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RESPONSE OF PEANUT PLANTS (*Arachis hypogaea* L.) TO THE APPLICATION OF BOKASHI FERTILIZER BASED ON SECONDARY VEGETATION BIOMASS AND PHOSPHORUS ON MARGINAL LAND

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Abstract

Peanuts (*Arachis hypogeae* L.) currently have low production levels due to the availability of fertile land. Bokashi fertilizer based on secondary vegetation biomass and phosphorus fertilizer can be used as a practical and environmentally friendly approach to maintain peanut plant growth and yield. This study aims to examine the interaction or independent treatment of bokashi fertilizer and phosphorus fertilizer on the growth and yield of peanut plants on marginal land. This study used a randomized block design with two factors. The first factor was bokashi fertilizer, consisting of 4 levels, namely without bokashi fertilizer (B0), 4 t ha^{-1} of bokashi fertilizer (B1), 8 t ha^{-1} of bokashi fertilizer (B2), and 12 t ha^{-1} of bokashi fertilizer (B3). The second factor is phosphorus fertilizer, consisting of 4 levels namely, no phosphorus fertilizer (F0), 100 kg ha^{-1} phosphorus fertilizer (F1), 125 kg ha^{-1} phosphorus fertilizer (F2) and 150 kg ha^{-1} phosphorus fertilizer (F3), resulting in 16 treatment combinations with 3 replicates. The results showed that the interaction between bokashi fertilizer and phosphorus fertilizer could enhance the growth and yield of groundnuts, particularly in terms of relative growth rate, leaf area index, net assimilation rate at 21-28 and 35-42 days after sowing, root-to-shoot ratio, chlorophyll content, number of pods, number of seeds, seed weight, 100-seed weight, and yield per hectare. The interaction treatment of bokashi fertilizer at a dose of 12 t ha^{-1} and phosphorus fertilizer at 150 kg ha^{-1} was the best treatment for peanut plant growth and yield.

Keywords: bokashi fertilizer, phosphorus fertilizer, peanuts, marginal land, peanut plant growth and yield.

INTRODUCTION

Peanuts (*Arachis hypogaea* L.) are legumes that are cultivated and are the second most popular nuts after soybeans in Indonesia. As a highly nutritious food, peanuts contain fat, protein, carbohydrates, and vitamins (Kurniawan *et al*., 2017). The demand for peanuts continues to increase year after year in line with population growth, community nutritional needs, food diversification, and increased food and feed industry capacity in Indonesia. Data from the Ministry of Agriculture shows that peanut production declined from 2021 to 2023. In 2022, peanut production fell by 10.54% from 2021. In 2023, peanut production fell again by 29.91% from 2022 (Direktorat Jendral Tanaman Pangan, 2023). One way to meet public demand is to optimize the peanut cultivation system by utilizing marginal land.

Marginal land is land that is low in fertility, both in terms of soil chemistry, physics, and biology. The total area of marginal land in Indonesia reaches 157.246.565 hectares. However, the potential land that can be utilized for sustainable agricultural cultivation is only 91.904.643 hectares or around 58.4% (BALITBANG. 2015). Marginal land often experiences degradation due to erosion, compaction soil, acidification, salinization, and chemical contamination, thereby reducing soil quality and crop productivity. This condition results in relatively low productivity of marginal land. One way to meet the organic matter and phosphorus content in marginal land is by using bokashi and phosphorus fertilizers. Bokashi is the result of fermenting organic materials from agricultural waste (manure, straw, garbage, sawdust husks) using EM4 (Tufaila, 2014). Bokashi can stimulate plant root growth by improving soil structure and increasing nutrient availability. Soil that is looser and richer in nutrients allows

roots to grow deeper and spread more widely so that plants can absorb water and nutrients more efficiently (Iswahyudi *et al*, 2020). The phosphorus content in bokashi fertilizer made from krinyuh and gamal is relatively low, so the use of phosphorus fertilizer can help meet phosphorus availability. Phosphorus fertilizer is a fertilizer that contains the nutrient phosphorus (P), which is important for plant growth, especially in root development, flower formation, and seed production. Phosphorus is especially important for legumes legumes. Phosphorus is a major component of adenosine triphosphate (ATP) in plants and also plays various roles in seed formation (Nazir *et al*., 2022). Marginal lands often have low organic matter and phosphorus content, so the application of bokashi fertilizer rich in nutrients can have a positive impact. Additionally, the use of secondary vegetation biomass as bokashi raw material also has the potential to provide dual benefits, namely vegetation waste management and soil fertilization. The use of and phosphorus fertilizer can interact positively to support the growth and production of peanut plants on marginal land.

