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Effect of Dosage of NPK Phonska and POC PSBN on Production of Peanut (*Arachis Hypogaea* L.)

Uly J Riwu Kaho[1)], Robert Sole[2)], Joritha Naisanu[3)], Nur Aini Bunyani[4)]
Faculty of Agriculture, Faculty of Faculty of Math and Science, Persatuan Guru 1945 NTT University,

Abstrak: Peanut (*Arachis hypogaea* L.) is a national food commodity and is a source of protein and vegetable oil. BPS NTT (2019), explained that peanut production fluctuated. This is presumably due to the non-intensive management of the peanut plant, therefore it is necessary to pay attention to the availability of nutrients as the main support for the growth of the peanut plant, which is provided through NPK Phonska fertilization and POC PSBN. The purpose of this study was to determine the effect of NPK phonska and POC PSBN fertilizers on the growth and production of peanut plants, to obtain doses of NPK phonska and POC PSBN fertilizers that could provide the best growth and production of peanuts. This research was carried out in the experimental field of the Faculty of Agriculture, Belo Village - Kupang City from December 2020 to February 2021. The design used in this study was a factorial randomized block design (RAK). The purpose of this study was to determine the effect of NPK phonska and POC PSBN fertilizers on the growth and production of peanut plants, to obtain doses of NPK phonska and POC PSBN fertilizers that could provide the best growth and production of peanuts. This research was carried out in the experimental field of the Faculty of Agriculture, Belo Village - Kupang City from December 2020 to February 2021. The design used in this study was a factorial randomized block design (RAK).. The results showed that the treatment of NPK Phonska fertilizer and POC PSBN gave a very significant effect on the growth and yield of peanut plants. The treatment of NPK phonska 100 kg ha^{-1} was equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc liter $^{-1}plot^{-1}$ resulted in peanut plant height of 142,333 cm, number of leaves 103,667 strands, number of pods 40,333 pods, seed weight 38,333 and harvest index 0.353 g. The interaction between NPK phonska fertilizer treatment of 100 kg ha^{-1} equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ gave the best results on the growth and yield of peanut plants. For the cultivation of peanuts, it is better to use NPK phonska fertilizer 100 kg ha^{-1} equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$. There needs to be further research on the use of higher doses of NPK phonska and POC PSBN fertilizers.

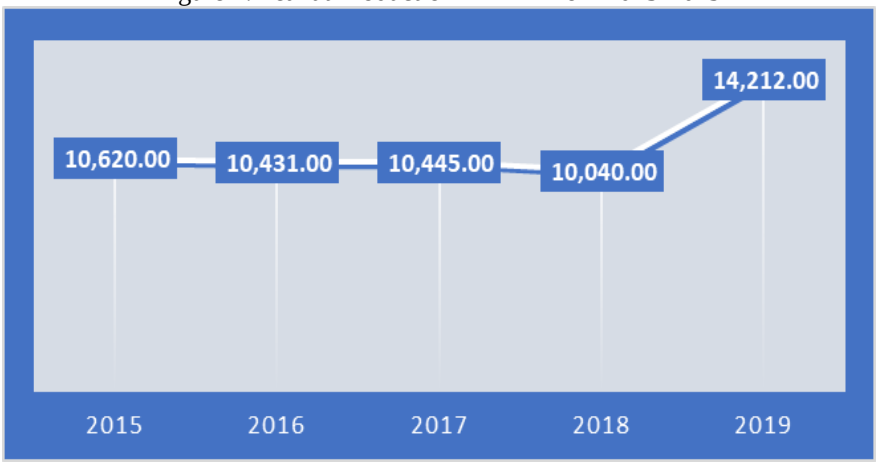
Keywords: NPK phonska, liquid organic fertilizer, peanut

Preliminary

Peanuts (*Arachis hypogaea* L.) contain 40-50% fat, 27% protein, 18% carbohydrates and vitamins. Peanuts are used as food for direct consumption or food mixtures such as bread, spices, industrial raw materials and animal feed, so that the need for peanuts continues to increase every year in line with the increase in population (Balitkabi, 2008).

BPS NTT (2019), explained that peanut production from 2015 to 2019 always fluctuated from year to year. This is presumably because the management of peanut plant management is not intensive.

