UNIVERSITI PUTRA MALAYSIA

INFLUENCE OF DIFFERENT TYPES OF FERTILIZERS ON GROWTH AND PHYSIOLOGY CHANGES OF MD2 PINEAPPLE

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FP 2015 72

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SERDANG, SELANGOR

2014/2015

INFLUENCE OF DIFFERENT TYPES OF FERTILIZERS ON GROWTH AND PHYSIOLOGY CHANGES OF MD2 PINEAPPLE

By

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A project report submitted to the Faculty of Agriculture,

University Putra Malaysia

In fulfillment of the requirement of PRT 4999 (Final Year Project)

For the award of degree of

Bachelor of Horticultural Science

2014/2015

ENDORSEMENT

This project report entitled **"Influence of Different Types of Fertilizers on Growth and Physiology Changes of MD2 Pineapple"**, is prepared by **Mohd Nor Ghani bin Abu Samah** and submitted to the Faculty of Agriculture in fulfillment of the requirement of Final Year Project (PRT 4999) for the award of the degree of **Bachelor of Horticultural Science**.

Submitted by, Student's signature

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Approved by,

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ACKNOWLEDGEMENT

In the name of ALLAH, the Most Gracious and the Most Merciful, praised be to ALLAH the Almighty for the blessing which enable me to complete my final year project successfully on the right period after a big effort physically and mentally given to this project with the help of all these peoples.

My deepest gratitude firstly goes to my supervisor, Dr. Siti Zaharah binti Sakimin from Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia for her supervision and constructive suggestion throughout the conduct of the project. Thanks a lot for being understanding and also for the entire valuable guidance and knowledge. Your kindness and guidance will always be remembered.

Special thanks to the laboratory staff in Department of Crop Science, Mr. Mazlan and Tuan Haji Khoiri, and staff of Field 15, Madam Wana because of their generous care, guidance, and helps in conducting the experiment all this time given. My deepest appreciation goes to my beloved family for their endless encouragement, understanding, and motivation throughout the completion of my final year project.

Endless thanks to my friends, especially Miss Zuziyah, Miss Fatin, Miss Halimah, and Miss Suraya for their kindness, understanding, and being supportive in completing this project. In addition to all my colleagues and friends, I would like to express my thanks to all of you.

Last but not least, thanks to all who made this project possible whether directly or indirectly. May Allah reciprocates all your kindness and helps. Thanks a lot. Wassalam.

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LIST OF SYMBOLS AND ABBREVIATIONS

°C	Degree Celcius
%	Percent
ANOVA	Analysis of Variance
cm	Centimeter
df	Degree of Freedom
et. al	And others
g	Gram
ha	Hectare(s)
kg	Kilograms
LSD	Least Significant Differences
mL	Mililitre(s)
P	Probability
pH	Symbol of denoting hydrogen ion in a solution
CRD	Completely Randomized Design
RM	Ringgit Malaysia
SAS	Statistical Analysis System
S.E	Standard error
WAT	Weeks after treatment
MAT	Months after treatment
TF	Type of fertilizer

ABSTRACT

This study prevails the influence of different types of fertilizers used in pineapple plantations in Malaysia. The studies also indicated to recommend the best performance fertilizer for pineapple crop to be used. In this study, pineapple variety chosen was MD2 from Cayenne group that have high production yield and broader aspects in terms of quality and consumer preferences. Treatments were arranged in complete block design with three replications and carried out in the open environment.

This study compared the performance of different fertilizers and fertilizers combination which is NPK, Kamila, and SRI fertilizer used solely or combined in several aspects which is growth performance in height of crop, length of leaf, and width of crop, relative chlorophyll content, nutrient analysis in leaves and soil, and pH. Besides that, these were to determine which type of fertilizers used solely or combined were the best in giving positive impact to the crop performance. NPK fertilizer was a fast release fertilizer while Kamila was a controlled-release fertilizer. These two fertilizers contributed major nutrients supply to the crop which was nitrogen, phosphorus, and potassium. For SRI fertilizer, it was a foliar fertilizer functioned to improve nutrient uptake and intensified the roots. Data were analyzed by using SAS version 9.1. As controlled release fertilizer characteristic of releasing the nutrients slowly, it gave stability to the nutrient supply to the treated plants throughout the experiment compared to other treatment. Additional of chemical fertilizer (Kamila) with SRI formulation significantly shows positive improvement in the plant performance compared to the plants without SRI formulation and is recommended for the pineapple planting as it performed better on parameters measured. However, many aspects need to be considered as the experiment was conducted in open condition.

