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The Effect of NPK Petro Ningrat and Phonska Oca Fertilizer Doses on Growth and Yield of Yard Long Bean Plants (Vigna Sinensis L.)

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ABSTRACT: The inaccurate fertilization dosage caused a decline in the yield of yard-long bean crops in Bali Province. This study aimed to determine the dosage of NPK Petro Ningrat fertilizer, Phonska Oca fertilizer, and the interaction between NPK Petro Ningrat and Phonska Oca fertilizers on the growth and yield of yard-long bean plants. The research used a Factorial Randomized Complete Block Design (RCBD) consisting of two factors: the dosage of NPK Petro Ningrat and the dosage of Phonska Oca. The NPK Petro Ningrat dosage consisted of four levels: N0: 0 kg/ha (control); N1: 150 kg/ha; N2: 300 kg/ha; and N3: 450 kg/ha. The Phonska Oca dosage consisted of three levels: P0: 0 ml/l water (control); P1: 10 ml/l water; and P2: 20 ml/l water. The observed parameters included plant height, number of leaves, fresh biomass, dry biomass, fresh pods, and dry pods. The results of the study showed that fertilization with NPK Petro Ningrat at a dosage of 450 kg/ha resulted in the best plant growth and yield.

KEYWORDS: long bean, NPK Petro Ningrat, Phonska Oca, fertilization, growth

I. INTRODUCTION

Yard-long bean (Vigna sinensis L.) is one of the leguminous vegetable crops with high economic value and strong market demand in Bali. Yard-long bean has rapid growth ability and high adaptability. However, its production in Bali does not yet meet market demand due to a decline in harvest yields from year to year, which results from reduced harvested area and inaccurate fertilization practices.

According to data from the Central Bureau of Statistics (BPS, 2024), yard-long bean production in Bali Province shows a declining trend over the past three years. In 2021, total production reaches 5,957 tons per year, then decreases to 4,724 tons in 2022, and further declines to 4,678 tons in 2023. This decline correlates with the reduction in harvested area, which shrinks from 513 hectares in 2021 to 374 hectares in 2022, and further drops to 350 hectares in 2023.

Nevertheless, the productivity of yard-long beans per hectare increases year by year. The average yield per hectare is recorded at 11.61 tons/ha in 2021, rises to 12.63 tons/ha in 2022, and reaches 13.36 tons/ha in 2023. Although productivity shows improvement, these figures remain below the maximum potential yield. For comparison, the Guarda variety of yard-long bean seeds produced by Panah Merah has a yield potential of 20 to 25 tons/ha (Est Wess Seed, 2023).

Suboptimal yard-long bean production impacts the inability to fully meet market demand. In addition to reduced harvested area, the low production output is also linked to improper fertilization practices. Most farmers still apply high doses of nitrogen (N) without considering nutrient balance or its effects on plant growth. Limited understanding of balanced fertilization prevents plants from receiving other essential nutrients needed for comprehensive growth. Nitrogen plays a crucial role in supporting both vegetative and generative growth phases. Meanwhile, phosphorus (P) contributes to photosynthesis and respiration and serves as a key component of nucleotide structures. Potassium (K) also plays an important role in photosynthesis and other physiological functions of plants (Triastuti et al., 2016).

Fertilization is one of the critical factors in crop cultivation, including efforts to improve yard-long bean production. Yield improvement can be achieved through the application of fertilizers containing complete essential macronutrients: nitrogen (N), phosphorus (P), and potassium (K). One type of inorganic fertilizer containing all three elements is NPK Petro Ningrat, which contains 12% nitrogen, 11% phosphorus, and 20% potassium. This fertilizer is known to enhance leaf greenness, accelerate plant height growth, increase the number of branches, stimulate root system development, strengthen plant structure, and improve resistance to pests, diseases, and drought stress.