Figure 1. Peanut Production in NTT from 2015-2019



Source: BPS (2019)

To increase peanut production, it is necessary to pay attention to the availability of nutrients as the main support for plant growth in the planting medium. Sumarno et al. (2002) stated that peanuts require nutrients N, P, K, and Ca in sufficient quantities, thus requiring both organic and inorganic fertilization. One of the inorganic fertilizers that can be used is NPK phonska fertilizer.

Phonska NPK fertilizer (15: 15: 15) is a complete compound fertilizer containing all essential macro-nutrients for plants which are combined into a single unit. The advantage of this compound fertilizer is that with one application of fertilizer it has included several elements so that no fertilizer mixing is needed. Phonska fertilizer has benefits including: making plant leaves greener and fresher and containing lots of green leaf grains which are important for the photosynthesis process, accelerating plant growth, accelerating the achievement of maximum plant height and maximum number of tillers, stimulating root growth, thicker roots so that plants become healthy and strong, makes the stems more upright, stronger and reduces the risk of falling, increases resistance to plant pests and diseases and drought, stimulates flower formation, accelerates ripening of seeds so that the harvest is more, increases protein content, facilitates the process of forming sugar and starch, increases the number of fruit/seeds each stalk, increasing the size of the tubers and grains.

According to Ispandi and Munip (2014), stated that the application of NPK fertilizer at a dose of 150 kg/ha can increase nutrient uptake and peanut production in alfisol dry land on all parameters observed. Furthermore, Setiawan (2014) stated that the response of several peanut varieties to the application of NPK fertilizer at a dose of 150 kg/ha (16 g/plot) could increase plant height at 5 weeks after planting and the number of empty pods planted.

The weaknesses of inorganic fertilizers are: 1) relatively expensive selling price due to limited production, 2) environmental damage (land), 3) reducing the value of product quality in terms of public health who consume corn, etc. Therefore, to reduce the impact, it is necessary to use organic fertilizer.

The main benefit of organic fertilizer is that it can improve the chemical, physical and biological fertility of the soil, as well as being a source of nutrients for plants. More specifically, the benefits of using organic fertilizers include improving soil structure, a source of nutrients for plants, increasing soil humus content, increasing micro-organism activity, increasing water holding capacity, reducing erosion and leaching of dissolved nitrogen, increasing exchange capacity. cations in the soil, increasing the buffering capacity against drastic changes in soil properties, increasing the work of soil microbes in the process of decomposition of organic matter.

One source of organic fertilizer that can be used is PSBN liquid organic fertilizer. PSBN POC is a high quality natural liquid organic fertilizer extracted from various organic wastes (livestock waste, plant waste and other natural wastes), which are processed based on environmentally sound technology (biotechnology), the content of PSBN fertilizer is 40+ nutrients that beneficial, namely: C-organic, 14 macro and micro nutrients, 17 amino acids, organic acids, and various nutrients and growth-regulating hormones with gibberlin (GA3).

PSBN fertilizer is also useful for increasing the effectiveness and efficiency of fertilization as well as increasing growth and maximum yield productivity, especially for plants that produce flowers and fruit. Anonimous (2007), stated that the application of liquid organic fertilizer PSBN at a dose of 10 cc per liter of water can increase the yield of food crops and secondary crops.

Formulation of the problem

1. Can the application of NPK Phonska fertilizer and POC PSBN increase the growth and production of peanut plants?
2. How many doses of NPK phonska and POC PSBN fertilizers can increase the growth and production of the best peanut plants?
3. Is there an interaction between NPK phonska fertilizer and POC PSBN on the growth and production of peanuts?

Hypothesis

1. The application of NPK phonska fertilizer and PSBN POC affects the growth and production of peanut plants.
2. There is at least one dose of NPK fertilizer and PSBN phonska POC which can provide the best growth and production of peanuts.
3. There is an interaction between NPK phonska fertilizer and POC PSBN on the growth and production of peanut plants.

Research Objectives

1. To determine the effect of NPK phonska fertilizer and POC PSBN on the growth and production of peanut plants.
2. To determine the dose of NPK Phonska and POC PSBN fertilizers that can provide the best growth and production of peanut plants.
3. To determine the interaction between NPK phonska fertilizer and POC PSBN on the growth and production of peanut plants.

Research Method

Place and Time of Research

This research was carried out in the experimental field of the Faculty of Agriculture, Batu Plat Village, Kota Raja District, Kupang City from December 2020 to February 2021.

