



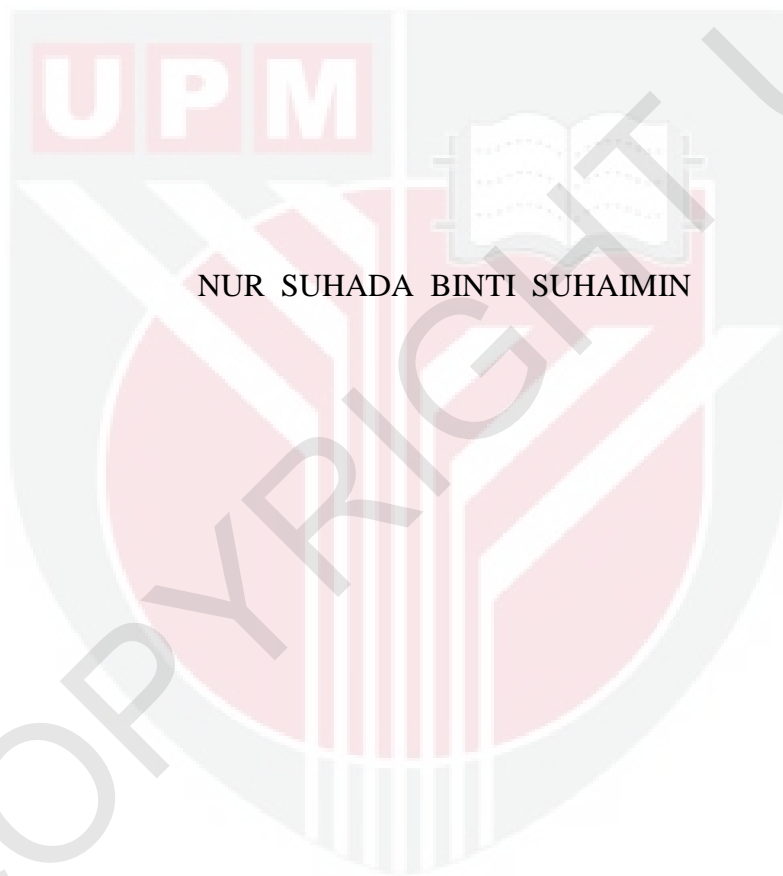
**UNIVERSITI PUTRA MALAYSIA**

**PHYSIO-CHEMICAL AND MINERALOGICAL CHARACTERISTIC OF RHU  
TAPAI SOIL SERIES**

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**FP 2015 129**

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UNIVERSITI PUTRA MALAYSIA

2014/2015

PHYSIO-CHEMICAL AND MINERALOGICAL CHARACTERISTIC  
OF RHU TAPAI SOIL SERIES

BY

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A project report submitted to Faculty of Agriculture,  
Universiti Putra Malaysia,  
in fulfilment of the requirement of PRT 4999 (Final Year Project)  
for the award of the degree of Bachelor of Agricultural Science

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This project report entitled “ Physio-Chemical and Mineralogy of Rhu Tapai Soil Series” is prepared by Nur Suhada Binti Suhaimin,matric no. 164843 and submitted to the Faculty of Agriculture,Universiti Putra Malaysia,in fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science.

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## ACKNOWLEDGEMENT

**In the name of Allah, the Most Gracious and the Most Merciful**

Thanks to Allah our mighty God for shedding on the good health, keeping my concentration and strength to complete this study, which hoped will contribute to the welfare of human kind.

My precious sincere gratitude and respect to my project supervisor, Assoc. Prof. Dr. Hamdan Jol from Department of Soil Science, for his invaluable pieces of advice, unwavering guidance, contribution patience and understanding during the period of my study.

Not to forget, I want to take this opportunity to express my appreciation to all staff members of the lab staff under Department of Soil Science , Universiti Putra Malaysia and Sir Azali, Madam Rosnah and Madam Azlina for their generous help, care, suggestion and facilities provided that had made this experiment successful without much problem.

Exceptional thankfulness to my family especially to my respected father Sir Suhaimin Bin Hamzah and to my dearest mother Madam Roslini Bt Abdullah for an endless love and trustworthy encouragement..

