

**UTILIZATION OF COCONUT SHELL ASH (*Coccoloba Nucifera*) IN  
AGRICULTURAL SOIL**

**ANIS IZ'ZATI BINTI GHAZALI**

**Final Year Project Report Submitted in  
Partial Fulfillment of the Requirement for the  
Degree of Bachelor of Science (Hons) Chemistry  
in the Faculty of Applied Sciences  
Universiti Teknologi Mara**

**JULY 2017**

## **ABSTRACT**

### **UTILIZATION OF COCONUT SHELL ASH (*Coccoloba Nucifera*) IN AGRICULTURAL SOIL**

Coconut shell ash is one of agricultural waste. This waste was found a lot globally and can cause risk to human health and also environment. An experiment was conducted to study the usage of coconut shell ash in agricultural soil. Coconut shell ash was formed by placing coconut shell in the muffle furnace. The temperature of muffle furnace used for the formation of coconut shell ash was 500°C. After coconut shell ash was formed, Fourier Transform Infrared Spectroscopy (FTIR) was used to determine characterization of calcium oxide in the coconut shell ash. It was found that the wavelength for calcium oxide is 477.10 cm<sup>-1</sup>. Determination of soil pH and soil properties of all the soil samples were conducted after all soil samples included control soil was collected. There are three portions of coconut shell ash that was applied to each soil sample which were one gram, three grams and five grams respectively. The usage of coconut shell was effective for rising pH of the soil. pH of the soil increase after the application of coconut shell ash. The highest pH of the soil is after the application of five grams of coconut shell ash. Hence, coconut shell ash can be used as a liming agent.

## TABLE OF CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENT</b>	iii
<b>TABLE OF CONTENT</b>	iv
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	ix
<b>ABSTRACT</b>	xi
<b>ABSTRAK</b>	xii
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Background of Study	1
1.2 Problem Statement	2
1.3 Significance of the Study	3
1.4 Objective of Study	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Liming Materials	5
2.1.1 Type of Liming Materials	6
2.2 Soil Acidity	7
2.2.1 Effect of Soil Acidity	9
2.3 Coconut Shell Ash	10
2.3.1 Coconut Shell Ash as Liming Agent	11
2.3.2 Characterization of Calcium Oxide in Coconut Shell Ash	12
2.4 Effect of Coconut Shell Ash in Increasing pH of the Soil	13
<b>CHAPTER 3 METHODOLOGY</b>	
3.1 Materials	15
3.1.1 Raw Materials	15
3.1.2 Chemicals	15
3.1.3 Apparatus	15
3.1.4 Instrumentation	16
3.2 Methods	16
3.2.1 Sampling Area	18
3.2.2 Soil Sampling	18
3.2.3 Coconut Shell	18
3.2.4 Sample Preparation for Soil	18
3.2.5 Preparation for Coconut Shell Ash	19
3.3 Characterization of Calcium Oxide in Coconut Shell Ash	19
3.4 Soil Properties and pH measurement of the Soil	20

3.5	The Effect of pH of the Soil Using Coconut Shell Ash	21
-----	--	----

**CHAPTER 4 RESULT AND DISCUSSION**

4.1	Characterization of Calcium Oxide Composition in Coconut Shell Ash	22
4.2	pH of The Soil and Soil Properties	23
4.3	Determination of Effect of Coconut Shell Ash On pH Of the Soil	28

**CHAPTER 5 CONCLUSION AND RECOMMENDATION** 32

**CITED REFERENCES** 34

***CURRICULUM VITAE*** 38

## LIST OF FIGURES

<b>Figure</b>	<b>Caption</b>	<b>Page</b>
2.1	Particle-size wheel for limestone	7
2.2	pH scale	9
2.3	Coconut shell	11
2.4	Coconut shell ash	11
2.5	FTIR spectra of coconut shell	13
3.1	Flowchart of methodology	17
3.2	Munsell colour chart	20
3.3	Textural triangle	21
4.1	Characterization of Calcium Oxide in Coconut Shell Ash	22
4.2	pH value of the soil	23
4.3	Soil at Point 1	24
4.4	Soil at Point 2	25
4.5	Soil at Point 3	25
4.6	Soil at Point 4	26
4.7	Soil at Point 5	26
4.8	Soil at Control Soil	27
4.9	Effect of Coconut Shell Ash On pH Of The Soil at Point 1	28
4.10	Effect of Coconut Shell Ash On pH Of The Soil at Point 2	28
4.11	Effect of Coconut Shell Ash On pH Of The Soil at Point 3	29
4.12	Effect of Coconut Shell Ash On pH Of The Soil at Point 4	29
4.13	Effect of Coconut Shell Ash On pH Of The Soil at Point 5	30