



UNIVERSITI PUTRA MALAYSIA

**THE EFFECT OF BIOFERTILIZER AND DIFFERENT RATE OF
CHEMICAL FERTILIZER ON THE GROWTH OF RICE (*Oryza sativa*)
MR 263 UNDER GLASSHOUSE CONDITION**

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**FACULTY OF AGRICULTURE
UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR**

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**BY
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A project report submitted to 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 Horticulture Science

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This Project reported entitled “The Effect of BioFertilizer and Different Rate of Chemical Fertilizer On the Growth of Variety Rice (*Oryza sativa*) MR263 Under Glasshouse Condition” was prepared by Amirul Syafiq bin Nasorudin and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for award of the degree of Bachelor of Horticulture Science.

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ABSTRACT

The biofertilizer or microbial inoculants can generally be defined as preparation containing live and efficient nitrogen fixing, phosphate solubilizing or cellulolytic microorganisms used for applying to seed, soil, or composting. The use of biofertilizer also lead to fertile soil, promote the growth of paddy, and environmental quality. Meanwhile, the use of many chemical fertilizers will lead to toxic effect on plant growth and caused environmental pollution. This experiment will determine the effect of biofertilizer (UPMB10 and GM118) and different rate of chemical fertilizer on the growth of paddy variety M263. It was conducted at Kompleks Ladang Bersepadu, Ladang 10, Universiti Putra Malaysia while the culturing of the bacteria was conducted at Agrotechnology Laboratory, Department of Agriculture Technology, Faculty of Agriculture, Universiti Putra Malaysia. The rice plants were grow under four treatments of biofertilizer (T1) – control, (T2) – UPMB10, (T3) – GM118 (T4) – GM118 + UPMB10. Each treatment also has the different ratio of chemical fertilizer (NPK). The treatment was applied at an early and middle stage of growth and the parameters collected at day 70 (maturation phase) were plant height, fresh and dry weight of plants and amount NPK in leaves tissue. Completely randomized design was used as the experimental design with four replicates. All data collected were subjected to ANOVA to determine the effect of biofertilizer on the growth of paddy and Tukey test were used for means separation. Result showed that the treatment containing combination biofertilizer and higher rate of fertilizer gives the highest result better than other treatments. From the data obtain in this study it showed that, the biofertilizer application on variety MR263 had significant difference between each treatment for plant height, chlorophyll contain, fresh weight, dry weight and NPK content in leaves tissue. The best result for this

experiment is treatment (GM118 + UPMB10) with fertilizer 8 compared to other treatments. As conclusion the combination biofertilizer showed the best result better than treatment of using single biofertilizer and control.



ABSTRAK

Biobaja atau inokulan mikrob umumnya boleh ditakrifkan sebagai persediaan mikroorganisma memiliki ciri pengikat nitrogen yang cekap, pelarutan fosfat atau selulotik digunakan untuk proses penyediaan biji benih , tanah, atau kompos. Penggunaan biobaja juga membawa kepada tanah yang subur , menggalakkan pertumbuhan padi , dan kualiti alam sekitar. Sementara itu , penggunaan baja kimia yang banyak akan menyebabkan kesan toksik terhadap pertumbuhan tumbuhan dan pencemaran alam sekitar. Eksperimen ini akan menentukan kesan biobaja (UPMB10 dan GM118) dan kadar yang berbeza baja kimia kepada pertumbuhan varieti padi M263. Projek ini dijalankan di Kompleks Bersepadu Ladang 10, Universiti Putra Malaysia manakala pengkulturan bakteria telah dijalankan di Makmal Agroteknologi, Jabatan Teknologi Pertanian, Fakulti Pertanian, Universiti Putra Malaysia. Pembiakan padi menggunakan rawatan daripada biobaja (T1) - kawalan, (T2) - UPMB10, (T3) - GM118, (T4) - GM118 + UPMB10 . Setiap rawatan juga mempunyai nisbah baja kimia yang berbeza (N P K). Rawatan ini telah digunakan pada peringkat awal dan pertengahan pertumbuhan dan parameter yang diambil pada hari 70 (fasa kematangan) adalah tinggi pokok, klorofil, berat basah dan kering tumbuh-tumbuhan, serta jumlah NPK dalam tisu daun. Semua data yang dikumpul diuji dengan menggunakan ANOVA untuk menentukan kesan biobaja terhadap pertumbuhan padi MR263 dan ujian Tukey digunakan untuk mengetahui perbezaan. Keputusan menunjukkan bahawa rawatan yang mengandungi kombinasi biobaja dan kadar yang lebih tinggi daripada baja kimia memberikan hasil yang paling tinggi daripada rawatan lain. Daripada data yang diperolehi dalam projek ini ia menunjukkan bahawa , penggunaan biobaja pada varieti MR263 mempunyai perbezaan yang signifikan antara setiap rawatan untuk ketinggian tumbuhan , klorofil, berat basah , berat kering dan kandungan NPK dalam tisu daun . Keputusan terbaik untuk eksperimen