LITERATURE REVIEW

Peanut plants are classified into Kingdom: *Plantae*; Division: *Spermatohypta*; Subdivision: *Angiospermae*; Class: *Dicotyledoneae*; Order: *Polypetalae*; Family: *Leguminosae*; Genus: *Arachis*; Species: *Arachis hypogaea* L. (Suprapto, 2006). Peanuts produce the best results when planted in loose, well-drained soil, especially sandy soil. Light-textured soil facilitates pod penetration and development, and soil calcium availability is essential for proper seed growth. The ideal soil for plants is soil that contains sufficient macro and micro nutrients (Buhairah, 2007). The current limitation of fertile land is one of the problems for crop cultivation, so utilizing marginal land can help optimize the peanut cultivation system. Marginal land is dry land with limited nutrient content. Farming on marginal land planted with seasonal crops usually has relatively low productivity (Sasmita *et al*., 2020). The use of organic fertilizers such as bokashi and additional phosphorus is one way to increase nutrient content and improve the texture of marginal land. Bokashi is the result of fermenting organic materials from agricultural waste (manure, straw, garbage, sawdust husks) using EM4 (Tufaila, 2014). Bokashi contains macro and micro nutrients such as N, P, K, Ca, Mg, Fe, Mn, Cu, Zn, and Boron that can help plant growth. Bokashi fertilizer can improve soil structure by increasing organic matter in the soil and enhancing the soil's ability to retain water content. Soil microbial activity can also help plants absorb nutrients from the soil (Arum *et al*., 2018). Phosphorus is an important nutrient, especially for legumes. Phosphorus is a major component of adenosine triphosphate (ATP) in plants and also plays various roles in seed formation (Nazir *et al*., 2022).

METHOD

Research Location and Time

This research was conducted in Motewe Village, Sidodadi Subdistrict, Batalaiworu, Muna Regency. The research location is at -4.8021975 °LS, 122.723116 °BT and is 1.843 km from the coastline. The work will take place from April 2025 to June 2025.

Research Design

This study uses a randomized block design (RBD) with a factorial pattern consisting of 2 factors. The first factor is bokashi fertilizer, consisting of 4 levels, namely without bokashi fertilizer (B0), 4 t ha^{-1} bokashi fertilizer (B1), 8 t ha^{-1} bokashi fertilizer (B2), and 12 t ha^{-1} bokashi fertilizer (B3). The second factor is phosphorus fertilizer, consisting of 4 levels, namely without SP-36 phosphorus fertilizer (F0), SP-36 phosphorus fertilizer 100 kg ha^{-1} (F1), 125 kg ha^{-1} of SP-36 phosphorus fertilizer (F2), and 150 kg ha^{-1} of SP-36 phosphorus fertilizer (F3). Thus, 16 treatment combinations with 3 replicates were obtained, resulting in 48 experimental units.

Research Procedure

The research was conducted by making bokashi, analyzing the soil, preparing the land, applying treatments, planting, maintaining, and observing the harvest. Bokashi was made from 100 kg of cow manure, 300 kg of kirinyuh, 300 kg of gamal, 18 kg of dolomite lime, 1 L of EM4, 1 kg of granulated sugar, and 10 L of water. Soil analysis was conducted to determine the available P, organic C, and salinity content. Initial soil analysis was conducted before the application of bokashi fertilizer and phosphorus fertilizer. Final soil analysis was conducted after the application of bokashi fertilizer and phosphorus fertilizer and after the plants had been harvested. Land preparation continued with the creation of 25 m x 3 m experimental plots. The bokashi fertilizer dosage was based on the optimum dosage from the test results. The planting distance was 25 cm x 30 cm, with two seeds per hole. Watering was carried out according to planting conditions. Two weeks after planting, thinning was carried out to

select one plant per hole to be maintained until harvest. Transplanting was carried out when the plants were seven days old after planting (DAP) by replacing dead plants. Weeding was carried out every week or adjusted to the growth of weeds. Pests and diseases were controlled with insecticides, pesticides, or fungicides according to the type of pests and diseases that attacked.

Observation Variables

The observation parameters include peanut growth, namely relative growth rate and area index. Leaves, net assimilation rate, root decay ratio, and chlorophyll analysis. Production parameters include the number of full pods, number of empty pods, number of young pods, number of seeds, seed weight, weight of 100 seeds, and yield (t ha^{-1}).

