
UNIVERSITI PUTRA MALAYSIA

# POTASSIUM FORMS IN BRIS SOILS (JAMBU SOIL SERIES)

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# POTASSIUM FORMS IN BRIS SOILS (JAMBU SOIL SERIES)

BY

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

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This report entitled Potassium Forms in Bris Soils (Jambu Soil Series) is prepared by Mohd Zulhilmi Bin Mohammad Zakaria and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science.

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## ABSTRACT

The BRIS soils are soils having nutrient deficiency, weakly structured, low water retention capacity, too sandy and limited ability to support plant growth and have a relatively high soil temperature. Due to their sandy nature, leaching process occur easily, leading to the low interact of K in soil matrix. The objectives of the study were to determine the different form of K which include the water soluble K, exchangeable K and, and total K, and also to determine the quantity-intensity relationship of potassium. All three forms of K showed that the status of K in sandy soils vary with different depth. The surface soil gave higher results compared to the lower horizons, and this is attributed to the high amount of organic matter content. The quantity-intensity (Q/I) relationship of K data also showed that surface soils gave higher result in their supply power of K. The overall results show slight irregularity among horizons and this is due to the fact that BRIS soils are formed through series of marine sand deposition thousands of years ago. The surface soil of 0-15 cm depth exhibited the higher result in all K forms and K supplying power but is still deficient in K and is insufficient for plant growth.

## ABSTRAK

Unsur Kalium (K) yang terdapat pada tanah berpasir adalah rendah disebabkan oleh pengurangan nutrient, kelemahan pada struktur tanah, rendah kadar keupayaan air, terlalu berpasir, terhad dalam membantu pertumbuhan tanaman dan mempunyai suhu tanah yang tinggi. Kekurangan unsur Kalium (K) akan meningkatkan kadar keupayaan larut lesap terjadi kerana apabila saiz partikal pada tanah pasir adalah besar dan keporosan yang tinggi boleh menyebabkan interaksi K di dalam tanah menjadi rendah. Objektif kajian ini adalah untuk mengenal pasti perbezaan pembentukan K melalui tiga jenis eksperimen yang meliputi  larut lesap K dalam air, pertukaran K dan jumlah K dalam tanah dan hubungan kuantiti/keamatan Kalium . Kesemua empat eksperimen memberikan hasil keputusan yang baik yang menunjukkan kadar unsur Kalium (K) mengikut kedalaman yang berbeza dari permukaan yang paling atas sehingga paling bawah. Kedalaman yang paling hampir dengan permukaan atas memberikan keputusan yang paling baik iaitu dengan kedalaman 0 – 15 cm dari permukaan atas. Ini menunjukkan permukaan paling atas kaya dengan bahan organik. Hubungan kuantiti/keamatan juga menunujukkan kedalaman 0 – 15 cm memberikan keputusan yang paling baik untuk meningkatkan kedapatan K. Sebagai kesimpulan, kedalaman 0 – 15 cm sememangnya menunjukkan nilai yang tinggi dalam eksperimen dan boleh menyumbang kepada aktiviti pertanian.

# CHAPTER 1

# INTRODUCTION

Nutrient are important to grow healthy crop to obtain high yield. Basically, most plant grow by absorbing nutrients from the soil. It happen when their ability depends on the nature of the soil. As we know, soil contains the three types of combination sand like clay, silt and organic matter. The soil texture and the acidity determine the extent to which nutrients are available to plants.

Soil texture affects how well nutrients and water are retained in the soil. Clays and organic soils hold nutrients and water more than sandy soils. Nutrients can loss when it often follow the water drains which carries nutrient along with it. It is called leaching. The leaching process will affect the low available nutrients for plant use.

Sandy soil is soil in which sand predominates classified as a sand-textured soil or simply a sandy soil. Sandy soils are coarse in texture. Some plants can grow wisely in sandy soils while others cannot tolerate it. Sandy soil has a low moisture-holding capacity compared to other soil types and therefore must be watered more frequently. It also has low nutrient-holding capacity than other soil types and must be fertilized more often. Sandy soils can be enormously improved by the generous addition of organic matter.

BRIS soil is a problematical soil in Malaysia. It has problem in many aspects such as nutrient deficient, weakly structured, low water retention capacity, too sandy and limited ability to support plant growth and have a relatively high soil temperature. The origin of BRIS soil is sediment or sand from the sea that accumulated from the erosion of layers of steep cliffs by the sea during the monsoon seasons has a coarse sand component.

BRIS soil has pH less than 5, indicating that this soil is acidic. Then, BRIS soil show a large range of porosities and consequently bulk density. Porosity is about 33% until 47% are commonly recorded. BRIS soil is distributed generously along the east coast of Peninsular Malaysia, from Kelantan (17,806.2 hectares), Terengganu (67,582.61) and Pahang (36,017.17) right down along the coast to the west coast of Johor (Ekhwan et al, 2009).

Potassium is one of the nutrient required by plants. The knowledge of their availability and forms are crucial in managing sufficient K in the soil

The Q/I approach can help the understanding, characterizing and evaluating potassium status of soil and also used for K fertilizer recommendations. The intensity factor is probably related to the concentration change of potassium nutrient in the soil solution activities of K, Ca and Mg while the quantity factor is refer to the potassium adsorption potassium which is gain or loss in soil solution from the soil.

Hence, the main objectives in this research were:

1) To determine the different forms of K (water soluble K, exchangeable K and total K) in BRIS soil
2) To study the quantity relationship of potassium in BRIS soils

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