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Effect of Various Doses of Cassava on Growth and Production of Mung Beans (*Vigna Radiata L*)

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ABSTRACT

The horticultural sector is growing and the need for its products is also increasing, including the need for green beans, but its availability is limited by land conditions that are poor in organic matter, so it needs to be treated with the addition of organic fertilizers such as vermicompost. This study aims to determine the effect of vermicompost and obtain the best dose for the growth and production of mung bean (*Vigna radiata* L.). The study was conducted using a factorial Completely Randomized Design (CRD) consisting of a single factor, namely the provision of vermicompost. From these factors, there were four levels of treatment (0, 5, 15, and 25 tons ha-1) and each treatment was given three replications so that there were 12 experimental units. The parameters reviewed were plant height, total productive branches, flower age, harvest age, total pods planted, percentage of pithy pods, weight of planted seeds, weight of seeds per plot, and weight of 100 seeds. The dose of vermicompost 25 ton.ha-1 was better than the dose of 0 ton.ha-1, the dose of 5 ton.ha-1, and the dose of 15 tons/ha. The treatment can increase plant height, total productive branches, total pods planted, percentage of pithy pods, weight of seeds planted, weight of seeds per plot, and weight of 100 seeds.

Keywords: *Dosage, Mung Beans, Cassava, Growth, Production*

1. INTRODUCTION

Mung bean (Vigna radiata L.) is a major legume crop in Indonesia after soybeans and peanuts. The amount of mung bean production in Riau Province has decreased from 448 tons in 2017 to 434 tons in 2018, this is due to inadequate cultivation. appropriate, there is a change of land function and the level of soil fertility is less. How to increase the productivity of green beans can be done by optimally applying fertilizer.

Efforts to increase the production of mung bean cultivation can be done in various ways, one of which is improving cultivation techniques through fertilization. According to Hadiyanto et al (2021) the addition of organic fertilizers is the main step in an effort to increase soil fertility, both physically, chemically and biologically. One of the organic fertilizers that can be used is vermicompost fertilizer. Kascing is a fertilizer that is sourced from media used for worm cultivation and as a by-product of earthworm cultivation. Kascing contains macro and micro nutrients that can stimulate plant growth. According to Canatoy (2018), vermicompost is neutral, has a pH value of 6.52 and has the nutrients needed by plants. Kascing contains 32.45% organic matter, 2.82% nitrogen, 1.14% phosphorus and 0.45% potassium. Kascing also has hormones such as gibberellins, cytokinins and auxin, also contains Azotobacter sp, which is a non-symbiotic N-fixing bacteria so that it can meet the N elements needed by plants.

Research on vermicompost has been conducted by Hasibuanet al. (2019), Syahri et al. (2019), but the results of their research were combined with other treatments that affected the microenvironment of plants, and in this study the vermicompost were studied alone without a combination of other treatments.

This study aims to determine the effect of giving several doses of vermicompost and to determine the best dose for the growth and production of green bean plants.

2. MATERIAL AND METHOD

The research was conducted at the Experimental Garden of the Faculty of Agriculture, Riau University, Bina Widya Campus KM 12.5, Simpang Baru Village, Tampan District, Pekanbaru City. This research took place for 3 months starting from October 2020 to December 2020. The materials needed in the research, namely Vima-1 variety green bean seeds, water, vermicompost, NPK fertilizer, Furadan, Insecticide Decis 2.5 EC and Fungicide Dithane M -45. The tools needed are hoes, machetes, rakes, wood, raffia rope, tape measure, gembor, hose, analytical balance, ruler, plastic, handsprayer and camera. The study was carried out experimentally using a completely randomized design (CRD) consisting of 1 factor, namely: Giving vermicompost consists of 4 levels, K0 = dose 0 ton.ha-1 (0 kg.plot-1), K1 = dose 5 tons. ha-1 (1 kg.plot-1), K2 = Dose 15 tons.ha-1 (3 kg.plot-1), K3 = Dose 25 tons.ha-1 (5 kg.plot-1). Each treatment level was repeated three times so that there were 12 experimental units. The land area used was 9.5 m x 15.5 m, the total plots used were 12 plots, each plot measuring 200 cm x 100 cm, and the distance between each plot was 50 cm. The parameters observed were plant height, number of productive branches, number of pods planted, percentage of pithy pods, weight of seeds planted, weight of seeds per plot, and weight of 100 seeds.

3. RESULTS AND DISCUSSION

1. Plants height

The results of observing plant height after giving vermicompost were further tested with DNMRT at a level of 5%, which can be seen in table 1.

