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THE EFFECT OF COOP FERTILIZER (COW FESES) AND PLANT DISTANCE ON THE GROWTH AND YEAR OF GREEN BEANS

(*Pengaruh Dosis Pupuk Kandang (Feses Sapi) Dan Jarak Tanam Terhadap Pertumbuhan dan Hasil Tanaman Kacang Hijau*)

Said Abdurrahman Assagaf, & Yasser Utomo
Faculty of Agriculture, Iqra Buru University
agrotechnology study program
Email: assagafuniqbu@gmail.com
yasseruniqbu@gmail.com

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Abstract

Mung bean is a short-lived annual plant of approximately 60 days, also acts as a tropical plant which throughout its life requires a hot atmosphere, which means that when in an area with low rainfall levels it is ideal if cultivating mung bean plants, the purpose of this study is to see the effect. Dose of Manure (Cow Feces) and Plant Distance on Growth and Yield of Mung Bean (Vigna Radiata L) in Batuboy Village). This research was conducted in Batuboy village, Namlea District, Buru Regency, and lasted from December 2016 to February 2017. The experiment's purpose was to determine and analyze the response of manure (cow feces) and spacing to the growth and yield of green bean plants. The experiment used a randomized block design (RBD) with a factorial pattern consisting of 2 factors, namely the provision of manure dose (first factor) and use of spacing (second factor). The first factor has three levels, namely K0 (without treatment), K1 (fertilizer dose of 1000 kg / h), K2 (fertilizer dose of 2000 kg / h). The second factor, the spacing consisted of 3 levels, namely J1 (50 x 10 cm), J2 (50 x 20 cm), J3 (50 x 30 cm), thus obtaining 9 treatments / combinations with 3 replications / group so that there were 27 units / units. trial. This study indicates that the application of manure (cow feces) 2000 kg/ha has a good effect on the growth and yield of green beans compared to others. This can be seen from the weight of production/plot 3.03 kg, while the best combination treatment is produced by a combination of 180 gr/plot manure and 50 x 30 cm spacing (K2J3).

Keywords: *Green Beans, Spacing, Buru*

Abstrak

Kacang hijau adalah tanaman semusim yang berumur pendek kurang lebih sekitar 60 hari, juga berperan sebagai tanaman tropis yang selama hidupnya menghendaki suasana panas yang berarti ketika dalam suatu daerah yang tingkat curah hujannya rendah sangat ideal bila membudi dayakan tanaman kacang hijau tujuan penelitian ini adalah melihat Pengaruh Dosis Pupuk Kandang (Feses Sapi) Dan Jarak Tanam Terhadap Pertumbuhan Dan Hasil Tanaman Kacang Hijau (Vigna Radiata L) di Desa Batuboy). Penelitian ini dilaksanakan di desa Batuboy, Kecamatan Namlea, Kabupaten Buru, berlangsung dari bulan desember 2016 hingga februari 2017. Tujuan percobaan adalah untuk mengetahui dan menganalisis respon pupuk kandang (feses sapi) dan jarak tanam terhadap pertumbuhan dan hasil tanaman kacang hijau. Percobaan menggunakan Rancangan Acak Kelompok (RAK) dengan pola faktorial yang terdiri dari 2 faktor yaitu pemberian dosis pupuk kandang (faktor pertama) dan penggunan jarak tanam (faktor kedua). Faktor pertama memiliki 3 taraf yaitu K0 (tanpa perlakuan), K1 (dosis pupuk 1000 kg/h), K2 (dosis pupuk 2000 kg/h). faktor kedua jarak tanam terdiri dari 3 taraf yaitu J1 (50 x 10 cm), J2 (50 x 20 cm), J3 (50 x 30 cm), sehingga memperoleh 9 perlakuan/kombinasi dengan 3 ulangan/kelompok sehingga terdapat 27 unit/satuan percobaan. Hasil penelitian ini menunjukkan bahwa pemberian pupuk kandang (feses sapi) 2000 kg/ha memberikan pengaruh yang baik terhadap pertumbuhan dan hasil tanaman kacang hijau di banding yang lainnya. Ini dapat dilihat dari berat

produksi/petak 3,03 kg, sedangkan untuk untuk perlakuan kombinasi yang terbaik di hasilkan oleh kombinasi Pupuk kandang 180 gr/petak dan jarak tanam 50 x 30 cm (K2J3).
Kata-kata kunci: *Kacang hijau, Jarak Tanam. Buru*

INTRODUCTION

Mung bean is an important legume crop in Indonesia and is in third place after soybeans and peanuts. Rukmana (2006) states that when compared to other legumes, green beans have advantages, including early age, more drought tolerance, can be planted in less fertile land, and at the same time can be used as soil fertilizers because they can find symbiosis with rhizobium bacteria.

