

AMELIORATION OF SOIL ACIDITY
FOR *Ananas comosus* (L.) Merr. CULTIVATION
ON BRIS SOIL, RHODUA SERIES,
TERENGGANU

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MASTER OF SCIENCE
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MASITA BTE MOHAMMAD

**Thesis Submitted in Fulfillment of the Requirement for the Degree of Master of
Science in the Faculty of Agrotechnology and Food Science
Kolej Universiti Sains dan Teknologi Malaysia**

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DEDICATION

This dissertation is dedicated to:

My beloved parents, Mr. Mohammad bin Hj. Seman and Mrs. Miskiah bte Abu Naim. My dear brother and sister, Nur Isman, Nur Shadilla, Nur Aziah, Ahmad Nazir, Zurina and Nuraihanah. My best friend; Nur Suraya Abdullah, Chalabi Aicha, Nurul Huda Abdul Kadir and Wan Nadilah Adibah Wan Ahmad.

Without their continual love and support, the completion of this dissertation would not have been possible.

Abstract of thesis presented to the Senate of Kolej Universiti Sains dan Teknologi
Malaysia in fulfillment of the requirement for the degree of Master of Science

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CULTIVATION ON BRIS SOIL, RHUDUA SERIES, TERENGGANU**

MASITA BTE MOHAMMAD

NOVEMBER 2006

Chairperson : Adzemi Arshad, Ph.D.
Member : Associate Professor Awang Soh Mamat, Ph.D
Nor Antonina Abdullah, Ph.D
Faculty : Agrotechnology and Food Science

A study on the amelioration of soil acidity for *Ananas comosus* (L.) Merr. cultivated on bris soil was conducted in pot at Plant Shade House, Department of Biological Science, KUSTEM and also in the field at Kg. Telaga Papan, Setiu, Terengganu using Rhudua series soil. These experiments were arranged in Randomized Complete Block Design (RCBD) with six treatments and four replications. This involved application of Ground Magnesium Limestone (GML) to neutralize the acidity of sandy soil. GML was applied in four equal split doses at six different rates of 0, 0.5, 2, 4, 8 and 10 Mg ha⁻¹. By pot experiment, the results showed positive effect on soil pH (H₂O); P, Ca and Mg concentrations in the soil; Ca, Mg and Cu concentration in the plants; plant height and number of leaf; dry weight, length, width and area of D-leaf; plant height and dry weight after harvest; weight, length and diameter of fruit; crown weight, fruit crown ratio, pith diameter and brix content. In contrast, there is negative effect on K, Cu, exchangeable Al and Al saturation in soil; and N, P, K, Mn and Fe concentration in plant. Zn concentration in plant; organic carbon, N, Zn, Fe, Mn, CEC and ECEC in soil; and other parameters such as crown length, pith length and fruit acidity do not show any

significant differences. Besides that, field experiment showed the increases on Ca, Mg, P, N, Cu and Mn in plant; dry weight, length, width and area of D leaf; weight, length and diameter of fruit; crown weight and fruit crown ratio. However, there is no effect on the concentration of K, Zn and Fe in plant; crown length and brix content. It also showed decreased on fruit acidity. By using the rapid method for correlation of soil test analysis with plant response data of Cate and Nelson (1965), to achieved 90% dry matter and fruit yield the liming rate should be increased from 1.6 Mgha^{-1} GML and 2.4 Mgha^{-1} GML with sufficient all other essential nutrient. Relationship between yield and soil chemical properties such as pH (H_2O), exchangeable Al and Al saturation are highly correlated whereas Zn, Cu, K, Ca, Mg and P moderately correlated. Mg and Mn in plant have correlations with fruit and dry matter yield while the rest of the nutrient concentrations are not correlated with yield.

Abstrak tesis yang dikemukakan kepada Senat Kolej Universiti Sains dan Teknologi Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

MEMPERBAIKI KEASIDAN TANAH UNTUK PENANAMAN *Ananas comosus* (L.) Merr. DI ATAS TANAH BRIS, RHUDUA SIRI, TERENGGANU

MASITA BTE MOHAMMAD

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Kajian tentang baik pulih tanah bagi penanaman *Ananas comosus* (L.) Merr. telah dijalankan dengan menggunakan tanah siri Rhudua di dalam pot di Rumah Teduhan Jabatan Sains Biologi, KUSTEM dan lapangan di Kg. Telaga Papan, Setiu, Terengganu. Eksperimen ini telah dilakukan menggunakan 'randomized complete block design' (RCBD) dengan enam rawatan dan empat replikasi. Ia melibatkan penggunaan Ground Magnesium Limestone (GML) untuk meneutralkan keasidan tanah pasir. GML diberikan pada empat dos berasingan mengikut enam kadar rawatan, iaitu 0, 0.5, 2, 4, 8 and 10 Mgha⁻¹. Pot eksperimen menunjukkan kesan positif pada pH (H₂O), kepekatan P, Ca dan Mg dalam tanah; kepekatan Ca, Mg dan Cu dalam tumbuhan; tinggi pokok dan bilangan daun; berat kering, panjang, lebar dan luas daun D; tinggi dan berat kering pokok selepas tuai; berat, panjang dan diameter buah; berat jambul, nisbah jambul-buah, diameter empulur dan kandungan brix. Sebaliknya, K, Cu, Al dan ketepuan Al dalam tanah; dan kepekatan N, P, K, Fe dan Mn di dalam tumbuhan menunjukkan kesan yang negatif. Kepekatan Zn dalam tumbuhan, organic karbon, N, Zn, Fe, Mn, CEC and ECEC dalam tanah; dan

parameter lain seperti panjang jambul, panjang empulur dan keasidan buah tidak memberi perbezaan beerti. Selain itu, eksperimen di lapangan menunjukkan peningkatan kandungan Ca, Mg, P, N, Cu dan Mn dalam tumbuhan; berat kering, panjang, lebar dan luas daun-D; berat, panjang dan diameter buah; berat jambul dan nisbah jambul-buah. Walaubagaimanapun, tiada kesan terhadap kepekatan K, Zn dan Fe dalam tumbuhan; panjang jambul dan kandungan brix. Ia juga menunjukkan penurunan kadar keasidan buah. Kaedah pantas (Cate and Nelson, 1965) telah digunakan bagi menentukan korelasi antara analisis tanah dengan data tindak balas tumbuhan untuk mencapai 90% hasil berat kering dan 90% hasil buah. Ia menunjukkan kadar pengapuran mestilah melebihi 1.6 Mgha^{-1} GML dan 2.4 Mgha^{-1} GML dengan nutrien yang mencukupi. Korelasi yang tinggi dapat dilihat di antara hasil dan sifat kimia tanah seperti pH (H_2O), kadar pertukaran Al dan ketepuan Al. Manakala, Zn, Cu, K, Ca, Mg dan P mempunyai korelasi yang sederhana. Kepekatan nutrien seperti Mg dan Mn dalam tumbuhan mempunyai korelasi yang tinggi dengan hasil buah dan berat kering manakala tiada korelasi pada nutrien lain.