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji pengaruh jenis baja kepada tanaman nanas di Malaysia. Disamping itu, kajian ini juga bertujuan untuk menyarankan penggunaan jenis baja yang terbaik untuk tanaman nanas. Dalam kajian ini, variti nanas yang digunakan adalah MD2 dari kumpulan *Cayenne* yang mempunyai penghasilan buah yang tinggi dan mempunyai aspek yang luas dalam kualiti buah dan juga pilihan pengguna. Rawatan disusun berdasarkan reka bentuk blok lengkap dengan tiga replikasi dan dijalankan dalam persekitaran terbuka.

Kajian ini membandingkan prestasi baja yang berlainan jenis dan gabungan baja iaitu NPK, Kamila, dan SRI dalam beberapa aspek iaitu prestasi tumbesaran, kandungan klorofil relatif, analisis nutrient dalam daun dan tanah, dan pH. Ini bertujuan untuk mengetahui sama ada baja yang berlainan jenis akan memberi kesan terhadap tanaman nanas berdasarkan aspek-aspek diatas. Selain itu, kajian ini juga bertujuan untuk mengetahui jenis baja atau kombinasi baja yang manakah yang terbaik dalam memberi impak positif kepada prestasi tanaman. Baja NPK ialah baja pelepasan cepat manakala Kamila ialah baja pelepasan terkawal. Kedua-dua baja ini menyumbang kepada bekalan nutrien asas iaitu nitrogen, fosforus, dan kalium. Bagi baja SRI, ia merupakan baja jenis foliar yang berfungsi untuk memperbaiki ambilan nutrien dan mengintensifkan pertumbuhan akar. Analisa kajian ini dijalankan dengan menggunakan aplikasi SAS versi 9.1. Dengan sifat baja pelepasan terkawal, ia memberikan kestabilan untuk pembekalan nutrien kepada pokok sepanjang uji kaji berbanding rawatan yang lain. Tambahan baja kimia (Kamila) bersama formulasi SRI menunjukkan dengan ketara peningkatan yang positif kepada prestasi pokok berbanding dengan pokok tanpa rawatan formulasi SRI dan ia disyorkan untuk penanaman nanas setelah menunjukkan prestasi yang baik atas parameter-

parameter yang ditentukan. Bagaimanapun, banyak aspek lain perlu diberi perhatian kerana kajian ini dilakukan di kawasan terbuka.

CHAPTER 1

INTRODUCTION

Pineapples fruit (*Ananas comosus* [L.] Merr.) is a member of the Bromeliaceae family, indigenous to Central and South America and originated from the area between Paraguay and Southern Brazil. It is growing in several tropical countries such as Hawaii, Indonesia, Malaysia, Philippines, and Thailand, and is one of the top fruits in demand planted in Malaysia as the 5 major pineapple producing countries are Brazil, Thailand, Filipina, Costa Rica, and Indonesia took the lead since 2010. It is very important to be commercialized as the environmental conditions are favorable for this plant.