Mung bean (Vigna radiata L.) is one of the legume plant commodities that many Indonesian people eat, such as green bean porridge and dumplings. The sprouts are known as bean sprouts. This plant contains nutrients, including amylum, protein, iron, sulfur, calcium, fatty oil, magnesium, niacin, vitamins (B1, A, and E). Another benefit of this plant is that it can facilitate defecation and increase enthusiasm for life. It can also be used to treat hepatitis, sprains, beriberi, puerperal fever, headaches/vertigo, restoring health, urinating less smoothly, lack of blood, fluttering heart.

Mung beans are tropical plants that require a hot atmosphere throughout their life. This plant can be planted in the lowlands to an altitude of 500 m above sea level. Mung bean plants can grow in low rainfall areas by utilizing residual moisture in former irrigated soil, such as rice. This plant grows well in the dry season. In the rainy season, the vegetative growth is speedy, so it easily collapses. The main obstacle to planting in the rainy season is diseases that attack the leaves and pods. Mung beans can grow in all kinds of well-drained soil types. However, it grows best in ordinary loam soils to those that have high organic matter. Soil that has a pH of 5.8 is ideal for green bean growth.

Meanwhile, very acidic soil is not good because it will hinder the provision of food. Mung beans require soil with sufficient nutrients (phosphorus, potassium, calcium, magnesium, and sulfur). This nutrient is essential for increasing production. In growth, green bean plants need soil that does not contain too many clay particles. Soil with high organic matter content is very suitable for green bean plants. Sandy soils can also be used to grow green bean plants as long as the soil water content is well preserved. The recommended soil, namely latosol and regosol soil. These two types of soil will be better if used after planting rice plants first. Soil acidity (pH) required for optimal growth is between 5.5-6.5. Soils with a pH below 5.5 need calcification to increase the pH and neutralize aluminum poisoning.

Meanwhile, for soil pH above 6.5, this treatment is not required. 16 Mung beans (Vigna radiata L.) can be cultivated at an altitude of 5- 700 asl. In areas with a height above 700 asl, the productivity of green beans decreases, and the harvesting life becomes longer. Plants will grow well at an optimal temperature of 25-270 C and grow well in relatively dry areas with an air humidity of 50-90% (Purwono and Hartono, 2005: 21). Almost all countries in the world need green beans for various purposes. What is required now is the green bean farmers' and producers' foresight in taking advantage of these opportunities (Andrianto and Indarto, 2004).

However, the increase in planted area was only about 5% / year. This slow increase is partly due to farmers' difficulty obtaining good quality seeds and harvest times that are not synchronous (Marzuki and Soeprapto, 2001). According to Setyamidjaja (2003), fertilizers are all materials given to the soil

to improve the physical, chemical, and biological properties of the soil, which according to the process consists of natural (organic) fertilizers and artificial (inorganic) fertilizers.

Organic fertilizers are fertilizers that are processed from organic waste such as animal manure, garbage, crop residues, sawdust, activated sludge, the quality of which depends on the process or action given (Yuliprianto, 2010). Waste is fertilizer derived from animal manure such as cow, goat, chicken, and sheep dung, which contains many macros and micronutrients (Distan, 2011).

Cow dung manure is an organic material that specifically plays a role in increasing phosphorus availability and micro-elements, reducing the destructive effects of aluminum, providing carbon dioxide in the plant canopy, especially in plants with dense canopy where air circulation is limited. Cow dung manure contains many nutrients needed by plants such as N, P, K, Ca, Mg, S, and Bo (Brady, 1974 in Sudarkoco, 1992).

Besides that, another critical factor in plant productivity is the arrangement of spacing. Setting spacing with a specific density aims to provide space for each plant to grow properly. Spacing will affect the density and efficiency of light use, competition between plants in water, and nutrients to affect crop production. At low densities, plants compete less with other plants, resulting in better performance of individual plants. On the other hand, at high density, the level of competition between plants for light, water, and nutrients is tighter so that plants can be stunted (Hidayat, 2008).

Based on the background stated above, it is considered necessary to carry out research to study and determine the response of testing manure (cow feces) and spacing to the growth and yield of green bean plants (Vigna radiate L).