Materials and tools

The materials used were local varieties of peanut seeds, NPK phonska fertilizer, PSBN POC, cow dung manure while the tools used in this study were hoe, machete, gembor, analytical scale, hand sprayer, raffia rope, wood, meter, stationery , calculator and ruler.

Experimental design

The design used in this study was a factorial randomized block design (RAK). The 1st factor is NPK Ponska and the 2nd factor is POC PSBN. 1st Factor: Dosage of NPK Fertilizer

N_0 = control
N_1 = 75 kg ha^{-1} Phonska is equivalent to 22,5 g $petak^{-1}$
N_2 = 100 kg ha^{-1} Phonska is equivalent to 25 g $petak^{-1}$

Factor ke-2 : Consentration POC PSBN

P_0 : control
P_1 : 8 cc liter $^{-1}petak^{-1}$.
P_2 : 10 cc liter $^{-1}petak^{-1}$.
P_3 : 12 cc liter $^{-1}petak^{-1}$.

From the two factors above, 12 treatment combinations and 3 replications were obtained, so that 36 experimental units were obtained.

Research Implementation

Land Preparation

The land that will be used for this research is first cleared of weeds or plant debris around it. This is followed by tillage. Soil cultivation is carried out with the aim of creating a good planting medium so that it can grow and produce well. Furthermore, beds are made longitudinally to the South-North.

Soil cultivation for planting peanuts is carried out with a bed height of 20-30 cm or around the tillage layer, then made beds with a size of 2 m x 1.5 m with a distance between one bed and another 50 cm and a distance of 50 cm. between blocks is 1 m. Furthermore, basic fertilization is carried out by giving cow manure as much as 20 tons/ha equivalent to 6 kg of beds-1, then watering for 1-2 days until it reaches field capacity. This is done with the aim that the soil can be mixed with cow manure.

Planting

Peanut seeds were planted in all treatment plots with a spacing of 25 cm x 25 cm. Planting is done by planting 2 seeds per hole, then after 1 week after planting, thinning is done leaving one healthy plant.

Application Treatment (Fertilization)

The treatment application was carried out 2 times according to the treatment dose. Fertilization was carried out when the plants were 7 days after planting (DAP) and 21 DAP. The treatment application technique was carried out by making ± 5 cm strokes from the plant, then given NPK fertilizer and covered with fine soil.

The POC PSBN application was applied 4 times, namely at 28 DAP, 38 DAP, 48 DAP, and 58 DAP with doses according to each treatment applied. PSBN POC is watered to the bottom of the plant in the afternoon according to the weather.

Plant maintenance

Watering is carried out 1-2 times a day according to soil and rain conditions. Watering using gembor adapted to conditions in the field. Embroidery is done when there are plants that die or their growth is not good. Embroidery is done 1 week after planting by replacing peanut plants that do not grow.

Weeding is done by cleaning the weeds around each plant, by removing the weeds that grow around the peanut plants without equipment. Weeding should be done only as necessary by looking at the state of the plant. Pest and disease control is carried out if there are pests or diseases that attack peanut plants.

Harvest

Harvesting can be done after the plant is 112 days after planting and physiologically shows the criteria for stems starting to harden, leaves turning yellow and some starting to fall, pods are full and hard, pod color is blackish brown by pulling the peanut plants carefully so that the pods are not left in the ground.

Observation Variable

Observations were made on the sample plants. The observed variables include:

1. Plant Height (cm).
   Plant height was measured from the base of the stem to the highest part of the plant, the measurement was carried out once, namely at the end of the vegetative period.
2. Number of leaves
   The number of leaves was observed at the end of the vegetative period. Observations were made by counting plant leaves.
3. Number of pods
   The number of pods is done by counting the number of pods in all sample plants at harvest.
4. Seed weight
   Peanut pods were dried in the sun for 4 days then peeled the pods to obtain dry seeds. Next, weigh all the seeds produced in the sample plants using an analytical balance.
5. Harvest index (g).
   Harvest index is calculated by weighing the weight of seeds after harvest on the sample plants divided by the weight of leaves, stems and roots (biological) plus the economic yield (seeds) multiplied by 100%. $\left[IP = \frac{Hasil\ ekonomis}{Hasil\ biologis} x100\% \right]$