Data Analysis

The observation data were analyzed using analysis of variance or ANOVA. Analysis results showing F count > F table were followed by Duncan's Multiple Range Test (DMRT) at a 95% confidence level.

RESULTS AND DISCUSSION

Relative growth rate

The results showed that the dry weight of each treatment increased over time (Figure 1). The highest results were obtained in the treatment with a bokashi fertilizer dose of 12 t ha^{-1} (B3) and SP-36 phosphorus fertilizer 150 kg ha^{-1} (F3). This indicates that bokashi fertilizer improves soil conditions and provides optimal nutrients so that peanuts can grow well. Organic/bokashi decomposed then compounds that they contain will be released, thereby increasing plant growth (Marano and Tomi, 2018). Peanuts that were given phosphorus fertilizer also had a positive effect on the relative growth rate of peanut plants because phosphorus is good for plant growth, such as the formation of plant organs. One of the important functions of phosphorus in plants is in cell division and enlargement and other processes within the plant, and helps accelerate root development and germination (Winarso, 2005).

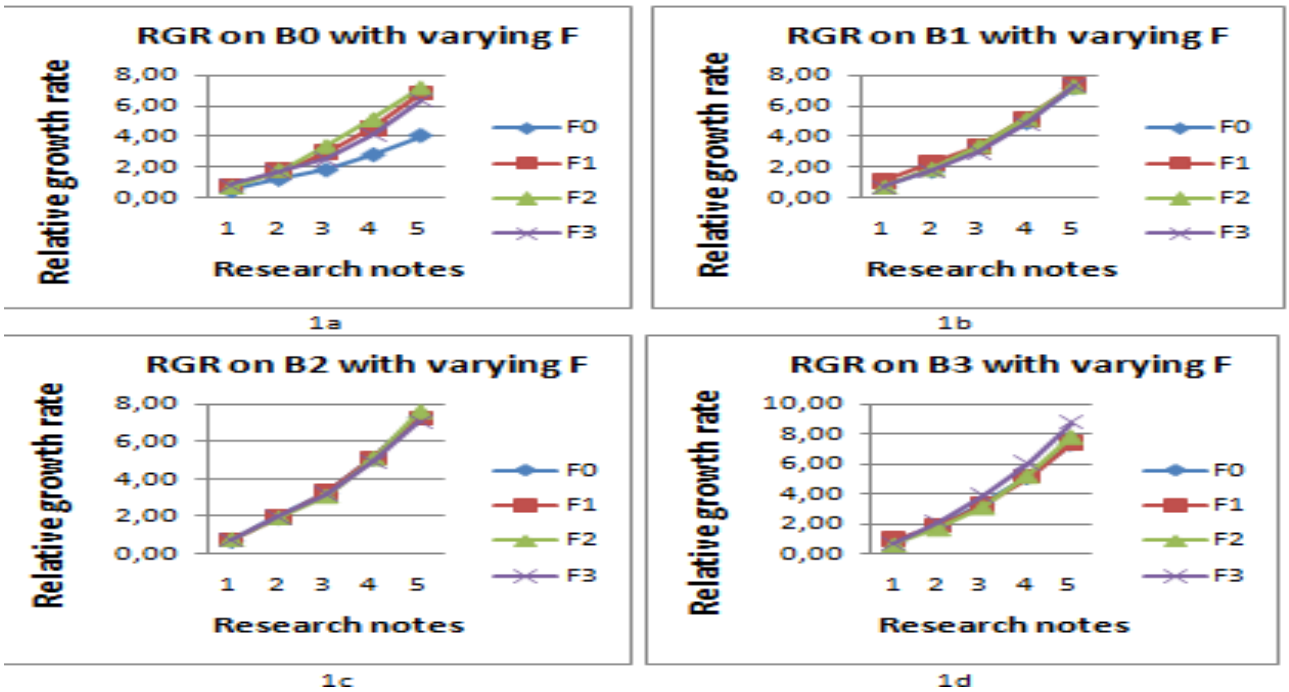

Figure 1. Development of the relative growth rate response of peanut plants to the application of bokashi fertilizer based on

secondary vegetation biomass and phosphorus on marginal land.

The use of bokashi fertilizer at a dose of 12 t ha^{-1} (B3) and SP-36 phosphorus fertilizer at a dose of 150 kg ha^{-1} (F3) increased at 21-42 days after planting. This shows that the interaction of bokashi fertilizer and phosphorus fertilizer at these doses can improve plant growth rates better than other treatments.

