest removal was BOD at 72.67%. Treatment 3 showed the best results in terms of adsorptive capacity among the treatments. Statistical analysis showed that all the parameters had significant effect on the varying height of the activated carbon.

Keywords: Activated carbon; Biofilter; Corn cobs; Piggery wastewater

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