Data Analysis

The mathematical model of the Randomized Block Design (RAK) according to Sastrosupadi (2000) is:

$Yij = \mu + \alpha_i + \beta_j + (AB)_{ij} + e_{ij}$

Information:

Y_{ijk} = General observation values for the first factor at the i level, the second factor at the j level and at the k replication.
μ = general average
α_I = the influence of the first factor at level i.
β_j = the influence of the second factor on the j level.
$(\alpha\beta)_{ij}$ = the interaction effect of factor I level i with factor II level j.
ε_{ijk} = test error effect
i = (1,2,3) dan j = (1,2,3) serta k = (1,2,3)

The research data obtained were analyzed using analysis of variance (ANOVA) to determine the effect of the treatment given. If there is an effect of treatment, it will be continued with Duncan's test (5%) to see the difference between the treatments given.

Results and Discussion

General description

Peanut seeds began to grow at the age of 5 days after planting (DAT) and began to grow evenly at the age of 7 days after planting (DAT). During the research, the plants were not affected by pests and diseases.

Peanut plants enter the generative phase when the plant is 31 days after planting (DAT) which is marked by the release of the first flowers. Harvesting is carried out at 110 days after planting (DAT) which is marked by the stems starting to wither, the leaves turn yellow and fall and the inner pod skin is brown.

Plant height

The results of analysis of variance showed that the interaction between NPK phonska and POC CSBN had a very significant effect on peanut plant height. The average height of peanut plants due to the application of NPK phonska and POC CSBN can be seen in Table 1.

Table 1 Effect of NPK phonska and POC CSBN on peanut plant height (cm tan^{-1})

NPK for Factor	PSBN POC Factor				
	P0	P1	P2	P3	Maean
N0	294.000 a	354.000 b	356.000 b	362.000 c	455.33333
N1	363.0 c	366.000 cd	369.000 c	379.000 e	492.33333
N2	401.000 f	405.000 f	415.000 g	427.000 h	549.33333
Rata-rata	88.167	93.750	95.000	97.333	

information: Numbers followed by the same letter in the same column and row are not significantly different on Duncan's 5% test

The results of Duncan's 5% test showed that the highest peanut plant height in the NPK phonska fertilizer treatment of 100 kg ha^{-1} Phonska was equivalent to 25 g plot^{-1} and POC PSBN with a concentration of 12 cc liter^{-1}plot^{-1} (N2P3) and was significantly different from the treatment. other. The treatment that produced the lowest peanut plant height was found in the treatment without Phonska NPK fertilizer and without POC PSBN (N0P0) and was significantly different from the other treatments.

The height of peanut plants in the N2P3 treatment was suspected because the interaction between Phonska NPK fertilizer and POC CSBN was able to provide sufficient nitrogen (N) nutrients for plant growth. N absorption can increase the formation of chlorophyll and protein so that the carbohydrate content in the apical meristem will be higher. With the absorption of N nutrients, it can increase the formation of amino acids so that the ability of the apical meristem to perform cell division is higher, thus plant growth is getting better.

The growth of plant height is closely related to the N content that can be absorbed by plants. The increase in plant height will continue until the end of the generative phase, but the fastest growth rate occurs in the fegetative phase. In this phase, if all requirements are met, plant growth will be optimal (Subagiyono, et al. 2009).

Table 1 above shows that the lowest peanut plant height in the N0P0 treatment was due to the low nutrient content, especially nitrogen so that the plant also absorbed nutrients in small quantities so that it had an impact on the vegetative growth of peanut plants. This situation is supported by Widarta (1994), which states that low nutrients in the soil will interfere with plant metabolism, thereby inhibiting root development and causing stunted plant growth.

4.3 Number of Leaves

The results of analysis of variance showed that the interaction between NPK phonska and POC CSBN had a very significant effect on the number of leaves of peanut plants. The average number of leaves of peanut plants due to the application of NPK phonska and POC CSBN can be seen in Table 2.

