UNIVERSITI PUTRA MALAYSIA

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FP 2015 87

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BY

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

Faculty of Agriculture

Universiti Putra Malaysia

2014/2015

CERTIFICATION

This project report entitled "Rubber (*Hevea brasiliensis*) Seedlings Growth Performance in Response to Various Rates of N and P Fertilizers" is prepared by Nur Aqilah Binti Saufe 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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ACKNOWLEDGEMENTS

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. Zulkefly Bin Sulaiman from Department of Crop 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 Ladang 10, Faculty of Agriculture and staffs from Department of Crop Science, Encik Mohd. Khoiri Bin Kandar and Encik Baharin Bin Mohd Amin for their generous help, suggestion and facilities provided that had made this experiment successful without much problem.

Exceptional thankfulness to my family especially to my respected father Encik Saufe Bin Ab. Kadir and to my dearest mother Puan Azizah Binti Che Ya 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 can ever put into words.

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ABSTRACT

The competitiveness with the other rubber producer has led the Rubber National Key Economic Area (NKEA) to drive the sectors' growth with acceleration of the replanting and new planting of rubber. Replanting has become critical as there are already 40,000 ha of old rubber trees that will be replanted continuously while new planting of 30,000 ha per year will be conducted within 5 years. Hence, adequate nutrition for rubber seedlings is considerably necessary to enhance growth and development of the rubber seedlings due to increasing demand for replanting purposes.

Therefore, this experiment was carried out to evaluate the rubber seedling growth performance in response to various rates of nitrogen (N) and phosphorus (P) fertilizers. The experimental design in this study was Randomised Complete Block Design (RCBD) which involved 9 treatments; T1(5.2 g urea/plant + 11.2 g CIRP/plant), T2 (5.2 g urea/plant + 16.2 g CIRP/plant), T3 (5.2 g urea/plant + 21.2 g CIRP/plant), T4 (10.2 g urea/plant + 11.2 g CIRP/plant), T5 (10.2 g urea/plant + 16.2 g CIRP/plant), T6 (10.2 g urea/plant + 21.2 g CIRP/plant), T7 (15.2 g urea/plant + 11.2 g CIRP/plant), T8 (15.2 g urea/plant + 16.2 g CIRP/plant) and T9 (15.2 g urea/plant + 21.2 g CIRP/plant) with 3 replications.

The result indicates that there was significant difference for the application of various rates of N and P fertilizers on the height increment, girth increment, chlorophyll content, above ground dry weight (leaf and stem), below ground dry weight (root). Nevertheless, there were no significant differences on total dry weight

of rubber seedlings. Besides that, this experiment showed that the application of T2 (2.0 g urea/plant and 7.5 g CIRP/plant) gave much higher value of nutrient content for nitrogen, phosphorus, potassium, calcium and magnesium in the leaf tissues than the control T1 (2.0 g urea/plant and 2.5 g CIRP/plant). This may indicate inadequate application rates of phosphorus at the control treatment (T1).

The expected result from this study will be useful for rubber plantation industry especially in the nursery and to provide new information about fertilizer requirement. Treatment T2 with application of fertilizer rate 2.0 g urea/plant and 7.5 g CIRP/plant gave the best result in all parameters taken in this study. So, the rate 2.0 g urea/plant and 7.5 g CIRP/plant is recommended to the rubber seedlings in the nursery.

ABSTRAK

Persaingan di antara pengeluar-pengeluar utama getah telah menggerakkan Bidang Ekonomi Utama Negara (NKEA) untuk memacu pertumbuhan sektor dengan meningkatkan penanaman semula dan penanaman baru tanaman getah. Penanaman semula berada di tahap kritikal apabila terdapat sebanyak 40,000 hektar pokok getah tua yang akan ditanam semula secara berterusan manakala penanaman baru sebanyak 30,000 hektar setahun akan dijalankan dalam tempoh 5 tahun. Oleh itu, nutrien yang mencukupi untuk anak pokok getah adalah penting untuk meningkatkan pertumbuhan dan perkembangan anak pokok getah kerana permintaan yang semakin meningkat untuk tujuan penanaman semula.

