



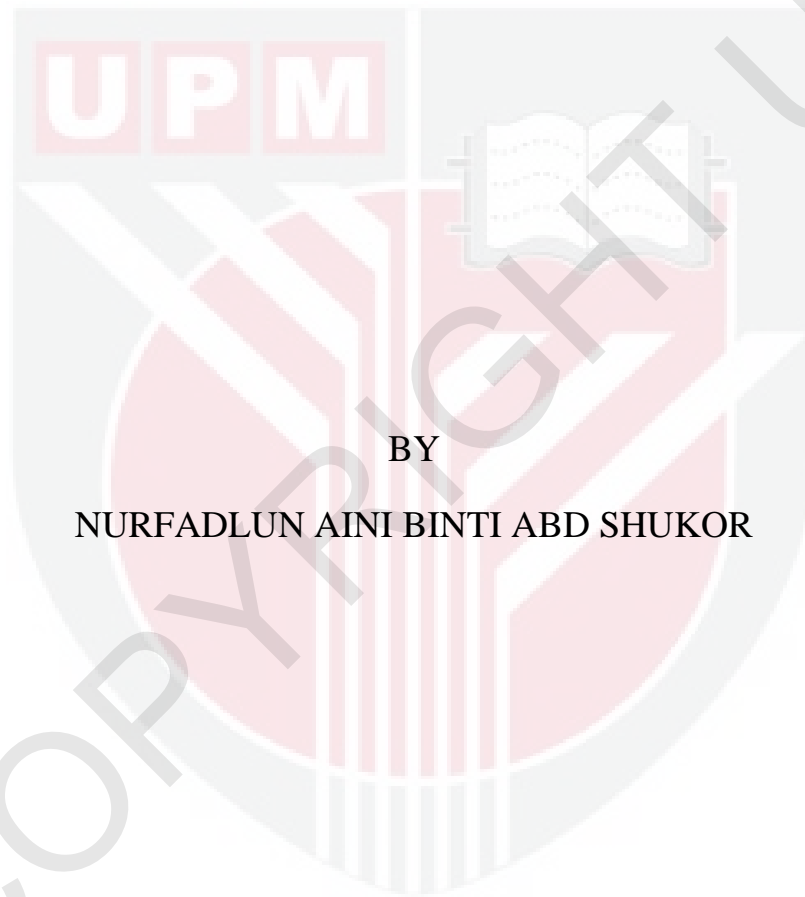
**UNIVERSITI PUTRA MALAYSIA**

**THE PHYSICAL, CHEMICAL AND MINERALOGICAL  
CHARACTERISTICS OF JAMBU SOIL SERIES**

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THE PHYSICAL, CHEMICAL AND MINERALOGICAL CHARACTERISTICS  
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OF JAMBU SOIL SERIES

BY

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A project report submitted to Faculty of Agriculture,  
University Putra Malaysia,

In fulfillment of the requirement of PRT 4999 (Final Year Project)  
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Faculty of Agriculture  
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## CERTIFICATION FORM

This project report entitled 'The Physical, Chemical and Mineralogical Characteristics Of Jambu Soil Series' is prepared by Nurfadlun Aini Binti Abd Shukor; matric number 164653 and submitted to the Faculty of Agriculture, University Putra Malaysia in the fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the first degree in Bachelor of Agricultural Science.

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## ABSTRACT

BRIS soil originates from sand from the sea that accumulated from the erosion of layers of steep cliffs by the sea during monsoon seasons and has coarse sand component. This study focused on the mineralogical content, physical and chemical properties also light and heavy mineral of Jambu Series in BRIS soil. The study shows information about the potential of the soil fertility. BRIS soil has a reputation of being a problematic soil, which are extremely leaching, low cation capacity (CEC) and low exchangeable bases that does not support plant growth. The objectives of the study were to determine the physical, chemical and mineralogical characteristics of the Jambu Soil Series. Data collected were subjected to the Analysis of Variance (ANOVA) and Least Significant Difference (LSD) test. Result of the physical analysis of the soil was recorded with low CEC and low exchangeable capacity. The texture was dominated by sand content (exceeding 90%). Based on the data that was analyzed, light mineral showed a high percentage (> 90%) compared to heavy minerals. The mineralogical data obtained from the XRD analysis shows the dominance of quartz. BRIS soil was characterized for being physically, chemically and mineralogically unfertile for agriculture.

