
**UNIVERSITI PUTRA MALAYSIA**

# *EFFECT OF WATERING FREQUENCIES ON PHYSIO-CHEMICAL OF Hevea Brasiliensis SEEDLING UNDER GLASS HOUSE CONDITION*

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**FP 2013 177**

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**SERDANG, SELANGOR**

**2012/2013**

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**A Project Submitted Partial Fulfilments of the Requirement for**

**the Degree Bachelor of Horticulture Science in the Department of Crop Science**

**Faculty of Agriculture University Putra Malaysia**

**2012/2013**

**CERTIFICATION OF APROVAL**

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# ACKNOWLEDGEMENT

*Assalamualaikum w.b.t*

Firstly, thank are due to Allah S.W.T who gave me to the capability to accomplish this project. With much gratitude and thanks, I would like to take this opportunity to express my appreciation towards my supervisor, Associate Prof. Dr. Wan Noordin Wan Daud for enlightening and providing me with advices, supervision, guidance, encouragement and support throughout the path to complete this study.

I also wish to express my appreciation and thanks to post gradute student Ms Suhaila for guiding me throughout this project. Not to forget, my beloved friends Naqib Azam, Zaid Zuhri and Fadhli Tariq. Without their help, guidance, opinion and ideas it will be difficult to accomplish my study.

Special thanks also go to my Family, especially my parent. Mr Abd Halim and Mrs.Zeleha Ayob for countless support for this project. Around of applause to all my friends, Fahmi Razali, Lokman Hakim and Izzati Sulaiman for their help, support and encouragement throughout the completion of this study.

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## ABSTRACT

Currently, about 1.25 million hectare of area in Malaysia is planted with rubber tree with output 1.2 million ton of natural rubber per year. The government aims to increase the production of rubber to 1.8 ton per hectare for the coming year 2012 (Malaysia Rubber Board, 2010).Development sector is now closing in many potential lands for rubber planting. Realizing the fact that limited land is available for planting in Malaysia, the best way to increase the production and among the farmers is by increasing the productivity of rubber.

Thus, this study was carried out to analyse the ability of RRIM 3001 clones to survive in water stress based on water frequency and towards difference soil series, which is Munchong series, Serdang series and Sg Buloh. The other objective is to determine the effect of physiological changes of plant under different soil and to investigate the effect of different growth of rubber plant under different water stress. The seedling used in this study were RRIM 3001. The study started in January 2013 and ended in Jun 2013. Five treatment were used in this study to investigate watering frequency, i.e. every day, two days and four days, sixth days and eight days. The experimental design was a Randomized Complete Block Design (RCBD) with tree replications and fifteen treatments. The data were recorded and analyzed with Analysis of Variance (ANOVA) and Least Significant Different (LSD) for mean comparison using Statistical Analysis System (SAS) statistical package for determining the effect of clones and watering frequency on the plants growth.

The result from this study showed the characteristics used to determined water stress in RRIM 3001 and towards difference soil such as girth circumference, leaf area, height, stomata conductance and chlorophyll content, showed T1, well-water

has highest and T15, least watered has lowest value at every treatment. Based on this experiment, Munchong Series is the best soil while Sg Buloh series is the least suitable soil for rubber seedlings.

## ABSTRAK

Masa ini, seluas 1,25 juta hektar kawasan digunakan untuk menanam pokok getah dengan output 1.2juta tan getah asli setahun. Kerajaan mencadang untuk meningkatkan pengeluaran getah kepada 1.8j tan per hektar untuk tahun 2012 mendatang (MRB, 2010). Sektor Pembangunan sekarang pula banyak menutup tanah-tanah yang berpotensi untuk tanaman getah. Menyedari kenyataan bahawa tanah yang ada cukup terhad untuk ladang getah di Malaysia, cara terbaik untuk meningkatkan pengeluaran dan pendapatan kepada petani adalah dengan meningkatkan produktiviti getah.