Lastly, sincere acknowledgement to all lecturers and friends for sharing ideas and problems. They have always taught me that anything is possible. I owe them more thanks than I appreciate all your sacrifices until I reach this state. Once again, I would like to thank all people who contribute in the making of this project

## TABLE OF CONTENT

CHAPTERS	PAGE
ACKNOWLEDGEMENTS	i
TABLE OF CONTENT	ii-iv
LIST OF FIGURES	v
LIST OF APPENDICES	vi
ABSTRACT	vii
ABSTRAK	viii
1. INTRODUCTION	
1.1 BACKGROUND	1-2
1.2 OBJECTIVES	3
2. LITERATURE REVIEWS	
2.1 BEACH RIDGES INTERSPERSED WITH SWALES (BRIS) SOILS	4-6
2.2 RHU TAPAI SERIES	7
2.2.1 PHYSICAL PROPERTIES OF BRIS SOIL ON RHU TAPAI SERIES	8-11
2.2.2 CHEMICAL PROPERTIES OF BRIS SOIL ON RHU TAPAI SERIES	12-13
2.2.3 MINERALOGY OF BRIS SOIL ON RHU TAPAI SERIES	13-14
2.2.4 LIGHT AND HEAVY MINERALS OF BRIS SOIL ON RHU TAPAI SERIES	15

2.3 X-RAY DIFFRACTION ANALYSIS	16
2.4 LAND USE OF BRIS SOIL ON RHU TAPAI SERIES	17
<b>3. METHODS AND MATERIALS</b>	
3.1 LOCATION	18
3.2 AREA OF STUDY	19
3.3 SOIL SAMPLING	20
3.4 SAMPLE PREPARATION	20
3.5 SOIL PHYSICAL PROPERTIES	
3.5.1 MECHANICAL ANALYSIS	21-22
3.5.2 DETERMINATION OF SOIL MOISTURE CONTENT	22
3.6 SOIL CHEMICAL PROPERTIES	
3.6.1 SOIL pH	23
3.6.2 ORGANIC CARBON DETERMINATION	23
3.6.3 CATION EXCHANGE CAPACITY	24
3.6.4 NITROGEN CONTENT DETERMINATION	24-25
3.6.5 AVAILABLE P DETERMINATION	25
3.6.6 EXCHANGEABLE BASES	26-27
3.7 X-RAY DIFFRACTION ANALYSIS	28
3.8 HEAVY AND LIGHT MINERAL ANALYSIS	29
<b>4. RESULTS AND DISCUSSION</b>	
4.1 SOIL MORPHOLOGY	30

4.1.1	DRAINAGE AND PERMEABILITY	30
4.1.2	USE AND VEGETATION	31
4.1.3	SUITABILITY FOR AGRICULTURE	31
4.2 PHYSICAL PROPERTIES OF RHU TAPAI SOIL SERIES		
4.2.1	SOIL TEXTURE	33-34
4.3 CHEMICAL PROPERTIES OF RHU TAPAI SOIL SERIES		
4.3.1	SOIL pH	35-36
4.3.2	TOTAL ORGANIC CARBON	37-38
4.3.3	TOTAL NITROGEN	39-40
4.3.4	CATION EXCHANGE CAPACITY	41-42
4.3.5	AVAILABLE PHOSPHORUS	43-44
4.3.6	EXCHANGEABLE BASES	45-46
4.3.7	LIGHT AND HEAVY MINERAL IN SOIL	47-48
4.4	MINERALOGY OF RHU TAPAI SOIL SERIES	49-53
5.	SUMMARY AND CONCLUSION	54-56
	REFERENCES	57-61
	APPENDICES	61-74



## LIST OF FIGURES

FIGURE		PAGE
3.1	Map of soils on beach ridges in Kelantan Plains	18
4.2.1	Distribution of Soil Texture in Rhu Tapai Soil Series	33
4.3.1	Soil pH in Rhu Tapai Soil Series	35
4.3.2	Total Organic Carbon in Rhu Tapai Soil Series	37
4.3.3	Nitrogen Content in Rhu Tapai Soil Series	39
4.3.4	Cation Exchange Capacity in Rhu Tapai Soil Series	41
4.3.5	Available Phosphorus in Rhu Tapai Soil Series	43
4.3.6	Exchangeable Bases in Rhu Tapai Soil Series	45
4.3.7	Light and Heavy Mineral in Rhu Tapai Soil Series	47
4.4.1	XRD Diffractogram of Rhu Tapai Soil Series at the 0-15cm Depth	50
4.4.2	XRD Diffractogram of Rhu Tapai Soil Series at the 15-30 cm Depth	51
4.4.3	XRD Diffractogram of Rhu Tapai Soil Series at the 30-45 cm Depth	52
4.4.4	XRD Diffractogram of Rhu Tapai Soil Series at the 45-60 cm Depth	53