## ABSTRAK

Tanah BRIS berasal daripada pasir dari laut yang terkumpul melalui hakisan terhadap lapisan tebing curam di tepi laut pada musim tengkujuh dan mempunyai komponen pasir kasar. Kajian ini memberi tumpuan kepada kandungan mineralogi, sifat-sifat fizikal dan kimia serta mineral ringan dan mineral berat Siri Jambu di tanah BRIS. Kajian ini menunjukkan maklumat mengenai potensi kesuburan tanah tersebut. Tanah BRIS mempunyai reputasi sebagai tanah bermasalah, mempunyai tahap larut lesap yang tinggi, mempunyai kapasiti kation (CEC) yang rendah dan asas pertukaran rendah yang tidak menyokong pertumbuhan tumbuhan. Objektif kajian ini adalah untuk menentukan fizikal, kimia dan ciri-ciri mineralogi daripada Siri Jambu. Data yang dikumpul adalah berdasarkan kepada Analisis Varians (ANOVA) dan ujian LSD. Keputusan analisis fizikal tanah telah direkodkan dengan tahap kandungan CEC dan pertukaran asas yang rendah. Tekstur tanah BRIS mempunyai kandungan pasir yang banyak (melebihi 90%). Berdasarkan data yang telah dianalisis, mineral ringan menunjukkan peratusan yang tinggi (> 90%) berbanding dengan mineral berat. Data mineralogi diperolehi daripada analisis XRD menunjukkan penguasaan kuarza. Tanah BRIS telah dicirikan mengikut sifat fizikal, kimia dan mineralogi sebagai tanah yang kurang subur untuk aktiviti pertanian.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

The shoreline of Peninsular Malaysia is found to be prograding towards the sea due to eustatic changes in the sea level (Nossin 1964; Hutchison 2009). Naturally, this process could have been repeated two or three times in the past 6 000 years. As a result, two or three sandy beach ridges (one ridge represents one level of drop in sea level) are found running parallel to the present shoreline. The formation of the sandy beach ridges due to eustatic sea effect has been well described by Tanner (1995) and Roslan *et al.*, (2010).

The undulating processes which made up the ridges and swales, which is locally known as BRIS as the acronym for beach ridges interspersed with swales (Roslan *et al.*, 2010). The swales are found in between the ridges; they sit in the depression areas, and are therefore inundated by water for most part of the year. It is known that the soils on the beach ridges are sandy (with > 95% sand) up to 150 cm of the soil profile. Coarse sand fraction is common in the topsoil; however, the subsoil is usually dominated by very fine sand (Roslan *et al.*, 2010).

At present, about 154,000 ha of BRIS soils are available in Malaysia, found mainly in the east coast states of Peninsular Malaysia, especially in the Kelantan – Terengganu plains. BRIS soils in these plains consists of many soils series of which the most common are the Baging, Rhu Tapai, Rudua and Jambu Series; the last three are Spodosols. These soil series are defined by their profile morphology and chemical properties.

The Rhu Tapai, Rudua and Jambu Series have a spodic layer at depths of 0 – 50, 50 – 100, and 100 – 150 cm, respectively (Paramanathan 1987; Roslan *et al.*, 2010) and so they fit into the definition of Spodosols (Soil Survey Staff 2010). The BRIS soils in Malaysia are not well utilized for crop production due to their inherent poor fertility. The only feasible and profitable crop grown on the soils over the years is tobacco (Ogbonnaya *et al.*, 1997). The major limitations were found to be excessive drainage, nutrient imbalance, and sandy texture. Therefore, management practices recommended to improve the soils are apply mulching into the soil with different types of organic materials to help in retain water and plant nutrients, also by irrigating the soils during dry period (Roslan *et al.*, 2010).



## 1.2 Objectives

This study focused on the physical, chemical and mineralogical characteristics of Jambu Soil Series. The objectives of this study were:

- I. To determine the physical and chemical properties of Jambu Soil Series.
- II. To determine the mineralogical characteristics of Jambu Soil Series.

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