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MOHD ARIF RAJAB

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MUHAMMAD ARIF BIN RAJAB

FACULTY OF AGRICULTURE

UNIVERSITI PUTRA MALAYSIA

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GROWTH PERFORMANCE AND GRAIN YIELD OF SOYBEAN (*GLYCINE MAX*) GROWN AT DIFFERENT PLANTING DENSITY

Muhammad Arif Rajab

A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia, in fulfilment of requirement of PRT4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science

Faculty of Agriculture

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CERTIFICATION

This project report attached here entitled **"Growth Performance and Grain Yield of Soybean (*Glycine max*) Grown at Different Planting Density"** was prepared by **Muhammad Arif Rajab** and submitted to 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**.

Student's name: Student's signature

Muhammad Arif Rajab ……..

Certified by:

……

(**Assoc. Prof. Dr. Adam Puteh**)

Project Supervisor

Department of Crop Science

Faculty of Agriculture

Universiti Putra Malaysia

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ABSTRACT

Planting density influences crop performance and the quality and quantity of soybean yield. This study was conducted to evaluate planting density on soybean growth and grain yield. In this study, soybean of *Dieng* cultivar was grown under field conditions. The treatment included three different planting density; 15 seeds, 30 seeds (control) and 50 seeds per meter. Plant samplings were done weekly from V1 stage (first trifoliate) to stage R7 (physiological maturity stage). Soybean plants were harvested to determined yield components at R8 (fully maturity stage). There was a significant difference ($P<0.05$) between fresh and dry grain weight when planted at different planting density. In this study, differences in the total seed yield was observed when planted at different plant densities in crop growth and seed yield which also related to crop competition at different population density**.** Planting density at 30 seeds per meter (control) had the highest fresh weight. Soybean planted at 30 seed m^{-1} was found to be an optimum planting density for the soybean.

ABSTRAK

Kepadatan tanaman mempengaruhi prestasi tanaman dan kualiti dan kuantiti hasil kacang soya. Kajian ini dijalankan untuk menilai kepadatan tanaman pada pertumbuhan kacang soya dan hasil bijirin. Dalam kajian ini, kacang soya daripada *Dieng* kultivar ditanam di ladang. Rawatan ini termasuk tiga kepadatan tanaman yang berbeza; 15 biji, 30 biji (kawalan) dan 50 biji bagi satu meter. Sampel tumbuhan telah dilakukan seminggu dari peringkat V1 (yang mempunyai tiga daun pertama) untuk mengadakan R7 (peringkat kematangan fisiologi). Tanaman kacang soya telah dituai untuk komponen hasil ditentukan pada R8 (sepenuhnya peringkat matang). Terdapat juga perbezaan yang signifikan ($P < 0.05$) antara berat gandum segar dan kering apabila ditanam di kepadatan tanaman yang berbeza. Dalam kajian ini, perbezaan dalam jumlah hasil benih diperhatikan apabila ditanam pada kepadatan tumbuhan yang berbeza dalam pertumbuhan tanaman dan hasil tanaman yang juga berkaitan dengan persaingan tanaman pada kepadatan penduduk yang berbeza. Kepadatan tanaman di 30 biji bagi satu meter (kawalan) mempunyai berat badan segar yang paling tinggi. Kacang soya yang ditanam di 30 biji m^{-1} telah didapati ia adalah kepadatan tanaman yang optimum untuk kacang soya itu.

Chapter 1

Introduction

1.1 Background

Soybean is among the major industrial and food crops grown in every continent. It is a leguminous can grow in tropics, subtropics, and temperate climates. A by-product from the oil production (soybean cake) is used as a high-protein animal feed in many countries. Soybean also improves soil fertility by adding nitrogen from the atmosphere.

Spacing is always a concern in planting management. Planting density refers to the spacing of plants when grown in the field. In other words, the distance of the plants in relation to one another. There was a significantly linear relationship between enhancing plant density and reducing size and this relationship occurred for each cultivar (Cushman et al., 2002).

Soybeans always give higher yield in narrow row spacing if weeds and pathogens are managed properly. Narrow rows have a yield advantage because of efficient light interception throughout the growing season and achieve canopy closure faster. Soybean canopy is a function of row spacing, seeding rate and environmental conditions.

The relative equidistant plant distribution leads to increased leaf area development and greater light interception early in the season. This increases crop growth rate, dry matter accumulation, and seed yield.

The use of narrow row spacing compensates canopy closure which is critical for sunlight capture. To obtain the benefits of soybean, this experiment necessary to be conducted so we can determine the optimum plant density for the maximum yield production of soybean under tropical environment.

1.2 Justification and Problem statement

Optimum planting distance must be appropriately apply in each planting system. Planting at different population density will cause plant to compensate for seed yield adjustment through changes in growth performance.

1.3 Hypothesis and Objective

H_O: There are no significant differences in total seed yield when planted at different plant densities.

H_A: There are significant differences in total seed yield when planted at different plant densities

Objectives of this study are:

- to determine the effect of plant density on crop growth performance and seed yield

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