Leaf Area Index

The bokashi treatment supplemented with phosphorus fertilizer had a positive effect on the leaf area index (Figure 2). The highest average value of the interaction between bokashi and phosphorus fertilizer was obtained in the B3F3 treatment with the highest dose compared to other treatments. This indicates that bokashi, which is made from kirinyuh and gamal, contains many nutrients, including N. The N nutrient contained in bokashi is good for increasing the leaf area index of plants. Physiological processes within the plant body will performs better when nitrogen nutrients are available, which affects the rate of leaf growth (Lingga and Marsono, 2004).

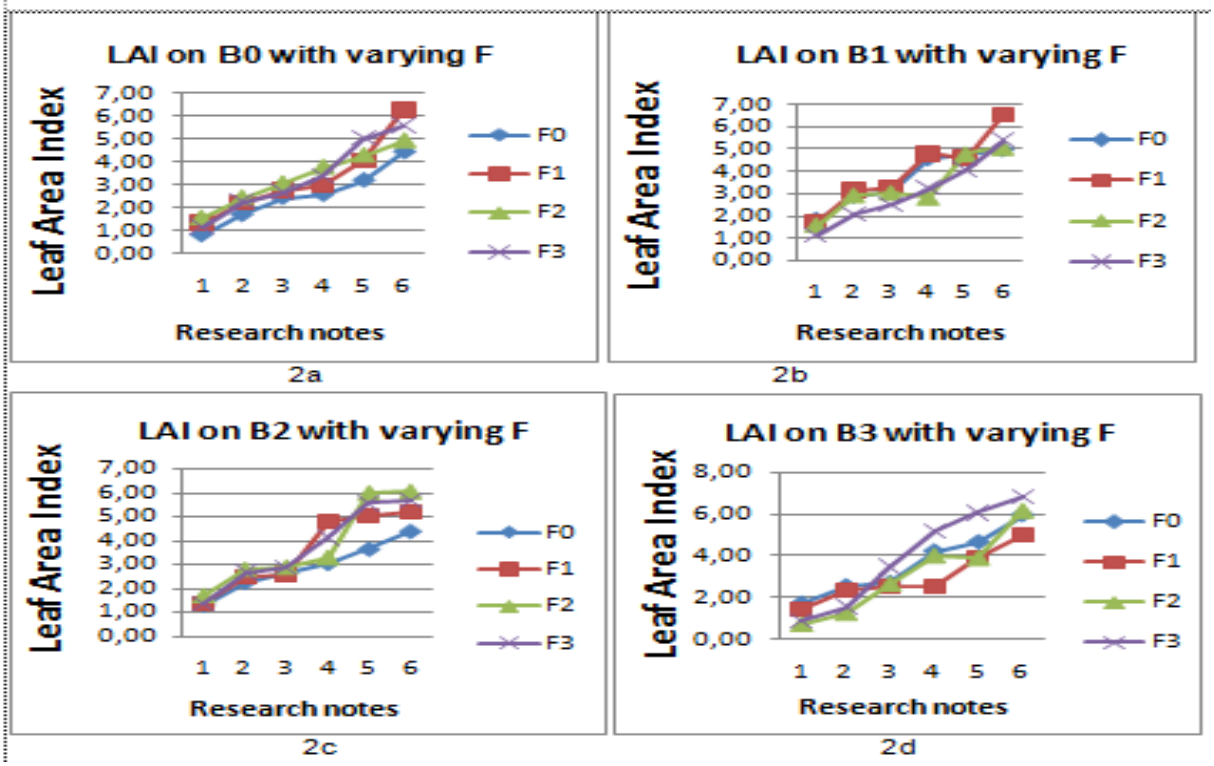

Figure 2. Development of leaf area index response of peanut plants to the application of bokashi fertilizer based on secondary
vegetation biomass and phosphorus on marginal land.

The results showed that the higher the dose of SP-36 phosphorus fertilizer applied, the higher the leaf area index produced. Phosphorus plays a role in root system development, which affects plant growth and thus the number and size of plant leaves. The number and size of leaves affect the leaf area index. A high leaf area index value indicates that light absorption occurs evenly throughout the plant canopy (Brady and Weil, 1982).

Net Assimilation Rate

The results showed that the highest treatment for increasing the net assimilation rate was obtained in treatment B3F3 and the lowest treatment was obtained in treatment B0F0 (Figure 3). It is suspected that the combination of bokashi fertilizer and phosphorus fertilizer is good for plants because bokashi contains microorganisms that help dissolve unavailable phosphorus into phosphorus that is available to plants, as well as increasing the organic matter content and soil pH, thereby supporting phosphorus absorption.