Oleh itu, eksperimen ini dijalankan untuk menilai prestasi pertumbuhan anak pokok getah terhadap kesan pelbagai kadar baja nitrogen (N) dan fosforus (P). Rekabentuk eksperimen yang telah digunakan dalam kajian ini adalah Randomised Complete Block Design (RCBD) yang melibatkan 9 rawatan; T1 (5.2 g urea/pokok + 11.2 g CIRP/pokok), T2 (5.2 g urea/pokok + 16.2 g CIRP/pokok), T3 (5.2 g urea/pokok + 21.2 g CIRP/pokok), T4 (10.2 g urea/pokok + 11.2 g CIRP/pokok), T5 (10.2 g urea/pokok + 16.2 g CIRP/pokok), T6 (10.2 g urea/pokok + 21.2 g CIRP/pokok), T7 (15.2 g urea/pokok + 11.2 g CIRP/pokok), T8 (15.2 g urea/pokok + 16.2 g CIRP/pokok) dan T9 (15.2 g urea/pokok + 21.2 g CIRP/pokok) dengan 3 replikasi.

Hasilnya menunjukkan bahawa terdapat perbezaan yang signifikan bagi pelbagai kadar baja N dan P pada kenaikan ketinggian, kenaikan lilitan, kandungan

klorofil, berat kering bahagian atas (daun dan batang), berat kering bahagian bawah (akar). Walau bagaimanapun, tidak terdapat perbezaan yang signifikan terhadap jumlah berat kering benih getah. Di samping itu, eksperimen ini menunjukkan bahawa penggunaan T2 (2.0 g urea/pokok dan 7.5 g CIRP/pokok) memberikan nilai yang lebih tinggi pada kandungan nutrien bagi nitrogen, fosforus, kalium, kalsium dan magnesium di dalam tisu daun daripada kawalan T1 (2.0 g urea/ pokok dan 2.5 g CIRP/pokok). Ini mungkin menunjukkan bahawa kadar baja fosforus yang tidak mencukupi di rawatan kawalan (T1).

Keputusan yang dijangka daripada kajian ini akan memberi kebaikan dalam industri perladangan getah terutamanya di tapak semaian dan dapat memberikan maklumat baru mengenai keperluan baja. Rawatan T2 dengan penggunaan kadar baja 2.0 g urea/pokok dan 7.5 g CIRP/pokok memberikan hasil yang terbaik dalam semua parameter yang diambil dalam kajian ini. Kadar 2.0 g urea/pokok dan 7.5 g CIRP/pokok adalah disyorkan untuk anak pokok getah di tapak semaian.

CHAPTER 1

INTRODUCTION

Malaysia is expected to produce about two million tonnes of latex annually by year 2020, and it is expected to contribute the country's total Gross National Income (GNI) from RM18.5 billion (2012) to RM52.9 billion in the year 2020. Four Entry Point Projects (EPP) were identified as primary contributors to the projected Gross National Income (GNI) growth, and one of the targets is to increase average national rubber productivity in Malaysia. To boost rubber productivity, this EPP aims to ensure only high-yielding and quality-planting materials are supplied to the smallholders. In the year 2012, the government has launched replanting and new planting programme under the Rubber National Key Economic Area (NKEA). Under this programme, replanting of old rubber trees (40,000 ha/year) and new planting (30,000 ha/year) will be conducted within 5 years (Economic Transformation Programme Annual Report, 2012).

Due to increasing demand of young rubber trees for replanting purposes, research should be conducted to ease the process of cultivation. For these reasons, research and knowledge on application of fertilizer is one of the most effective methods to enhance growth and development of the rubber seedlings in the nursery. Effective nutrient supply in the nursery is important to speed up the process of maturation and vegetative growth of rubber seedlings, as well as reduce cost of production. To produce two whorls polybag of rubber seedling from young budding, it requires eight until nine months before field planting ; phase 1 – three to four months for production of rootstocks, phase 2 – 21 to 31 days for bud grafting, phase

3 – growth of successful scion after budding that takes 3 to 4 months before transplant into the field. For the nursery stage, the rate and frequency of fertilizer application begin one month immediately after the plant achieved first whorl of hard leaves. The establishment of rubber nursery is required to be focused on the right fertilizer for the growth of rubber seedlings. This is important to obtain early maturity and planting materials transplanted into the field to achieve high initial establishment success.

Therefore, the main objective of this study is to evaluate the rubber seedlings growth performance in response to various rates of nitrogen (N) and phosphorus (P) fertilizers. A study on the effect of various rates of nitrogen fertilizer and phosphorus fertilizers is carried out to prove the best rates and effectiveness of fertilizer on the growth of rubber seedlings.

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