

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

MARIA THERESA R. COSTALES

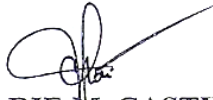
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ENGINEERING
(Agricultural Bioprocess Engineering)**

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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:



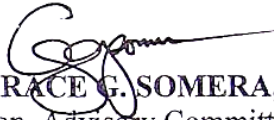
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BIOGRAPHICAL SKETCH

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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TABLE OF CONTENTS

	PAGE
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDIX TABLES	xii
LIST OF APPENDIX FIGURE	xiii
INTRODUCTION	1
Background of the Study	1
Statement of the Problem	2
Significance of the Study	3
Objectives of the Study	4
Scope and Limitation of the Study	4
Time and Place of the Study	5
REVIEW OF RELATED LITERATURE	6
Activated Carbon	6
Corn Cob as Raw Material	7
Preparation of Activated Carbon	12
Activating Agents Used During Activation	13
Thermo-chemical Activation Process	14
Decontamination Mechanisms of Activated Carbon	15
Applications of Activated Carbon	17
Global Demand for Activated Carbon	17
Characterization of Activated Carbon	18
Percent Ash	18
Percent Moisture	19
Bulk Density	20
Scanning Electron Microscopy (SEM)	20
Biofilters	21
Effluent Standard of the Philippines	22
Water Quality Parameters	23
METHODOLOGY	25

Conceptualization of the Study	25
Sample Collection and Preparation	26
Carbonization Process	26
Chemical Reagent Used	27
Thermo-Chemical Activation Process	27
Characterization of Activated Carbon	28
Percent Ash	28
Percent Moisture	29
Bulk Density	29
Morphological Structure Determination	30
Filtration Process	30
Test Procedure	30
Filtering Capacity	30
Sample Preparation for Laboratory Analysis	32
Statistical Analysis	34
 RESULTS AND DISCUSSIONS	 35
Physico-chemical Properties of Activated Carbon	34
Percent Moisture	35
Percent Ash	36
Bulk Density	37
Morphological Structure	38
Performance of Biofiltration System	39
Operating Time	39
Filtering Capacity	40
Water Quality	41
Biochemical Oxygen Demand (BOD)	41
Total Suspended Solids (TSS)	43
Ammonia	46
Phosphate	48
Total Coliform	50
Adsorption Efficiency	52

SUMMARY, CONCLUSION, AND RECOMMENDATION	54
Summary	54
Conclusion	55
Recommendation	56
LITERATURE CITED	57
APPENDICES	65
Appendix I - Analytical Laboratory Analysis	66

LIST OF TABLES

TABLE		PAGE
1	List of previous studies conducted utilizing corn cob for activated carbon production	8
2	List of other agricultural by-products processed into activated carbon	10
3	Effluent Standard for Class C water body	23
4	Height, volume and mass of activated carbon in the filtering pipe	31
5	Method of testing and holding time requirement of each parameters set by the laboratory testing center	33
6	Percent moisture of the produced activated carbon	35
7	Percent ash of the produced activated carbon	36
8	Bulk density of the produced activated carbon	37
9	Operating time (hr) of the filtering pipe	38
10	Capacity (L/hr) of the filtering pipe	40
11	Biochemical oxygen demand (BOD) after the filtration process as affected by the different treatments	41
12	Total Suspended Solids (TSS) after the filtration process as affected by the different treatments	43
13	Ammonia after the filtration process as affected by the different treatments	46
14	Phosphate after the filtration process as affected by the different treatments	48
15	Total coliform after the filtration process as affected by the different treatments	50

LIST OF FIGURES

FIGURE		PAGE
1	Morphology of corn plant	7
2	Mechanisms of adsorption	16
3	SEM Micrograph of corn cob and corn cob-based activated carbon	21
4	Conceptual framework of the study	25
5	Parts of the biofilter (side-view)	31
6	Biofilter set-up (front-view)	32
7	SEM micrographs of carbonized corn cob and activated charcoal	38
8	BOD before and after the filtration process	42
9	TSS before and after the filtration process	44
10	Ammonia before and after the filtration process	46
11	Phosphate before and after the filtration process	48
12	Total coliform before and after the filtration process	50
13	Adsorption efficiency of activated carbon	51

LIST OF APPENDIX TABLES

APPENDIX TABLE		PAGE
1	Raw data for percent moisture calculation	70
2	Raw data for percent ash calculation	70
3	Raw data for bulk density calculation	70
4	Analysis of Variance on the operating time of filtering pipe, hr	70
5	Analysis of Variance on biochemical oxygen demand (BOD) after the filtration process as affected by the different treatments	71
6	Analysis of Variance on total suspended solids (TSS) after the filtration process as affected by the different treatments	71
7	Analysis of Variance on Ammonia after the filtration process as affected by the different treatments	71
8	Analysis of Variance on Ammonia after the filtration process as affected by the different treatments	71
9	Analysis of Variance on biochemical oxygen demand (Total coliform) after the filtration process as affected by the different treatments	72

LIST OF APPENDIX FIGURES

APPENDIX FIGURE		PAGE
1	Collection of corn cob samples	73
2	Collection of biomass fuel for the rice husk kiln	73
3	Carbonization Process	74
4	Carbonized corn cob	74
5	Crushing and sieving carbonized corn cob	75
6	Weighing of carbonized corn cob	75
7	Activating agents used in the study	76
8	Measuring and pouring of phosphoric acid to the corn cob charcoal	76
9	Mixing of the phosphoric acid and corn cob charcoal	77
10	Samples with phosphoric acid	77
11	Impregnated charcoal	78
12	Corn cob charcoal with phosphoric undergoing thermo-chemical activation	78
13	SEM Analysis of samples	79
14	Collection of piggery wastewater samples	79
15	Weighing of activated carbon to be loaded in the filtering pipe	80
16	Setting up the filtration system	80
17	Pouring the wastewater in the filtration system	81
18	Filtration of piggery wastewater	81

19	Filtered wastewater	82
20	Samples contained in an ice box for preservation	82
21	Sample being submitted at the laboratory	83

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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