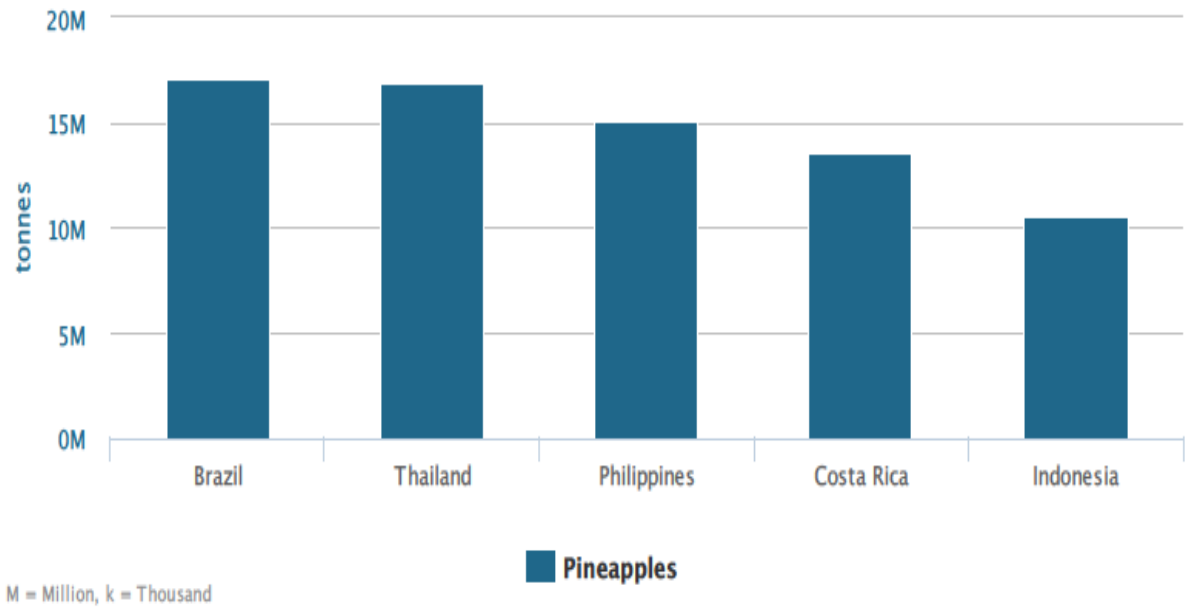

Figure 1: Five major pineapple producing countries in the world, 2010-2013. Source: The Food and Agriculture Organization Corporate Statistical Database (FAOSTAT)

Pineapple fruit is an herbaceous perennial tropical fruit that favors tropical climate with edible multiple fruit such as berries and it has the most economically important value especially to the tropical region countries. Normally, pineapple height can reach up to 1.0 to 1.5 meters, short, tough stem, and waxy leaves. Mostly, pineapples are cultivated from its crown cutting of the fruit and it is the easiest way to propagate it. Although pineapple is a fruit tree that is considered easy to be propagated, however fruit development needs a long time before it can be harvested.

Recently in Malaysia, pineapples have been planted commercially for its fresh and canned fruits, especially in Johor. Consumers are realizing pineapples fruit is rich with vitamin content. It also is being eaten as dessert in many occasions, especially in a hotel or mixed it in a fruit salad. It produces nice blend of flavor and aroma when mixed with other fruits and vegetables. This made the pineapple fruit became a popular exotic fruit.

The biggest groups planted in Malaysia in Malaysia are Cayenne, Spanish, and Queen. These varieties are for fresh uses and purposely for local market. Pineapple is exported to neighbor countries including Singapore and Brunei. The pineapple industry has given a large profit to Malaysia especially when Malaysian Pineapple Industry Board (MPIB) has formed The Pineapple Cultivation Technology Centre to improve the pineapple industry in Malaysia especially to the small farmers.

Pineapple has been recognized as the most economically important crop in tropical countries, however our major concern is on the excessive used of chemical fertilizers. This situation has raised the environmental problems issues in the producing countries. It's getting worst with the increasing of the fertilizer price from year to year. For example in year 2003, the price of

NPK Green fertilizer (15-15-15) was about RM 1300 tonne^{-1} (FAOSTAT, 2003), but it increased to about RM 1900 tonne^{-1} in recent years (Syed Omar, 2009). Increase in chemical fertilizer price has become a dilemma for farmers in the world including in Malaysia. As chemical fertilizer price increased, we have to adjust the suitability of the crops to the organic fertilizer made from natural resources to maintain the profitability from pineapple industry.

Commonly, urban community demands safer foods supply from any of chemical used. As pineapple crops used an abundance of chemical fertilizers to increase its growth rate and fruit quality, this issue must be handled strictly so then farmers will not use excessive chemical rates on this crop. As reported by Obiefuna (1987), the best NPK fertilizer rate for pineapple plants in tropical ferrallitic soil was 200 kg ha^{-1} year^{-1} of N, 50 kg ha^{-1} year^{-1} of P, and 200 kg ha^{-1} year^{-1} of K to produce the highest and best quality of fruits. However, lack of study in our tropical pineapple fruit makes us cannot compete with other producing countries in terms of information and technology development. The finding in the growth and physiology changes of MD2 varieties on different type of fertilizers application may provide additional information into the technology development in Malaysian pineapple industry.

1.1 Objectives

The aims of this study were:

1. To identify the influence of different types of fertilizers on growth and physiological changes of MD2 pineapple.
2. To recommend the types of fertilizers that show good performance to MD2 pineapple crops.

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