## LIST OF APPENDIXES

APPENDIX		PAGE
1	Results of analysis of variance (ANOVA) for clay content	62
2	Results of analysis of variance (ANOVA) for silt content	63
3	Results of analysis of variance (ANOVA) for sand content	64
4	Results of analysis of variance (ANOVA) for pH of soil	65
5	Results of analysis of variance (ANOVA) for total carbon	66
6	Results of analysis of variance (ANOVA) for CEC	67
7	Results of analysis of variance (ANOVA) for Phosphorus	68
8	Results of analysis of variance (ANOVA) for Calcium	69
9	Results of analysis of variance (ANOVA) for Magnesium	70
10	Results of analysis of variance (ANOVA) for Sodium	71
11	Results of analysis of variance (ANOVA) for Potassium	72
12	Results of analysis of variance (ANOVA) for Heavy Mineral	73
13	Results of analysis of variance (ANOVA) for Light Mineral	74
14	XRD Analysis of Rhu Tapai Soil Series at the 0-15cm Depth	75
15	XRD Analysis of Rhu Tapai Soil Series at the 15-30 cm Depth	76
16	XRD Analysis of Rhu Tapai Soil Series at the 30-45 cm Depth	77
17	XRD Analysis of Rhu Tapai Soil Series at the 45-60 cm Depth	78

## ABSTRACT

Sandy beach ridges are dominated by soils having sand texture which are locally named BRIS (Beach Ridges Interspersed with Swales) soil. Coastal plains of Peninsular Malaysia had been inundated by seawater, coastal zone had undergone progradation that led to formation of wide beach ridges plains along state of Peninsular Malaysia. More than 90% of the composition of BRIS soil is sand and the soil is considered practically worthless for agricultural purposes. The study area was conducted along the Kelantan-Terengganu Coastal Plains, Peninsular Malaysia. Rhu Tapai series is one of the BRIS soil series. The objectives of this study are to determine mineralogy in Rhu Tapai series and to study the physical and chemical properties of these series. This series located on second ridge occurring some distance away from the first ridge. Soil undergo process podzolisation that result formation of spodic horizon at depth 0-50 cm. For Rhu Tapai series that was Spodosols, soil pits were dug and samples were taken according to its genetic horizons. The analysis for physical properties, chemical properties and mineral identification were carried out. Methodology to determine mineral in soil will be by X-ray diffraction (XRD) that is the single most important method for identifying the variety of mineral species present in soils. Soil physical and chemical data obtained were subjected to analysis of variance (ANOVA), and the means were separated using Least Significant Different (LSD) test. The result showed low clay and silt content, high porosity, low water retention and lack of soil nutrients such as nitrogen and phosphorous are all the characteristic of the soil which limit the growth on crops. The mineralogy found were dominantly by quartz and presence of kaolinite, hematite, feldspar, gibbsite and goethite in small amounts in soil. Soil productivity of this soil can be improve by apply plant waste as mulching and removing the eluvial horizon in order to reach the organic rich spodic layer in order to soil susceptible for cropping.

## ABSTRAK

Permatang pantai berpasir yang didominasi oleh tanah mempunyai tekstur pasir iaitu tanah Bris. Dataran pantai Semenanjung Malaysia telah dibanjiri oleh air laut, zon pantai menjalani proses degredasi yang membawa kepada pembentukan luas permatang pantai dataran di sepanjang negeri Semenanjung Malaysia. Lebih daripada 90% daripada komposisi tanah bris adalah pasir dan tanah yang dianggap tidak bernilai untuk tujuan pertanian. Kawasan kajian terletak dijalankan di sepanjang Pantai Kelantan-Terengganu, Semenanjung Malaysia. Rhu Tapai siri adalah salah satu siri tanah bris. Objektif kajian ini adalah untuk menentukan mineralogi dalam siri Rhu Tapai dan untuk mengkaji sifat-sifat fizikal dan kimia dalam siri ini. Siri ini terletak di rabung kedua berlaku agak jauh dari rabung pertama. Untuk Rhu Tapai siri yang Spodosols, lubang tanah itu digali dan sampel diambil mengikut ufuk genetiknya. Analisis untuk sifat-sifat fizikal, sifat-sifat kimia dan pengenalan mineral telah dijalankan. Kaedah untuk menentukan mineral di dalam tanah akan oleh sinar-X (XRD) adalah kaedah yang paling penting untuk mengenal pasti pelbagai spesies mineral yang hadir dalam tanah. Tanah fizikal dan kimia data yang diperolehi telah tertakluk kepada analisis varians (ANOVA), dan cara-cara dipisahkan menggunakan ujian LSD. Keputusan menunjukkan tanah liat dan kelodak rendah mengandungi, keliangan tinggi, pengekalan air yang rendah dan kekurangan nutrien tanah seperti nitrogen dan fosforus adalah semua ciri-ciri tanah yang menghadkan pertumbuhan pada tanaman. Mineralogi yang ditemui adalah dominan oleh kuarza dan kaolinit kehadiran, hematit, feldspar, gipsit dan goethite dalam jumlah yang kecil di dalam tanah. Produktiviti tanah ini boleh meningkatkan dengan mengaplikasikan sisa tanaman sebagai sungkupan dan menghapuskan lapisan eluvial untuk sampai ke lapisan spodic kaya organik untuk tanah terdedah untuk tanaman.