Table 2 Effect of NPK phonska and POC CSBN on the number of peanut plant leaves (strands)

NPK for Factor	PSBN POC Factor				
	P0	P1	P2	P3	Maean
N0	137.000 a	198.000 b	214.000 bc	239.000 c	262.66667
N1	263.0 d	271.000 de	283.000 de	286.000 de	367.66667

N2	291.000 ef	290.000 ef	296.000 ef	311.000 f	396
Rata-rata	57.583	63.250	66.083	69.667	

information: Numbers followed by the same letter in the same column and row are not significantly different on Duncan's 5% test

The results of Duncan's 5% test showed that the highest number of peanut plant leaves in the Phonska NPK fertilizer treatment of 100 kg ha^{-1} Phonska was equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ (N2P3) and was significantly different from N0P0, N0P1, N0P2, N1P0, N1P1, N1P2 and N1P3 treatments. However, it was not significantly different from the N2P0, N2P1 and N2P2 treatments. The treatment that produced the lowest number of peanut plant leaves was found in the N0P0 treatment and was significantly different from the other treatments.

The high number of leaves of peanut plants in the N2P3 treatment was suspected because the interaction between Phonska NPK fertilizer and POC CSBN was able to provide higher nutrient elements, especially Nitrogen (N), resulting in increased leaf cell formation. Lingga (1998) stated that the nutrient N helps create and maintain green leaves so that the photosynthesis process runs normally so that it can increase the rate of formation of plant fegetative organs such as increasing the number of leaves.

Table 2 above shows that the lowest number of peanut plant leaves in the N0P0 treatment was thought to be due to the low nutrient absorption. Wilkins (1992), stated that the formation of new shoots and leaves is related to the availability of nutrients. Lack of nitrogen nutrients will reduce the amount of chlorophyll so that the rate of photosynthesis is reduced and the resulting photosynthate also ultimately inhibits plant growth, due to the limited production of protein and other important materials.

4.4 Number of Pods

The results of analysis of variance showed that the interaction between NPK phonska and POC CSBN had a very significant effect on the number of peanut pods. The average number of peanut pods due to the application of NPK phonska and POC CSBN can be seen in Table 3

Table 3 Effect of NPK phonska and POC CSBN on the number of peanut pods.

NPK for Factor	PSBN POC Factor				Maean
	P0	P1	P2	P3	
N0	57.000 a	61.000 b	64.000 b	73.000 c	85
N1	75.0 c	82.000 d	83.000 de	86.000 e	108.66667
N2	95.000 f	99.000 f	107.000 g	121.000 h	140.66667
Rata-rata	18.917	20.167	21.167	23.333	

information: Numbers followed by the same letter in the same column and row are not significantly different on Duncan's 5% test

The results of Duncan's 5% test showed that the highest number of peanut pods in Phonska NPK fertilizer treatment of 100 kg ha^{-1} Phonska was equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ (N2P3) and was significantly different from other treatments. The treatment that produced the lowest number of peanut pods was found in treatment N0P0. and was significantly different from other treatments.

The high number of peanut pods in the N2P3 treatment is suspected because the addition of liquid organic fertilizer CSBN can help increase soil biological activity, so that microorganisms in the soil are able to release P bonds so that they become available to plants. P functions include accelerating seedling root growth, strengthening young plant roots, accelerating flowering and fruit ripening and increasing grain production. Most of the phosphate in the soil functions as a building block and is bound in organic compounds (Rinsema, 1983).

Phosphate is a constituent component of every living cell and tends to be more abundant in seeds and growing points (Hakim, 1998). Phosphate fertilization can stimulate the initial growth of plant seeds, the formation of flowers, fruits and seeds (Wiryanta, 2004).

Table 3 above shows that the lowest number of peanut pods in the N0P0 treatment is thought to be because this treatment was not given fertilizer so that the nutrient content available for the formation of new cells was reduced so that the amount of chlorophyll and the rate of photosynthesis was reduced and the ability to form pods was better hampered.

4.5 Dry Seed Weight (g)

The results of analysis of variance showed that the interaction between NPK phonska and POC CSBN had a very significant effect on the dry seed weight of peanut plants. The average dry seed weight of peanut plants due to the application of NPK phonska and POC CSBN can be seen in Table 4.