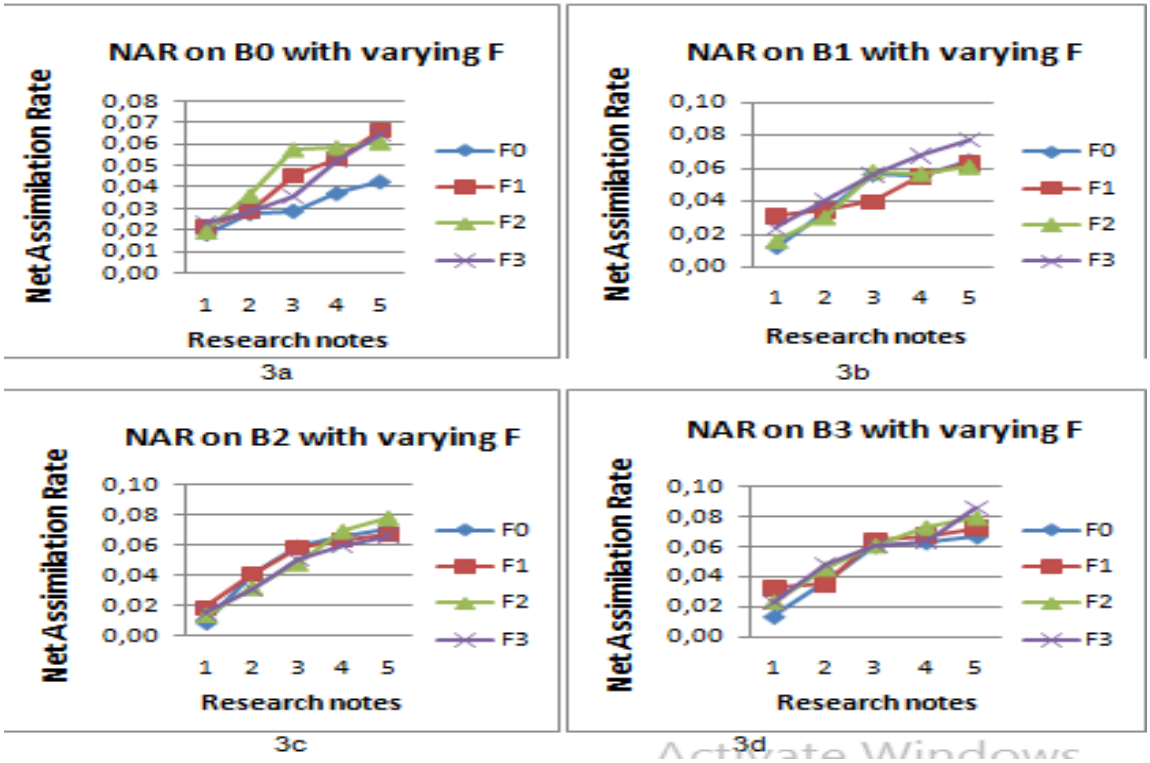

Figure 3. Development of the net assimilation rate response of peanut plants to the application of bokashi fertilizer based on
secondary vegetation biomass and phosphorus on marginal land.

Bokashi and phosphorus fertilizers play an important role in increasing the rate of net assimilation in plants because both contribute to improving soil conditions and the availability of nutrients needed for photosynthesis and plant metabolism. Bokashi and phosphorus fertilizers increase nutrient uptake and the ability of plants to convert photosynthetic products into permanent biomass Larger photosynthates will enable the formation of larger plant organs, which will then produce greater dry matter yields (Safitri et al, 2025).

Shoot and Root Ratio

The application of bokashi fertilizer and phosphorus fertilizer can have a positive effect on the root-to-shoot ratio of peanut plants. The results showed that the treatment without fertilizer (B0F0) had the highest value of 1.08 and the lowest was found in the B3F3 treatment, which was 0.58 (Table 1).

Table 1. Effect of the interaction between bokashi fertilizer and phosphorus on the root decay ratio of peanut plants.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	1,08[a]	0,89[a]	0,86[a]	0,75[a]	0,102
	p	q	q	r	0,107
B1	0,76[b]	0,80[a]	0,75[b]	0,71[a]	0,110
	p	p	p	p	
B2	0,76[b]	0,72[a]	0,73[b]	0,70[a]	
	p	p	p	p	
B3	0,69[b]	0,66[b]	0,61[c]	0,58[b]	
	p	p	p	q	
UJBD α0,05	2=0,102	3=0,107	4=0,110		

Note: Numbers followed by different letters in the same column (a, b, c) and row (p, q, r) indicate significant differences at the 95% confidence level according to UJBD.