Table 1. Green bean plant height (cm) with vermicompost and spacing.

Vermicompost (ton.ha^{-1})	Average
0	64,11 c
5	69,03 b
15	71,22 ab
25	73,95 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to *Duncan's* multiple-distance test at the 5% level.

The vermicompost 25 ton.ha-1 significantly increased the plant height compared to the vermicompost and the vermicompost 5 ton.ha-1, but not significantly different from the vermicompost 15 ton.ha-1. It is suspected that increasing the dose of vermicompost can increase the content of macro and micro nutrients in the soil. As the content of macro and micro nutrients increases, the photosynthesis process will also increase and the cell elongation process can run well so as to increase plant height.

According to Lingga and Marsono (2008), the response of plants to fertilization will increase if the application of fertilizer is in accordance with the right dose, time and method. Sarief (1986) states that the availability of sufficient nutrients during the growth process will increase the photosynthesis process so that cell division, enlargement and differentiation will be better.

The results of this study have different results on plant height parameters, when compared with the research conducted by Hasibuan et al. (2019), which concluded that vermicompost had no significant effect on the growth of long beans.

2. Productive branch

The results of observations of productive branches after vermicompost were further tested with DNMRT at a level of 5% can be seen in table 2

Table 2. Productive branches of green bean plants (branches) that are given vermicompost.

Vermicompost (ton.ha^{-1})	Average
0	3,00 b
5	3,31 ab
15	3,47 ab
25	3,75 a

Numbers followed by unequal lowercase letters in the same column are significantly different according to *Duncan's* multiple-distance test at the 5% level.

Vermicompost 25 ton.ha-1 significantly increased productive branches compared to no vermicompost, but it was not significantly different at a dose of 5 ton.ha-

1 and a dose of 15 ton.ha-1. The vermicompost 25 ton.ha-1 significantly increased the productive branch compared to the no vermicompost, but it was not significantly different from 5 ton.ha-1 and 15 ton.ha-1. It is suspected that the provision of vermicompost 25 ton.ha-1 can improve soil conditions and increase the available nutrients. Good soil conditions will create a suitable growing environment for plant growth and the nutrient content of nitrogen, phosphorus and potassium in vermicompost can be utilized optimally so that it can assist in the vegetative growth of plants.

Dermawan et al. (2020), stated that nitrogen nutrients are needed by plants for the formation of chlorophyll and stimulate plant vegetative growth such as plant height and increase in the number of branches. According to Novizan (2005), nutrients are needed for the process of cell division and elongation. Nutrients also play a role in the formation of chlorophyll which is needed in the process of photosynthesis to produce carbohydrates.

3. Number of Planted Pods

The results of observing the number of pods planted after giving vermicompost were further tested with DNMRT at a level of 5%, which can be seen in table 5.

Table 3. Number of pods of green bean (pods) that were given vermicompost.

Vermicompost (ton.ha^{-1})	Average
0	19,96 c
5	22,49 b
15	23,87 ab
25	25,02 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to Duncan's multiple-distance test at the 5% level.

. The vermicompost of 25 ton.ha-1 significantly increased the number of pods planted compared to that without vermicompost and 5 ton.ha-1, but it was not significantly different from that of the vermicompost 15 ton.ha-1. It is suspected that the increase in the provision of vermicompost, the content of organic matter contained in the soil will also increase and the nutrient needs needed by plants for the photosynthesis process can be met. One of the results of photosynthesis is used in the growth of the final phase of the plant, namely the formation of pods. Suhartono (2008) stated that in order to optimize the heap resulting from the photosynthesis process, it is necessary to have sufficient intake of organic matter and water for plants.

4. Perecntage of pithy pods

The results of observing the percentage of pithy pods after giving vermicompost were further tested with DNMRT at a level of 5%, which can be seen in table 6.

Table 4. Percentage of green pea pods (percent) that were given vermicompost.

Vermicompost (ton.ha^{-1})	Average
0	86,83 c
5	90,11 b
15	92,04 a
25	92,42 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to Duncan's multiple-distance test at the 5% level.

The vermicompost of 25 ton.ha-1 and 15 ton.ha-1 significantly increased the percentage of pithy pods compared to that without vermicompost and 5 ton.ha-1 vermicompost. It is suspected that increasing the dose of vermicompost can increase the phosphorus content in the soil and play a very important role in the formation of protein and starch which is useful for the preparation of plant cells and organs so that it can increase the percentage of green bean pods.

