

The Effect of Giving Bokashi Goat Manure Mixed with Lamtoro on the Growth and Yield of Peanuts (*Arachis hypogaea* L.)

Ginda Thufriati Sepdelan, Friza Elinda, Dewi Jayagma Ilham and Aulia Meyuliana*

Mahaputra Muhammad Yamin University, Solok, West Sumatera, Indonesia

*Correspondence e-mail: auliameyuliana@ummy.ac.id

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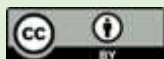
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Abstract: Peanuts are a legume commodity that is widely planted in Indonesia, the amount of demand for which continues to increase every year, but it is still not sufficient for the needs in Indonesia. To overcome the problems that occur in the field, organic fertilizer can be used, namely bokashi goat manure mixed with lamtoro, which is expected to reduce the use of inorganic fertilizers. This study aims to determine the effect of providing bokashi goat manure mixed with lamtoro, which is expected to improve soil fertility and the availability of nutrients in the soil. This research was conducted in Jorong Lubuk Pulai, Nagari Sirukam, Payung Sekaki District, Solok Regency. This research was conducted using a Randomized Block Design (RBD) with 6 treatments and 4 groups. The treatments given were goat manure bokashi mixed with lamtoro as much as P0: 0 grams/plant (control), P1: 10 grams/plant, P2: 20 grams/plant, P3: 30 grams/plant, P4: 40 grams/plant, P5: 50 grams/plant. The parameters observed were plant height (cm), number of primary branches (fruit), age at flowering (days), and fresh weight of seeds per plant (g). The provision of bokashi goat manure mixed with lamtoro did not have a significant effect on the observation variables, namely plant height, number of primary branches, flowering age, and fresh seed weight per plant.

Keywords: bokashi, lamtoro, legume, organic fertilizers

1. INTRODUCTION

Peanuts are the second most widely grown legume commodity in Indonesia after soybeans. The amount of peanut demand continues to increase every year, but it is still not sufficient to meet the needs in Indonesia because productivity continues to decline during 2020-2022. BPS data states that peanut production in 2020 was around 13.95 kw/ha, in 2022 there was a decrease again to 11.00 kw/ha. However, the level of demand continues to increase so that it cannot be balanced with the large productivity which can cause the supply of domestic peanuts to continue to decrease (BPS, 2022). One of the factors that affect agricultural land productivity is the lack of soil fertility. In some problems that have occurred in the field, farmers in Indonesia are accustomed to using chemical fertilizers. Exposure to chemicals that has occurred for a long time can cause the remaining organic matter content in the soil to decrease from one percent to become dead soil (Kurniawan, 2017).

Non organic fertilizers when used in the long term will harm the soil including soil pH tends to be acidic, and the soil being hard and becomes not fertile. Efforts that can be made to overcome this are to balance the use of inorganic fertilizers with organic fertilizers (Elinda *et al.*, 2023). The solution to reduce the use of chemical fertilizers is to utilize organic fertilizers made from plant and animal waste. The use of organic fertilizers can increase soil fertility and crop production in environmentally friendly sustainable agriculture. One type of organic fertilizer that is often used for plants is bokashi (Itelima *et. al.*, 2018). The results of Erfina *et. al.*, (2023) research, the provision of goat manure fertilizer without a mixture of plants has a significant effect on flowering age, number of pods, weight of 100 seeds, and number of small seeds with a dose of 20 grams in green bean plants.

The research Atika *et al.*, (2017), goat manure fertilizer has a C/N of 20-25 which causes the decomposition process to run well so that the nutrients contained in goat manure fertilizer can be available to plants in addition to being able to provide nutrients, goat manure has a high ion binding capacity so that it will make the use of organic fertilizers more effective by minimizing the use of inorganic fertilizers due to evaporation or being washed away by irrigation water or rainwater. Therefore, in making bokashi, goat manure can be added with plants that can add nutrients to bokashi such as lamtoro. State Aulia *et. al.*, (2021), lamtoro contains a lot of organic material, where the nutritional content of lamtoro in 100 grams is 2.52% N, 0.21% P and 1.63% K, so that the lamtoro plant is very good for use as fertilizer for cultivated plants.

