

**IMPROVING SELECTED CHEMICAL PROPERTIES OF PEAT SOILS
USING RUBBERWOOD BARK BIOCHAR**

NURFARAHANA BINTI MD ZIN

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Technology and Plantation Management
in the Faculty of Plantation and Agrotechnology
Universiti Teknologi MARA**

JULY 2019

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious and The Most Merciful. Peace and blessing of Allah al Mighty to our beloved, final Prophet Muhammad S.A.W and his relatives, all his companions and those who have followed. Alhamdulillah, all praise and thankfulness to Allah S.W.T, The Most Glorious and Omnipotent, with His willingness has allowed me to complete this research project.

First of all, I would like to thank to Universiti Teknologi MARA Malaysia especially Faculty of Plantation and Agrotechnology, UiTM Cawangan Melaka, Kampus Jasin for the research facilities. My special appreciation goes to my project supervisor, Dr. Nur Qursyna Binti Boll Kassim for her full guidance, supportive spirit and for spending her precious time in helping me to finish this project.

I also would like to thank the lab assistants, Mr. Aizuddin, Mr. Saidi and Ms. Azlin for their kindness in allowing me using the equipment. I also would like to express my gratitude to panels during exhibition and presentation of Final Year Project besides special thanks to reviewer of this thesis. The comments received from Mrs. Salwa Haji Adam, Mr. Muhammad Nuruddin Mohd Nor and Mrs. NorAzlina Abu Sari really helped me in generating and improvised this thesis report.

Besides, thank you to my group members who has together with me in conducting research and experiment and also helping me and give beneficial information upon completing this project. I am also indebted to my housemates, best friends and everyone who has always give positive encouragement throughout this research process. Positive words from those people keep me stronger so thank you.

Finally, this research is dedicated to my beloved parents, who always give me freedom to explore my own path, encouragement and support to success. I hope this thesis report would be beneficial to the next generation.

TABLE OF CONTENTS

	Page
<u>DECLARATION</u>	i
<u>ACKNOWLEDGEMENT</u>	ii
<u>TABLE OF CONTENTS</u>	iii
<u>LIST OF FIGURES</u>	v
<u>LIST OF TABLES</u>	vi
<u>LIST OF ABBREVIATIONS</u>	vii
<u>ABSTRACT</u>	viii
<u>ABSTRAK</u>	ix
<u>CHAPTER</u>	1
1 INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statement	3
1.3 Research Objective	4
1.4 Significant of Study	4
2 LITERATURE REVIEW	6
2.1 Biochar	6
2.2 Biomass Wastes	8
2.3 Rubberwood Bark	9
2.4 Peat Soil	10
2.5 Aerobe Paddy	11
3 MATERIALS AND METHODS	13
3.1 Production of Rubberwood Bark Biochar	13
3.2 Experimental Set Up	13
3.3 Experimental Design	14
3.4 Data Collection	14
3.4.1 Soil Analysis	14
3.4.2 Plant Analysis	18
3.5 Data Analysis	19
3.6 Flow Chart of Study	20

4	RESULTS AND DISCUSSION	21
4.1	Pre-Analysis on Peat Soil	21
4.2	Paddy Growth	23
4.3	Soil Chemical Analysis	23
4.3.1	Soil pH	24
4.3.2	Soil Exchangeable Calcium (Ca)	26
4.3.3	Soil Exchangeable Magnesium (Mg)	28
4.3.4	Soil Exchangeable Potassium (K)	30
4.3.5	Soil Available Phosphorus (P)	31
4.4	Soil-Plant Relationship	33
5	CONCLUSIONS AND RECOMMENDATIONS	37
	<u>REFERENCES</u>	39
	<u>APPENDICES</u>	42
	APPENDIX 1: Descriptive Table	43
	APPENDIX 2: ANOVA Table	45
	APPENDIX 3: Post-Hoc Table	46
	APPENDIX 4: Production of Rubberwood Bark Biochar	48
	APPENDIX 5: Experimental Set Up	49
	APPENDIX 6: Bulk Density Determination	50
	APPENDIX 7: Soil pH Determination	51
	APPENDIX 8: Analysis of Soil Exchangeable Ca, Mg and K	52
	APPENDIX 9: Analysis of Soil Available Phosphorus	53
	APPENDIX 10 (a): Plant Analysis	54
	APPENDIX 10 (b): Plant Analysis	55
	APPENDIX 11: Calculation of Bulk Density	56
	APPENDIX 12: Calculation of Water Content	57
	APPENDIX 13: Calculation for Rate of Rubberwood Bark Biochar	58
	APPENDIX 14: PIMES Proceeding Paper	59
	<u>PLAGIARISM REPORT</u>	67
	<u>CURRICULUM VITAE</u>	70

ABSTRACT

Peat soil is developed from the accumulation of organic matter due to slow decomposition process resulted from anaerobic condition. As such, it is renowned for its high acidity and often restricted the growth of plant due to low nutrient availability. In the particle board industry, abundance of rubberwood bark is produced. By turning the waste into biochar, this product is suggested to have a potential to improve selected chemical properties in peat soils. This study aims to evaluate the effects of different rate of rubberwood bark biochar on selected chemical properties of peat soils. Results showed that application of rubberwood bark biochar at the rate of 226.80 grams (Treatment 4) significantly improve the availability of calcium (Ca), magnesium (Mg) and potassium (K) combined with positive increment of tillers number, root length and height of paddy plant compare to other treatments. This study suggested a positive effect of rubberwood bark biochar as soil amendment in peat soils. However, higher rate of rubberwood bark biochar application (>226.80 grams) may be tested in future study to evaluate the maximum rate and its effects on the soils.

Keywords: Rubberwood bark, biochar, peat, soil chemical