A high value indicates that plant growth is more focused on the upper part (shoot) of the plant, while a low value indicates that plant growth is more focused on the lower part (root). A shoot-to-root ratio of more than one

indicates that plant growth is more focused on the shoot, while a shoot-to-root ratio of less than one indicates that plant growth is more focused on the root (Azmi *et al*., 2022). Bokashi is very effective in improving soil structure so that roots can develop well. Bokashi can improve soil aeration and structure, support microorganism life, and increase nutrient availability, thereby supporting plant root growth (Fitriany and Abidin, 2020). Phosphorus also plays a significant role in root growth, sufficient phosphorus availability accelerates root growth and improves the efficiency water absorption and other nutrients. Phosphorus accelerates root development and creating a strong root system so that plants can absorb more nutrients (Novia, 2015). Strong roots can absorb more water and nutrients, allowing plants to grow well.

Chlorophyll Analysis

The results showed that the amount of chlorophyll in peanut plants increased as the amount of fertilizer applied to the plants increased. The highest dose was obtained in the B3F3 treatment with a value of 23.83 mg L^{-1} and the lowest in the B0F0 treatment with a value of 12.14 mg L^{-1} (Table 2). The increase in chlorophyll content is thought to be closely related to several nutrients, one of which is nitrogen, which can help form chlorophyll molecules. Nitrogen is an essential nutrient that makes up the porphyrin ring, which is the basic framework of chlorophyll (Sakr and Husein, 2012). Rhizobium bacteria, which form a symbiotic relationship with peanut roots, also play an important role in the soil ecosystem due to their ability to fix nitrogen. This process converts nitrogen in the air into compounds that can be used by plants, such as ammonium (NH_4^+), which contributes to increased soil fertility and plant productivity.

Table 2. Effect of the interaction between bokashi fertilizer and phosphorus on chlorophyll (mg L^{-1}) in peanut plants.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	12,14[b] q	15,89[b] p	18,73[a] p	15,60[b] p	2=3,401 3=3,575
B1	19,41[a] p	16,73[a] p	14,88[b] q	15,23[b] q	4=3,688
B2	16,78[a] q	19,58[a] p	21,22[a] p	18,84[b] p	
B3	19,16[a] q	17,79[a] q	16,20[b] q	23,83[a] p	
UJBD α0,05	2=3,401	3=3,575	4=3,688		

Note: Numbers followed by different letters in the same column (a, b, c) and row (p, q, r) indicate significant differences at the 95% confidence level according to UJBD.

Phosphorus has a positive effect on the amount of chlorophyll in plants. The application of phosphorus fertilizer can increase leaf chlorophyll content, as phosphorus plays a role in supporting various plant metabolic processes plant metabolism, including the synthesis of components that support chlorophyll formation. The main of phosphorus in plants is to store and transfer energy in the form of ADP and ATP. Energy is obtained from photosynthesis and carbohydrate metabolism, which is stored in phosphate compounds for use in growth and production processes (Liferdi, 2010).

Number of Pods

The results showed that the B3F3 treatment with a value of 17.00 produced the highest number of pods compared to other treatments (Table 3). This indicates that bokashi fertilizer, which is the result of organic material fermentation, contains complete nutrients, beneficial microorganisms, and compounds that can improve soil conditions.

Table 3. The effect of the interaction between bokashi fertilizer and phosphorus on the number of pods in peanut plants.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	4,22[c] q	4,44[d] q	7,11[c] p	7,78[c] p	2=1,676 3=1,761 4=1,817
B1	9,11[b] p	8,89[c] p	8,67[c] p	9,00[c] p	
B2	9,78[b] q	11,22[b] p	11,11[b] p	11,89[b] p	
B3	13,00[a] q	13,56[a] q	14,67[a] q	17,00[a] p	
UJBD α0,05	2=1,676	3=1,761	4=1,817		

Note: Numbers followed by different letters in the same column (a, b, c) and row (p, q, r) indicate significant differences at the 95% confidence level according to UJBD.

The use of organic materials can improve aeration and reduce soil density, thereby facilitate the entry of ginofor into the soil to become pods, and an increase in the number of pods will increase seed yield (Munip et al., 2009). The addition of phosphorus also serves to accelerate flower formation, especially pod formation in peanut plants. Phosphorus fertilization provides benefits such as improving flowering, fertilization, and seed formation, and accelerating fruit ripening (Jumin, 1994).