Isband et al, (2001) stated that the flowering and fruiting of plants is highly dependent on the absorption of nutrients, so that if the absorption of nutrients increases, the number of filled pods formed is more, and vice versa if the amount of nutrients absorbed is small, the number of empty pods is empty. increased. Jati et al (2018), added that the P element is needed by plants for the protein synthesis process and enzymatic processes during the generative period so that it can optimize seed filling which will increase pithy seeds. The formation of the contents of the pod depends on the level of moisture and the supply of nutrients, especially phosphorus and calcium for the process of fertilization and seed ripening.

5. Planting seed weight

The results of observing the weight of the seeds after giving vermicompost were further tested with DNMRT at a level of 5%, which can be seen in table 7.

Table 5. Seed weight of mung bean (grams) given vermicompost.

Vermicompost (ton.ha^{-1})	Average
0	12,49 b
5	15,56 a
15	16,12 a
25	17,05 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to *Duncan's* multiple-distance test at the 5% level.

The vermicompost 5 ton.ha-1 significantly increased the seed weight of the crop compared to that without the vermicompost, but if the dose was increased, it tended to increase the seed weight of the crop. It is suspected that the provision of vermicompost can increase the availability of nutrients in the soil compared to without vermicompost and has an impact on the optimal physiological and metabolic activities of a plant, namely the ability of plants to translocate assimilate into seeds. The ability of a plant to translocate the assimilate into seeds will affect its size indirectly will also affect the weight of seeds per mung bean plant. Seed weight

per plant is also influenced by the number of pithy pods per plant. The more pithy pods, the more seeds are produced so that the weight of the seeds is also higher. Kamil (1997) stated that the increase in seed weight in plants depends on the availability of assimilate and the ability to translocate in seeds.

6. Weight of seeds per plot

The results of the observation of seed weight per plot after vermicompost were further tested with DNMRT at a level of 5% can be seen in table 8.

Table 6. Seed weight per plot of green peas (grams) given vermicompost.

Vermicompost (ton.ha^{-1})	Average
0	281,00 c
5	331,02 b
15	353,98 ab
25	372,48 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to Duncan's multiple-distance test at the 5% level.

The vermicompost of 25 ton.ha-1 significantly increased the seed weight per plot compared to that of the vermicompost and 5 ton.ha-1, but it was not significantly different from that of the vermicompost 15 ton.ha-1. It is suspected that the provision of vermicompost and proper spacing can increase the availability of organic matter, water availability, microorganism activity and nutrient content in the soil that will be utilized by plants. Giving vermicompost is also able to increase the level of soil fertility physically, chemically and biologically, so that the available nutrients can be absorbed by plants to the maximum. Nurhuda et al (2021) stated that if the plant's nutrient needs have been fulfilled, then the plant can be optimal in the metabolic process in its tissue, namely in optimizing the photosynthesis stage so as to produce photosynthate which is needed during cell division and enlargement and plants are able to grow and produce optimal production.

7. Weight 100 seeds

The results of observing the weight of 100 seeds after giving vermicompost were further tested with DNMRT at a level of 5%, which can be seen in table 9.

Table 7. The weight of 100 green beans (grams) given vermicompost

Vermicompost (ton.ha^{-1})	Average
0	6,21 c
5	6,46 b
15	6,66 ab
25	6,83 a

Numbers followed by unequal lowercase letters in the same column were significantly different according to *Duncan's* multiple-distance test at the 5% level.

The vermicompost 25 ton.ha-1 significantly increased the weight of 100 plant seeds compared to 5 ton.ha-1 and without vermicompost, but it was not significantly different from the vermicompost 15 ton.ha-1. It is suspected that an increase in the dose of vermicompost increased the availability of macronutrients such as N, P, and K in the soil. The availability of sufficient K

elements can be utilized by plants to increase plant metabolic activity and translocate assimilate into seeds, the ability of a plant to translocate these assimilate into seeds will affect its size indirectly will also affect the weight of mung bean seeds.

According to Rosmarkam and Yuwono (2002) that K functions as an enzyme activator in the photosynthetic process, to help the translocation of photosynthate from leaves to pod storage which can increase carbohydrates and sugars in fruit, and plant seeds are fuller and denser. Kamil (1986) stated that the weight of 100 seeds is related to the amount of moisture contained in the seeds, as well as various environmental factors such as the availability of nutrients for plants.

4. CONCLUSION

From the research that has been carried out, it can be concluded that the administration of vermicompost 25 ton.ha-1 gave the best results for the growth and production of green bean plants. pithy pods, weight of seeds planted, weight of seeds per plot, weight of 100 seeds.

SUGGESTION

Based on the research that has been carried out in increasing the growth and production of vima-1 mung bean plants, 25 tons of vermicompost ha-1 can be given

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