RESEARCH METHOD

This research was conducted in Batuboy village, Namlea District, Buru Regency. The implementation of this research was started in December 2016 to February 2017. The tools used in this study were hoe, machete, meter (measuring instrument. While the materials used in this study were green bean seeds, manure (cow feces). This study using a factorial randomized block design (RBD) consisting of two factors:

Factor I: Manure (K) consists of:
K0 = Control
K1 = 1000 kg/Ha
K2 = 2000 kg/Ha

Factor II: Plant Distance (J)
J1 = Plant Distance 50 x 10 cm
J2 = Plant Distance 50 x 20 cm
J3 = Jarak Tanam 50 x 30 cm.

Factor I: Manure (K) consists of: The research method contains information on the nature of the research, data and data sources, data collection techniques, data collection instruments, data collection procedures, and data analysis methods.

DISCUSSION

Recapitulation of Variety Analysis Results

The research data for all observation parameters are presented in the appendix (1a, 1b to 6a, 6b), while the summary of the analysis results is presented in the following table.

Table 1. The summary of the results of the cross-sectional analysis of the parameters of the observation of the application of manure and distance of planting on the growth and production of green beans.

Source of Diversity / Variable	Group	treatment combination	Manure	Spacing	Interacito n
Plant height	**	**	**	**	**
Number of Leaves	**	**	**	**	**
Pod Length	**	**	**	**	tn
Number of Pods	tn	**	**	**	tn
Weight 100 Grains	tn	**	**	tn	tn
Production Weight	tn	**	**	**	tn

Information:
tn = Not Real
** = Very Real

In Table 1. The summary results of variance showed that the replicates / groups on the parameters of plant height, number of leaves, pod length were very significantly different, but the number of pods, weight of 100 grains and weight of production / plot were not significantly different.
While the treatment parameters (combination) where plant height, number of leaves, length of pods, number of pods, weight of 100 grains and production weight had a very significant effect. For the observed parameters of manure, it has a very significant effect on all observed variables and its use, in contrast to the observation parameter of the planting distance, only one variable has no significant effect, namely the weight of 100 grains for the other variables which have a very significant effect.
Likewise, the interaction observation parameters on plant height and number of leaves had a very significant effect. Meanwhile, the interaction on the observations of pod length, number of pods, weight of 100 grains and production weight had no significant effect.

Plant Height (cm)

The observation results of plant height and variance are presented in the tables in Appendix 1a and 2b. Variety shows that the treatment of manure dose and spacing has a very significant effect as well as the interaction is very significant.
Table 2. BNJ test results Plant height (cm) on manure treatment and spacing for green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	41.92 a	43.80 ab	45.16 bc	43.63 a	1,91
K_1	46.32 cd	47.17 de	48.19 def	47.23 b	
K_2	49.20 fg	51.04 g	58.77 h	53.00 c	
average	45.81 a	47.33 a	50.71 b		

Information: Numbers followed by different letters mean significantly different at the BNJ 0.05 level

The results of the 0.05 BNJ test in Table 2 show that the application of manure (K2) provides the highest average value for plant height, namely 53.00 cm, very significantly different from Control (K0) and (K1), while the spacing treatment (J3) 50 x 30 cm with a height of 50.71 cm, has a very significant effect on the treatment of spacing (J1) 50 x 10 cm and spacing (J2) 50 x 20 cm. with a height of 50.71 cm.
In the treatment combination, there was an interaction between 180 g / plot of manure with a spacing of 50 x 30 (K2J3), showing that the best plant height was 58.77 cm, very significantly different from all combination treatments.

Number of Leaves (strands)

The results of the observation on the number of leaves and their variance are presented in the Appendix 2a and 2b tables. Variety shows that the treatment of manure dose and spacing has a very significant effect, as well as the interaction is very significant.
Table 3. Results of the BNJ test for the number of leaves (strands) on the manure treatment and spacing for green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	22.62 a	23.25 abc	23.55 abc	23.14 a	1,03
K_1	23.11 ab	23.55 abc	23.74 bcd	23.46 ab	
K_2	24.62 d	23.85 bcd	27.07 e	25.18 b	
Average	23.45 a	23.55 a	24.79 b		

Note: Numbers followed by different letters mean significantly different at the BNJ 0.05 level.

The results of the BNJ 0.05 test in Table 3, show that the application of manure (K2) provides the highest average value for the number of leaves, namely 25.18, significantly different from (K1) and very significantly different from the control (K0), while treatment spacing (J3) 50 x 30 cm, very significant effect on the treatment spacing (J1) 50 x 10 cm and spacing (J2) 50 x 20 cm. with 24.79 leaves.

In the combination of interactions between 180 gr / plot manure and 50 x 30 spacing (K2J3), the highest number of leaves was 55.25 cm, very significantly different from all existing combination treatments.

Number of pods

The results of the observation on the number of pods and fingerprints are presented in the tables in Appendices 3a and 3b. Variance prints showed that the treatment and spacing had a very significant effect, but the interaction had no significant effect.