2. METHOD

The research was conducted in Nagari Sirukam, Payung Sekaki District, Solok Regency, West Sumatra Province, at an altitude of 620 meters above sea level. The materials used in this study were top soil, goat manure, lamtoro leaves, bran, brown sugar, EM-4, and the peanut seeds used were of the upright type, namely the Garuda Biga variety.

a. Plant height Experimental design

This study used a Randomized Block Design (RAK) consisting of 6 treatments and 4 replications. Data analysis used the F test at the 5% level. The treatments given were goat manure bokashi mixed with lamtoro as much as P0: 0 grams/plant (control), P1: 10 grams/plant, P2: 20 grams/plant, P3: 30 grams/plant, P4: 40 grams/plant, P5: 50 grams/plant. The parameters observed were plant height (cm), number of primary branches (fruit), flowering age (days), fresh weight of seeds per planting (g).

b. Organic fertilizer preparation

Bokashi was made using 5 kg of goat manure, 600 grams of bran, 200 grams of lamtoro leaves, 80 grams of brown sugar, 1500 ml of water and 50 ml of Em-4. The prepared ingredients are mixed evenly, then crush 80 grams of brown sugar dissolved in 1500 ml of water and add 50 ml of EM-4. After all is mixed evenly, the solution is slowly poured on the goat manure and lamtoro leaf dough ingredients, while turning it over until the solution is well mixed, the dough is covered with a tarpaulin. Harianto *et al.*, (2020), said the best incubation period for goat manure and lamtoro leaves was 28 days at a temperature of 28°C. After 28 days of incubation, bokashi can be applied to plants.

3. RESULT AND DISCUSSION

c. Plant height

Plant height is a variable of plant growth that is easily observed as a parameter to determine the effect of treatment on plants. The increase in plant height indicates the vegetative growth activity of a plant. Based on the results of the analysis of variance at the 5% level, it is known that the

provision of various doses of goat manure bokashi mixed with lamtoro does not have a significant effect on the character of plant height.

Table 1. Average height of peanut plants (cm) at the age of 4 WAP (Weeks After Planting)

Doses (grams/plant)	Average plant of height (cm)
P4	18,69 ^{tn}
P0	17,76
P3	17,63
P5	17,50
P2	16,02
P1	15,46

Diversity coefficient= 15,66%^{tn}

Details: The numbers in the columns and rows of the average plant height show no significant difference when the F test is carried out at the 5% level.

Based on Table 1 above, it can be seen that the provision of goat manure bokashi mixed with lamtoro with the highest average on peanut plant height is in the P4 treatment, which is 18.69 cm and the lowest average plant height is in the P1 treatment, which is 15.46 cm. The effect of giving bokashi given to peanut plants on the growth of plant height achieved shows that giving goat manure bokashi mixed with lamtoro can provide good growth in peanut plants. In addition, giving bokashi fertilizer with different doses will cause different growth rates. Sufficient nutrients will produce better plant growth. For example, nitrogen (N) is an essential nutrient for plants. With sufficient nutrients, the maximum plant height will be achieved.

d. Number of Primary Branches

The number of primary branches is one of the important parameters to be observed in order to obtain information on how the environment and genetics influence plants. Based on the results of the analysis of variance, it shows that the provision of various doses of goat manure bokashi mixed with lamtoro does not have a significant effect on the character of the number of primary branches of peanut plants.

Tabel 2. Average number of primary branches of peanut plants at the age of 4 WAP (Weeks After Planting)

Doses (grams/plant)	Average number of primary branches (cm)
P0	7,50 ^{tn}
P2	7,37
P3	7,31
P5	7,31
P4	7,19
P1	7,00

Diversity coefficient= 15,66%

Details: The numbers in the columns and rows of the average plant height show no significant difference when the F test is carried out at the 5% level.

Based on Table 2, it is known that the provision of goat manure bokashi mixed with lamtoro with the highest average number of primary branches is in P0, which is 7.50 pieces and the lowest average number of primary branches of peanut plants is in the P1 treatment, which is 7.00 pieces. This shows that the number of primary branches from each treatment shows almost the same number of branches. When viewed from the treatment, P0 gave a good growth response even without being given goat manure bokashi mixed with lamtoro fertilizer because the provision of basic fertilizer can help increase the growth of the number of branches in peanut plants.

e. Age at Flowering

The flowering age of plants is one of the parameters that need to be observed. The flowering age of a plant can be influenced by various environmental factors such as light, rainfall and genetic influences of the variety used. Based on the results of the analysis of variance of the flowering age of plants observed from the beginning of planting until the plants flowered 50%, it showed that the provision of various doses of goat manure bokashi mixed with lamtoro did not have a significant effect on the character of the flowering age of peanut plants.

Tabel 3. Average flowering age of peanut plants (days) at the age of 5-6 WAP (Weeks After Planting)

Doses grams/plant	Average flowering age (days)
P1	43,25 ^{tn}
P4	42,75
P3	42,50
P5	42,50
P2	41,00
P0	40,50

Diversity Coefficient = 6,06%

Details: The numbers in the columns and rows of the average plant height show no significant difference when the F test is carried out at the 5% level.