ini adalah rawatan (GM118 + UPMB10) dengan kadar baja 8 berbanding rawatan lain. Sebagai kesimpulan gabungan bio baja menunjukkan hasil yang terbaik lebih baik daripada rawatan menggunakan biobaja tunggal dan kawalan.



CHAPTER 1

INTRODUCTION

1.1 Introduction

Among the cereals, rice and wheat plays an equal importance as important food sources for civilization. Rice is a primary food for nearly one-half of the world's population. In 1990, the crop was grown on 145.8 million hectares of land, and producing 518.8 million metric tons of grain (paddy, rough rice). Although rice is grown in 112 countries, crossing an area from 53° latitude north to 35° south, about 95 percent of the crop is grown and used up in Asia. Rice provides fully 60 percent of the food intake in Southeast Asia and about 35 percent in East Asia and South Asia. The highest level of per capita rice consumption (130 to 180 kilograms [kg] per year, 55 to 80 percent of total caloric source) takes place in Bangladesh, Cambodia, Indonesia, Laos, Myanmar (Burma), Thailand, and Vietnam.

In the world, there are different shapes and sizes of many varieties of rice ranging from long and slender to the short and tubby. In the world market as well as in Malaysia, much emphasis is placed on grain length and whiteness as a criterion of grading and quality. The other factors such as palatability from mountainous Himalayan to lowland delta areas, there are 42 rice producing countries in the world. It has been predicted that half the world's population lives

entirely or in part on rice. Ninety percent of the world crop is grown and used up in Asia. American consumption, although increasing, is still only about 11 kg per person annually, as compared with 90–181 kg per person in parts of Asia. Rice is the only major cereal crop that is mainly consumed by humans directly as harvested, and only wheat and corn are produced in equal quantity.

In Malaysia, the main varieties of rice found in retail outlets are ordinary local and imported white rice, brown unpolished rice and specialty rice such as fragrant rice, Basmati, parboiled and glutinous rice. The main criteria in the classification are length of grain, content of head rice, content of broken rice and milling degree.

MR253 and MR263 rice varieties have unique features that can increase rice yield significantly. MR253 variety can provide a high yield even when it is grown in areas with poor soil such as peat and acidic soil. MR253 is tolerant to unfavorable environment and help to improve the yield. In addition, the yield of this variety also has other features such as resistance to major pests in addition to good quality seeds. These varieties will replace rice varieties that are widely used in this country, namely the MR219 and MR220. MR219 variety resistance to disease are steadily declining, therefore MR263 rice varieties produced to help prevent pests.

On the basis of mean grain yield, rice crops produce more food energy and protein supply per hectare than wheat and maize. Hence, rice can support more people per unit of land than the two other staples (Lu and Chang 1980). It is, therefore, not surprising to find a close relationship in human history between an expansion in rice cultivation and a rapid rise in population growth.

The important criteria that ensure that the plant can grow very well is fertilization. The major input in rice production is fertilizer which can contribute almost 50% of production cost. Productivity is directly related to the efficient management of the input and resources. There is a new technology of fertilizer which is called biofertilizer. Biofertilizers are the formulation of living microorganisms which are able to fix atmospheric nitrogen in the available form for plants either by living in the soil or being associated symbiotically with plants (Rao, 1993).

Chen (2006) reported that biofertilizer is a substance which contains living microorganisms and help with the expand the root system and better seed germination. A healthy plant usually has healthy roots which should be dominated by beneficial microbes. Conversely, in unhealthy soil, dominated by pathogenic microbes, optimum plant growth would not be possible. These biofertilizers are product consisting of beneficial microorganisms, which are known to improve plant growth through supply of plant nutrient. The soil microorganism consist of phosphate solubilizing microbe, mycorrhiza and some blue- green algae (Shamsuddin et al., 1999).

1.2 Objectives

The objectives of this study are :

- a) To determine the effect of bio fertilizer on the growth of rice variety MR 263.
- b) To compare the growth of rice variety MR263 between the different type of biofertilizer.
- c) To determine the interaction effects between biofertilizer and chemical fertilizer application on the growth of rice variety MR263.

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