Table 4. BNJ test results The number of pods planted in the sample on the treatment of manure doses and spacing of green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	29.14	29.77	31.22	30.04 a	1,24
K_1	31.14	31.48	32	31.54 b	
K_2	32.11	32.81	33.22	32.71 b	
Average	30.80 a	31.35 ab	32.14 b		

Note: Numbers followed by different letters mean significantly different at the BNJ 0.05 level

The results of the BNJ 0.05 test in table 4 show that providing manure (K2) provides the highest average value for the number of pods, namely 32.71 pods, very significantly different from control (K0) and significantly different from (K1), while treatment spacing (J3) 50 x 30 cm, very significant effect on treatment spacing (J1) 50 x 10 cm and significant effect on spacing (J2) 50 x 20 cm.

Pod length (cm)

The results of the pod length observations and their variance are presented in Tables 4a and 4b. The analysis of variance showed that the manure treatment and spacing had a very significant effect, while the interaction had no significant effect.

Table 5. BNJ test results Pod length (cm) on the treatment of manure doses and spacing for green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	8.01	8.26	8.81	8.36 a	0,33
K_1	9.14	9.5	9.64	9.43 b	
K_2	9.98	10.17	10.92	10.36 c	
Average	9.04 a	9.31 ab	9.79 b		

Note: Numbers followed by different letters have a significant effect on the BNJ 0.05 level

The results of the BNJ 0.05 test in Table 5 show that the treatment of manure dose (K2) gave the highest average value for pod length, namely 10.36 cm, which was very significantly different from the control (K0) and (K1). While the spacing (J3) 50 x 30 cm showed the best pod length, which was 9.79 cm, which was very significantly different from treatment (J1) and significantly different in treatment (J2).

Weight 100 grains (grams)

The results of the observation on the weights of 100 items and their variance are presented in Tables 5a and 5b. The analysis of variance showed that the manure treatment and spacing had a very significant effect, while the interaction had no significant effect.

Table 6. BNJ test results Weights of 100 grains (grams) on the treatment of manure doses and spacing of green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	5.23	5.82	5.89	5.65 a	0,67
K_1	6.49	6.14	6.64	6.42 b	
K_2	6.81	6.97	7.03	6.94 b	
Average	6.18 a	6.31 a	6.68 a		

Note: Numbers followed by different letters mean significantly different at the BNJ 0.05 level

The results of the BNJ 0.05 test in table 6 show that the manure dose treatment (K2) gives the best average value for the weight of 100 grains, namely 6.94 grams, very significantly different from the control (K0) and significantly different from the fertilizer dosage treatment. cage (K1). While the spacing (J3) 50 x 30 cm showed the weight of 100 grains (gr) which was not significantly different from the treatment (J1) 50 x 10 cm and (J2) 50 x 20 cm.

Production per plot (kg)

The results of observations on mung bean production and their variance are presented in Tables 6a and 6b. The analysis of variance showed that the manure treatment had a significant effect, while the treatment of spacing had a very significant effect and the interaction had no significant effect.

Table 7. The results of the BNJ production test per plot (kg) on the treatment of manure doses and spacing for green bean plants.

Treatment	J_1	J_2	J_3	Average	BNJ (0,05)
K_0	1.27	1.42	1.53	1.41 a	0,33
K_1	2.14	2.26	2.52	2.31 b	
K_2	2.78	3.06	3.26	3.03 c	
Average	2.06 a	2.25 ab	2.44 b		

Note: Numbers followed by different letters mean significantly different at the BNJ 0.05 level

The results of the BNJ 0.05 test in table 7 show that the treatment of manure dose (K2) provides the highest average value for production weight, namely 3.03 kg, which is very significantly different from the control (K0) and (K1). While the spacing treatment (J3) 50 x 30 cm showed pod weight which was not significantly different from treatment (J2) 50 x 20 cm but was very significantly different from treatment (J1) 50 x 10 cm.

Plant growth is the development of a plant, these various developments can be expressed in a way, starting from a certain part of a plant to the total number of plant developments and within plant limits ranging from fresh weight, length, height, growth or total plant growth (Poerwiwidodo, 2002).

The results of this study indicate that manure, especially cow feces with different distances, gives results that are quite significantly different from one another from the observed parameters. Growth and development are not only determined by the physical genetics of plants, but also by examining environmental factors including climate, nutrients and water, which are very influential on processes and activities in

plants. The results of the experiment can be seen that the application of manure and different spacing has different effects on the observed parameters. This can be seen from plant height, number of daum, number of pods, pod length, weight of 100 seeds, and production / plot.