Based on Table 3, it can be seen that statistically the average flowering age of peanut plants does not show a significantly different number of days. However, the highest average flowering age was found in P1, which was 43.25 days, and the lowest average flowering age of peanut plants was found in the P0 treatment, which was 40.5 days. This explains that the P0 treatment has a good effect on accelerating the flowering age of plants even though the P0 treatment was not given a mixed goat manure bokashi treatment. From table 3, the average flowering age of plants from each treatment can be seen that the flowering age of peanut plants appears to show a different number of days when the plants will flower as a whole. In this study, environmental factors are also included as influences that can affect the flowering age of peanut plants.

f. Fresh Weight of Seeds per Plant

The wet weight of seeds is one of the parameters that need to be observed. Based on the results of the analysis of variance, it shows that the provision of various doses of goat manure bokashi mixed with lamtoro does not have a significant effect on the wet weight character of peanut seeds.

Tabel 4. Average wet weight of peanut seeds at harvest (grams)

Doses grams/plant	Average wet weight of seeds (grams)
P5	13,29 ^{tn}
P3	13,12
P2	12,58
P4	11,87
P1	9,39
P0	9,33

Diversity coefficient= 32,45%

Details: The numbers in the columns and rows of the average plant height show no significant difference when the F test is carried out at the 5% level.

Based on Table 4 statistically the average wet weight of peanut seeds shows almost the same amount. However, the plant with the heaviest average wet weight of seeds is in P5, which is 13.29 g and the lowest average wet weight of seeds is in P0, which is 9.33 g from the results of the wet weight of seeds in plants after harvesting each treatment explains that the wet weight of seeds in peanut plants shows an increase that occurs during the harvest period. Table 9 shows that the highest average wet weight of peanut seeds is in the P5 treatment with a dose of 50 grams/plant.

The effect of bokashi on plant height, according to Pramita *et. al.*, (2016), the lack of bokashi given to the soil before the planting process did not show any effect on the height of peanut plants. So that the nutrients in plants are obtained from the provision of organic soil materials depending on the type and number of organic materials given, the higher the dose given, the higher the nutrient content in the soil. As stated, Sunarsan *et al.*, (2024), the function of nitrogen is for plant growth and also as a component of protein enzymes which play an important role in plant metabolism. The nutrients contained in the soil are classified as very low so that they are not sufficient to meet the nutrient needs of plants. More organic fertilizer given means the more nutrient levels will be produced from the mineralization of fertilizer that can be absorbed by plants to increase the growth of a plant.

Bokashi fertilizer is able to provide nutrients for plants even in small amounts to increase branch growth. This is in accordance with the opinion of Marlina *et. al.*, (2015), stating that the nitrogen (N) nutrient contained in bokashi fertilizer is very important for vegetative plant growth because it can stimulate overall growth, especially stems, branches and leaves. In addition, other factors that can affect branch growth in peanuts are environmental factors. In accordance with the opinion of Karmila and Andriani (2019), high or low temperatures are also one of the factors that determine the growth and development of a plant.

The time required for a plant to flower is determined by temperature and day length, where the higher the temperature around the plant, the quicker the plant will flower. The weight or low yield of crops is also influenced by soil conditions as a growing medium for plants. Rahmadan and Prastia (2021) stated that the physical, chemical and biological properties of the soil that are quite good and supported by appropriate environmental factors will make it easier for plants to absorb nutrients so that plant growth and yields are better.

Bokashi mixed with lamtoro can increase nutrients in bokashi, especially macro nutrients like nitrogen and micro nutrients but in this research that doses did not have a significant effect. Lamtoro leaves that have compound nutrients are an alternative as organic fertilizer. State Aulia *et. al.*, (2021) macro nutrients, especially N, P, K and Ca are found in abundance in green organic fertilizers such as lamtoro leaves. Lamtoro contains a lot of organic material, where the nutrient content of lamtoro in 100 g is 2.52% N, 0.21% P and 1.63% K, so lamtoro plants are very good for use as fertilizer for cultivated plants.

Factors that can affect the filling of peanut pods are highly dependent on the availability of nutrients contained in the bokashi goat fertilizer mixed with lamtoro. In accordance with the opinion of Permatasari, *et al.*, (2014), and Sinaga (2017), it is stated that if the availability of essential macro nutrients is in sufficient and balanced conditions, it will cause the process of amino acid and protein formation to increase in seed formation so that it will produce pods that are filled more optimally.

4. CONCLUSIONS

The provision of bokashi goat manure mixed with lamtoro did not have a significant effect on the observation variables, namely plant height, number of primary branches, flowering age, and fresh seed weight per plant.

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