Table 4 Effect of NPK phonska and POC CSBN on dry seed weight of peanut plants

NPK for Factor	PSBN POC Factor				Maean
	P0	P1	P2	P3	
N0	54.000 a	65.000 b	77.000 c	86.000 d	94
N1	88.0 d	90.000 d	95.000 e	97.000 e	123.333
N2	101.000 f	106.000 g	108.000 g	115.000 h	143.333
Rata-rata	20.250	21.750	23.333	24.833	

information: Numbers followed by the same letter in the same column and row are not significantly different on Duncan's 5% test

The results of Duncan's 5% test showed that the highest dry seed weight of peanut plants in the NPK phonska fertilizer treatment of 100 kg ha^{-1} Phonska was equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ (N2P3) and significantly different with other treatments. The treatment that produced the lowest number of peanut pods was found in treatment N0P0. and was significantly different from other treatments.

The high dry seed weight of peanuts in the N2P3 treatment was suspected because the administration of NPK Phonska with a combination of POC PSBN would increase the absorption of P nutrients in the growth and development of peanut plants..

Phosphate function in plants is to store and transfer energy in the form of ADP and ATP. Energy is obtained from photosynthesis and carbohydrate metabolism in a mixture of phosphates for use in the growth and production processes (Liferdi, 2009). Phosphate is a constituent component of every living cell and tends to be more abundant in seeds and growing points (Hakim, 1998). Phosphate fertilization can stimulate the initial growth of plant seeds, the formation of flowers, fruits and seeds (Wiryanta, 2004).

Table 4 above shows that the dry seed weight of peanut plants was lowest in the N0P0 treatment due to the lack of nutrients needed by peanut plants during plant growth and development. Efendi (1979), explains that if the nutrients needed by plants are available in sufficient quantities, it will allow plants to grow and produce maximum.

4.6 Harvest Index

The results of analysis of variance showed that the interaction between NPK phonska and POC CSBN had a very significant effect on the harvest index of peanuts. The average harvest index of peanuts due to the application of NPK phonska and POC CSBN can be seen in Table 5.

Table 5 Effect of NPK phonska and POC CSBN on peanut crop yield index

NPK for Factor	PSBN POC Factor				Maean
	P0	P1	P2	P3	
N0	0.830 a	0.850 b	0.860 b	0.900 c	1.1466667
N1	0.9 cd	0.920 de	0.930 e	0.950 f	1.2366667
N2	0.970 g	0.980 g	1.010 h	1.060 i	1.34
Rata-rata	0.226	0.229	0.233	0.243	

information: Numbers followed by the same letter in the same column and row are not significantly different on Duncan's 5% test

The results of Duncan's 5% test showed that the highest peanut crop yield index in the NPK phonska fertilizer treatment of 100 kg ha^{-1} Phonska was equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ (N2P3) and was significantly different from other treatments. The treatment that produced the lowest number of peanut pods was found in the N0P0 treatment and was significantly different from the other treatments.

The high harvest index of peanuts in the N2P3 treatment is suspected because the administration of NPK Phonska and POC CSBN will increase the absorption of nutrients in the growth and development of peanut plants.

Sitompul and Guritno (1995) stated that the harvest index is the yield of the plant divided by the total dry weight of the plant. Harvest index shows the accumulation of photosynthate in the roots, stems, leaves or storage tissues. and the synthesis shown by the coefficient of plants in photosynthesis The function of phosphate in plants is to store and transfer energy in the form of ADP and ATP. However, if the nutrient content is limited, plant growth will decrease and ultimately produce low plant biomass.

Table 5 above shows that the lowest peanut crop yield index in the N0P0 treatment due to lack of nutrients without the application of liquid organic fertilizers CSBN and NPK, the plants will lack nutrients so that it affects the photosynthesis process and results in a low harvest index.

Conclusion

1. The treatment of NPK Phonska fertilizer and POC PSBN gave a very significant effect on the growth and yield of peanut plants.
2. Phonska fertilizer treatment of 100 kg ha^{-1} Phonska equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ resulted in peanut plant height of 142,333 cm, number of leaves 103,667 leaves, number of pods 40,333 pods, weight seeds 38,333 and harvest index 0.353 g.
3. Interaction between Phonska 100 kg ha^{-1} NPK fertilizer treatment with Phonska equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$ gave the best yield on peanut crop yields.

Suggestion

1. For the cultivation of peanuts, it is better to use Phonska NPK fertilizer 100 kg ha^{-1} Phonska equivalent to 25 g $plot^{-1}$ and POC PSBN with a concentration of 12 cc $liter^{-1}plot^{-1}$
2. There needs to be further research on the use of higher doses of NPK phonska and POC PSBN fertilizers.

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