Oleh itu, kajian ini dilakukan untuk menganalisis kemampuan bagi klon RRIM 3001 untuk bertahan untuk hidup berdasarkan frekuansi penyiraman berbeza serta perbezaan jenis tanah iaitu siri tanah Munchong, siri tanah Serdang dan juga siri tanah Sg. Buloh. Objektif lain adalah untuk menentukan kesan perubahan fisiologi tumbuhan bawah tanah yang berbeza dan untuk mengkaji kesan pertumbuhan yang berbeza kilang getah di bawah tekanan air yang berbeza. Anak pokok yang digunakan dalam kajian adalah dari klon RRIM 3001. Kajian ini bermula pada bulan Januari 2013dan berakhir pada bulan Jun 2013. Lima rawatan yang digunakan dalam kajian adalah kadar frekuansi siraman iaitu setiap hari, 2 hari, 4 hari, 6 hari dan 8 hari. Bentuk eksperiman yang digunakan dalam kajian ini adalah Bentuk Penuh Rawak Berblok (RCBD) dengan tiga replikasi dan lima belas rawatan. Data direkodkan dan dianalisikan dengan Analisis Varian (ANOVA) dan Beza Nyata Terkecil menggunakan pakej Analisis Statistik System (SAS) statistik untuk menentukan pengaruh klon dan frekuensi penyiraman terhadap pertumbuhan tanaman.

Hasil daripada kajian ini menunjukkan ciri-ciri yang digunakan untuk menentukan tekanan air di RRIM 3001 dan ke arah tanah perbezaan seperti lilitan batang, luas daun, ketinggian, konduktans stomata dan kandungan klorofil, menunjukkan T1, siraman terbaik, mempunyai bacaan tertinggi dan T15,siraman yang kurang, mempunyai bacaan rendah pada setiap rawatan. Berdasarkan eksperimen ini, tanah siri Munchong adalah terbaik dan tanah siri Sg Buloh pula adalah kurang sesuai untuk anak benih pokok getah.

# CHAPTER 1

# INTRODUCTION

The rubber tree, *Hevea brasiliensis*, originated from Brazil have been widely planted in South East Asia. The countries involved in the production of the world's largest natural rubber are Thailand, Indonesia, Malaysia, Vietnam, India,and Sri Lanka. Nowadays, Malaysia is the leading producer of natural rubber in the world. About 18% of the total world's rubber is produced from Malaysia. Malaysia today is the world's third largest producer and exporter of natural rubber (NR), the fifth largest consumer and the largest global consumer of latex concentrate. In the products manufacturing sector, Malaysia is the leader in the production and supply of medical rubber gloves, catheters, latex threads and cords.

The rubber plantation was started in Malaysia in 1877. Rubber is able to grow anywhere in Malaysia, due to the suitability of climate and soil; but most of the rubber estates are concentrated in the western coastal plains of Malaysia. According to Noordin (1993), rubber can be planted in marginal areas like dry areas. Rubber is a strategic commodity for Malaysia especially for downstream and upstream sector. In Malaysia, smallholders are the major producer of rubber which contributes about 94% to the country's total rubber production. Rubber price rise due to good demands from consumers, coupled with positive car sales in China and tyre's manufacture in Japan (MRB , 2010). Most plantation areas are located in South East Asia, especially Thailand,

Indonesia and Malaysia is the largest producers of natural rubber in the world (Lieberei, 2007). According to the Malaysian Department of Statistic, 16% of the major exporters of natural rubber in the world are Malaysia, by means produces 939,241 tons of natural rubber in the 1,020,380 hectare of rubber planting areas. The main rubber suppliers in this country are Johor, Kedah, Perlis, Perak and Negeri Sembilan (Malaysian Rubber Board, 2010).

However, demand of natural rubber is limited follow shortage of supply in the world due to underinvestment in new planting and replacing existing rubber areas with oil palm lead to a significant shortage of rubber. The demand for land is ever increasing with the increase in population. In keeping with the increase in population and quality of life, the demand for rubber has increase significantly. Environmental issues like global warming and water scarcity also generate a big problem for rubber plantation. Water has been a very important resource to agriculture since the issues of global warming and climate change arise. Water is scarce and its quality is decreasing in many part of the world (Gholizadeh *et al.,* 2010). Plant water status is also affected by reducing of water availability in plant (Shafar *et al*., 2011). All these factors have permanent influence on growers of natural rubber to raise land productivity whilst protecting the environment (Rodrigo, 2007). From the problem, this study is focus on the right amount of water needed by rubber at nursery stage. The reducing amount of water will be help the smallholders reducing their cost for planting material and watering cost in establish nursery stage.

The main purpose of this study was to evaluate response of RRIM 3001 in relation to different watering frequencies and soil types. The other objectives are to

determine the response in growth and water relationship a rubber plant, RRIM 3001 under different types of soil and also to evaluate amount of water and uptake for plant growth.

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