The results of the BNJ test (0.05) in table 2. The plant height shows the dose of manure (K2), giving the highest plant height, namely 53.00 cm, while the spacing treatment (J3) 50 x 30 cm gives a very significant difference. treatment of spacing (J1) and treatment of spacing (J2). Then, the combination of 180 g / plot manure dose and 50 x 30 spacing (K2J3) gave real results of 58.25 cm from all combination treatments.

Then in the BNJ test (table 3) the dose treatment of manure (K2) gave the highest number of leaves, namely 25.18, while for the spacing with spacing (J3) the highest number of leaves was 24.79, in combination with The average value possessed by the combined treatment dose of fertilizer was 180g / plot and the spacing was 50 x 30 cm (K2J3) with 27.77 leaves. Likewise in the results of the BNJ test (table 4) the number of pods showed that the dose of manure (K2) gave the highest number of pods, namely 32.71 pieces, while the spacing of 50 x 30 cm (J3) gave a very significant difference in the distance treatment. cropping (J2) and the real difference pa (J3). Then the combination of 180 g / plot manure and 50 x 30 cm spacing (K2J3) gave the best results, namely 33.22 pieces.

Likewise, the BNJ results (Table 5) pod length showed that the application of manure (K2) gave the best results, namely 10.36 cm. while the 50 x 30 spacing (J3) treatment provided a significant difference in the spacing (J2) treatment and a very significant difference in (J1). Then the combination of 180 g / plot manure and 50 x 30 cm spacing (K2J3) gave the best results, namely 10.93 cm.

Likewise, the BNJ results (table 6) with a weight of 100 grains indicate that the manure (K2) dose gives the best result, namely 6.94 g. while the spacing treatment (J3) did not give a significant difference with the spacing treatment (J2) and (J1). Then the combination of 180 g / plot manure and 50 x 30 cm spacing (K2J3) gave the best results, namely 7.03 (g).

Likewise, the BNJ results (Table 7) production weight per plot (kg) showed that the application of manure (K2) gave the best results, namely 3.03 kg / plot, while the 50 x 30 spacing treatment (J3) did not give a significant difference. on treatment (J2) and gave a very real difference in (J1). Then, the combination of 180 gr / plot manure and 50 x 30 spacing (K2J3) gave the best production results, namely 3.26 kg / plot.

Basically, the fertilizer needed by a plant depends on the fertility of the soil being managed. A land that has different soil fertility levels and soil types will also have different determinants of fertilizer doses and the applicable spacing. Plant density in this case the spacing has an inseparable relationship with the amount of yield to be obtained from a plot of land. Tight spacing can lead to intense competition by plants for nutrients which in turn can reduce production. In addition to the plant elements themselves that affect the spacing, the factor of soil fertility, soil moisture will also cause competition if the spacing is getting closer (Subandi, 2001).

The production of a plant is determined by the activities that take place in the cells and tissues of photosynthesis or the net result of photosynthesis. Photosynthesis is the result of reducing energy by decreasing energy due to breathing. Photosynthesis can be in the form of fruit, seeds, and stems (Rukmana, 2008)

Most of the plant's wet weight is due to water content. So that the wet weight of a plant is generally very dependent on the humidity of a plant. The amount of water demand for each growth phase is directly related to physiological processes,

morphology, and environmental factors. (Loveless, 2008)

Agustina (2008) adds that the availability of nutrients in the soil greatly affects the water requirements for plants. In addition, the availability of nutrients is one of the environmental factors that greatly determines the rate of plant growth. As well as good spacing can reduce competition between plants for nutrient absorption, water and sunlight so that plant height yields can be better when compared to plants with irregular planting.

CLOSING

Based on the research results, it can be concluded as follows: Giving manure dose of 2000 kg / ha (K2) had a good effect on plant height 53.00 cm, number of leaves 25.18, number of pods 32.71, pod length 10.36 cm, weight 100 grains. 6.94 g and production 3.03 kg / plot. The treatment of spacing (J3) 50 x 30 cm had a good effect on plant height, number of leaves, number of pods, length of pods weighing 100 grains and production of green bean plants. Giving a combination of 180 g / plot manure dosage and 50 x 30 spacing (K2J3) gave the best results, namely plant height 58.25 cm, number of leaves 27.07 strands, number of pods 33.22, pod length 10.93 cm, the weight of 100 grains is 7.03 g, and the production weight is 3.26 kg per plot. The growth and development of green bean plants is influenced by the availability of nutrients in the soil, even though the green bean plants are quite resistant to dryness, but the lack of nutrients for plants will cause disrupted plant growth and decreased production yields.

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