Number of Young Pods

Bokashi fertilizer has an independent effect on the number of young pods in peanuts. The results of the study show that the bokashi fertilizer treatment with the highest value was treatment B3 with a value of 7.09, and the lowest value was obtained in treatment B0 with a value of 5.19 (Table 4).

Table 4. Effect of independent bokashi fertilizer treatment on the number of young pods in peanut plants.

Bokashi Fertilizer	Young Pods	UJBD 0.05
B0	5,19[b]	2=1,38039
B1	5,72[a]	3=1,450652
B2	6,28[a]	4=1,496538
B3	7,09[a]	

Note: Numbers followed by different letters in the same column (a, b, c) indicate significant differences at the 95% confidence level according to UJBD.

Bokashi fertilizer can increase the number of young pods because it improves the physical, chemical, and biological properties of the soil, thereby supporting root growth and improving the availability of nutrients for plants. With a looser soil structure and optimal soil pores, plants can absorb nutrients more easily. Light-textured (crumbly) soil is beneficial for peanut plants, as pods can easily penetrate the soil, and the fruit buds (gynoecia) can also easily enter the soil and develop normally (Rukmana, R. 1998).

Number of Seeds

The results of the study show that the highest treatment was obtained in treatment B3F3 with a value of 35.22, and the treatment that produced the lowest number of pods was B0F0 with a value of 12.44 (Table 5). It is suspected that bokashi and phosphorus fertilizer have a very positive effect on peanuts, as where bokashi increases soil organic matter and microbes, improves soil structure, while phosphorus accelerates root growth and seed formation, so that the combination of the two increases nutrient availability and ultimately produces a greater number of seeds.

Table 5. The effect of the interaction between bokashi and phosphorus fertilizers on the number of peanut seeds.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	12,44[d] q	12,78[c] q	13,43[d] q	17,44[d] p	2=2,624 3=2,757

B1	18,89[c] q	20,89[b] q	24,71[c] p	22,22[c] p	4=2,845
B2	24,63[b] q	24,04[b] q	26,44[b] q	30,36[b] p	
B3	32,12[a] q	32,83[a] p	34,55[a] p	35,22[a] p	
UJBD α0,05	2=2,624	3=2,757	4=2,845		

Note: Numbers followed by different letters in the same column (a, b, c) and row (p, q, r) indicate significant differences at the 95% confidence level according to UJBD.

The organic matter contained in bokashi can also increase water availability in the soil, thereby increasing peanut production, especially during seed filling. Water plays a role in the translocation of organic compounds from the leaves to the seeds in the pods (Marsono and Sigit, 2001). Fertilizer phosphorus can accelerate and strengthen plant growth, accelerate flowering and fruit ripening, seeds or grains, and improve seed filling (Kartasapoetra and Sutedjo, 2000).

Seed Weight

The application of bokashi fertilizer and phosphorus fertilizer can have a positive effect on the seed weight of groundnut plants. Research results show that the treatment without B3F3 fertilizer yielded the highest value of 17.56 g, while the lowest value was found in the B0F0 treatment at 20.49 g (Table 6).

Table 6. Effect of interaction between Bokashi fertilizer and phosphorus on weight seeds (g) of bean plants soil.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	20,49[d] p	21,84[d] p	28,66[c] p	29,17[d] p	2=17,201 3=18,077
B1	44,32[c] q	58,32[c] p	38,83[c] q	68,44[c] p	4=18,649
B2	80,43[b] q	88,88[b] q	98,86[b] p	110,69[b] p	
B3	112,57[a] r	133,16[a] q	150,04[a] q	176,56[a] p	
UJBD α0,05	2=17,201	3=18,077	4=18,649		

Note: Numbers followed by different letters in the same column (a, b, c) and row (p, q, r) indicate significant differences at the 95% confidence level according to UJBD.

The interaction between bokashi and phosphorus fertilizer in peanuts generally supports each other in increasing seed weight, mainly through increased phosphorus availability and improved soil conditions. Sufficient organic matter availability from bokashi fertilizer in the soil increases the availability of nutrients, especially the essential nutrients N, P, and K. Pod filling and seed formation are highly depends on the availability of N, P, and K nutrients. If the availability of essential macro nutrients is sufficient and balanced, it will cause the formation of amino acids and proteins to increase in seed formation, resulting in maximally filled pods (Permanasari et al, 2014).Peanut plants absorb 10% of their phosphorus requirements during the vegetative phase and 40-50% during flowering, with the remainder absorbed during seed filling. Phosphorus is essential for peanut seed formation (Jumakir *et al*., 2000).