## CHAPTER 1

### INTRODUCTION

BRIS soils are made of marine sand deposits. BRIS is actually an acronym for Beach Ridges Interspersed with Swales. Malaysia has a vast area of sandy fallow beach ridges interspersed swales (BRIS) soil. In Peninsular Malaysia, BRIS soils are found along the east coast states of Peninsular Malaysia, from Kelantan to Mersing in Johor. Based on the USDA Soil Taxonomy (Soil Survey Staff, 2010), BRIS soils are classified into 2 orders, Entisols and Spodosols. Entisols are soils which are characterized by their young nature. This means the soil have an A/C profile, whereas the B horizon has not formed yet. Spodosols are soils that have undergone podzolization process to form the spodic horizon. There are already 24 soil series recognized as BRIS soils in Peninsular Malaysia (Department of Agriculture, 2003).

BRIS soil originates from sediment sand from the sea that accumulated from the top of layers of steep cliffs by the sea during the monsoon seasons and has a coarse sand component. The occurrence of sandy beach ridges along the coastal plains in Peninsular Malaysia (Haile, 1970; Tjia, 1970). It has been confirmed by the presence of notches-like features above the mean high water tide on cliffs at Langkawi Islands, Malaysia as evidence for the sea level rise during the Holocene. (Hodgkin, 1970). Carbon dating of the oldest sediment in Sunda Shelf gave its age of about 6260 years (Haile, 1970).

Presence of pyrite-deposits in peaty acid sulfate soils at Jelawat Rusa, Kelantan shown that the area was once under the sea because this type of pyrite can only formed in sediments containing Fe inundated by seawater (Totok Suswanto et al., 2007). Formation of wide beach ridges plains along the coast in the east coast states of Peninsular Malaysia led by high sea level where a large area in the coastal plains of Peninsular Malaysia had been inundated by seawater had undergone progradation (Tjia et al., 1977).

BRIS soil is distributed generously along the east coast of Peninsular Malaysia, from Kelantan (17,806.2 hectares), Terengganu (67,582.61 hectares), Pahang (36,017.17 hectares) right down along the coast to the west coast of Johor. Right now, the survey conducted by Soil Survey Section from Department of Agriculture is only on semi-detailed level. Based on the semi-detailed soil map of the area, we can perform detailed soil survey in order to get more accurate information of BRIS soils in that particular area.

More than 90% of the composition of BRIS soil is sand and the soil is considered practically worthless for agricultural purposes. These Beach Ridges Interspersed with Swales (BRIS) had found seven types of BRIS soil based on depth, drainage and soil is a problematic soil in Malaysia. The classification sandy, weakly structured, nutrient deficient, low water retention capacity, limited ability to divide BRIS soil into two orders, namely Entisol and support plant growth and having a relatively high soil Spodosol. Entisol is a young soil without a podogenetic temperature.

## **1.2 Objectives**

This study was mainly focused on Beach Ridges Interspersed with Swales (BRIS) on Rhu Tapai series. The objectives for this study were :

- i. To study the physical and chemical properties of Rhu Tapai soil series
- ii. To identify the mineralogical content of Rhu Tapai soil series
- iii. To determine heavy mineral and light mineral of Rhu Tapai soil series

## **1.3 Research Justification**

Malaysia is facing the problem of insufficient land for agriculture sector. Therefore, we must use all available land resources wisely including marginally suitable soils such as BRIS soils. By studying the distribution and characteristics of BRIS soils, we can suggest the suitable crops which can tolerate the soil condition and the proper soil management require.

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