100 Seed Weight

The application of bokashi fertilizer and phosphorus fertilizer can have a positive effect on the 100 seed weight of peanut plants. The results showed that the treatment without fertilizer (B0F0) had the lowest value of 328.40, while the highest value was found in the B3F3 treatment at 894.53 (Table 7). It is suspected that bokashi fertilizer helps provide essential nutrients in the soil, such as nitrogen (N), phosphorus (P), and potassium (K). In addition, phosphorus can increase plant metabolism, which can affect the seed filling process and increase its weight.

Table 7. The effect of the interaction between bokashi fertilizer and phosphorus on the weight of 100 (g) groundnut seeds.

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	328,40^{c} r	451,27^{c} q	518,20^{b} p	549,07^{b} p	2=88,904 3=93,429
B1	530,10^{b} p	558,73^{b} p	545,73^{b} p	587,97^{b} p	4=96,384
B2	594,03^{b} p	651,20^{b} p	612,20^{b} p	642,77^{b} p	
B3	704,07^{a} q	727,30^{a} q	744,80^{a} q	894,53^{a} p	
UJBD α0,05	2=88,904	3=93,429	4=96,384		

Note: Numbers followed by different letters in the same column (a, b, c) and row (P, q, r) indicate significant differences at the 95% confidence level according to UJBD.

Seed development is more influenced by N supply during seed formation. Phosphorus is also required for protein synthesis in plants; sufficient phosphorus during seed filling will enlarging the seeds produced, thereby increasing the weight of the plant seeds (Lakitan, 1993). Seed filling is highly dependent on the availability of N, both N absorbed by Rhizobium bacteria available in the air and N available in the soil. If N availability is balanced, it will result in increased amino acid and protein formation, so that the seed filling process and pod filling are complete.

Production (ha^{-1})

The results of the study show that peanut production increases the amount of fertilizer applied to the plants. The highest dose was obtained in the B3F3 treatment with a value of 3.53 t ha^{-1} and the lowest in the B0F0 treatment with a value of 0.61 t ha^{-1} (Table 8). This is thought to be because the kirinyuh and gamal biomass used as the basic ingredients of bokashi fertilizer provide many benefits to plants, especially for peanut production.

Table 8. The effect of the interaction between bokashi fertilizer and phosphorus on peanut production (t ha^{-1})

Bokashi	Phosphorus				UJBD α 0,05
	F0	F1	F2	F3	
B0	0,61^{c} p	0,86^{c} p	0,96^{c} p	0,79^{c} p	0,371 0,389
B1	0,92^{c} p	1,04^{c} p	1,24^{c} p	1,06^{c} p	0,402
B2	1,59^{b} p	1,75^{b} p	1,95^{b} p	1,92^{b} p	
B3	2,37^{a} q	2,33^{a} q	2,57^{a} q	3,53^{a} p	
UJBD α0,05	2=0,371	3=0,389	4=0,402		

Note: Numbers followed by different letters in the same column (a, b, c) and row (P, q, r) indicate significant differences at the 95% confidence level according to UJBD.

Kirinyu contains 7.76% N, 1.10% P, and 5.79% K. Kirinyu biomass can be a potential source of organic material for improving soil fertility and increasing crop yields and production (Murdaningsih and Yosefa, 2014). In addition, the leaf tissue of gamal plants contains 3.15% N, 0.22% P, 2.65% K, 1.35% and 0.41% Mg. The high N content in gamal can increase crop production. Nitrogen increases plant growth, enhances plant metabolism, and promotes protein and carbohydrate formation, resulting in increased plant growth and production (Nasution *et al*., 2017). The use of phosphorus fertilizer can increase peanut production, as phosphorus is believed to that phosphorus can promote seed formation, thereby supporting maximum production. Phosphorus is very important in seed formation and is found in large quantities in seeds, so if plants are given sufficient phosphorus fertilizer, seed formation will be optimal, thereby increasing seed weight and production (Gusmiatun *et al.*, 2019).

CONCLUSION

The application of bokashi fertilizer and phosphorus fertilizer can increase the growth and production of peanuts on marginal land. The application of bokashi fertilizer at a dose of 12 t "(B3) and SP-36 phosphorus fertilizer at a dose of 150 kg ha'(F3) is the best fertilizer response to increase the growth and yield of peanut plants on marginal land.

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