In addition, there is the organic fertilizer Phonska Oca, which contains nitrogen, phosphorus, and potassium ranging from 3–6%, and is enriched with micronutrients such as total Fe (90–900 ppm), total Mn (250–5000 ppm), total Cu (250–5000 ppm), total B (125–2500 ppm), total Co (5–20 ppm), total Mo (2–10 ppm), and Si (minimum 200 ppm), along with added magnesium (Mg) at a minimum of 200 ppm. These contents enhance the efficiency and effectiveness of fertilizer use, ultimately contributing to increased quantity and quality of harvests (Petrokimia Gresik, 2021). Bastiana et al. (2013) demonstrate that applying liquid organic fertilizer at a concentration of 20 ml per liter of water boosts sweet corn yield up to 17.68 tons per hectare. Furthermore, according to Fahrurrozi et al. (2019), the use of liquid organic fertilizer—whether applied to soil or sprayed on leaves—provides high effectiveness in supporting sweet corn growth and production.

Balanced fertilization between organic and inorganic fertilizers not only improves fertilizer use efficiency but also enhances soil chemical properties, particularly by increasing the availability of essential nutrients such as N, P, and K required by plants. Adequate nutrient availability supports proper root system formation and fruit development, thereby contributing to improved growth and yield of yard-long bean crops.

Research conducted by Purwato Iswahyudi et al. (2019) shows that NPK fertilizer application significantly affects various growth and yield parameters of yard-long bean plants, such as increased plant height, number and weight of fresh pods, and total crop yield. This indicates that the nutrient content in NPK fertilizer effectively supports both vegetative and generative plant growth. Ilmam and Bambang (2023) state that applying 25 kg/ha of nitrogen (N) combined with 90 kg/ha of potassium (K) enhances vegetative growth and harvest yield of yard-long bean plants. Moreover, Purwanto et al. (2019) report that NPK fertilizer application significantly influences plant growth parameters, including plant length (cm), fresh pod weight (kg), and total yield (tons/ha). This effectiveness is observed in treatments with NPK fertilizer at a dosage of 200 kg/ha, which produces better growth and yield responses compared to other treatments.

Therefore, determining the appropriate fertilizer dosage is essential to achieve optimal growth and yield of yard-long bean crops. Research on the effects of NPK Petro Ningrat and Phonska Oca organic fertilizer is expected to provide scientific insights useful for identifying efficient and effective dosages to support sustainable yard-long bean production.

II. MATERIALS AND METHODS

This study used a Factorial Randomized Complete Block Design (RCBD) with two factors. The first factor was NPK Petro Ningrat fertilizer (N) with four treatment dosages, and the second factor was Phonska Oca fertilizer (P) with three treatment dosages. The NPK Petro Ningrat fertilizer (N) consisted of four levels: N0 (control/no fertilizer), N1 (150 kg/ha or 22.5 g/plot), N2 (300 kg/ha or 45 g/plot), and N3 (450 kg/ha or 67.5 g/plot). The Phonska Oca fertilizer (P) consisted of three levels: P0 (control/no fertilizer), P1 (10 ml/l water), and P2 (20 ml/l water). The combination of NPK Petro Ningrat and Phonska Oca treatments resulted in 12 treatment combinations, each replicated three times, yielding a total of 36 experimental units.

The study was conducted in an open field located in Yeh Kuning Village, Jembrana Subdistrict, Jembrana District, Bali Province. Land preparation began with weed removal, followed by soil tilling and the formation of planting beds measuring 50 cm × 300 cm. A total of 36 plots were prepared, all with the same dimensions, and the spacing between blocks and beds was set at 30 cm.

Fertilization in this study used two types of fertilizer. NPK Petro Ningrat fertilizer was applied in two stages: basal fertilization was given three days before planting, and follow-up fertilization was carried out at 20 days after planting (DAP) using the same dosage levels: N0 (no fertilizer), N1 (11.25 g/plot), N2 (22.5 g/plot), and N3 (33.75 g/plot). The second and third follow-up fertilizations were conducted using liquid Phonska fertilizer with the following dosages: P0 (no fertilizer), P1 (10 ml/l water), and P2 (20 ml/l water).

Harvesting of yard-long bean plants was performed based on the characteristics of mature pods: maximum pod size, easy snapping of the pods, and seeds inside the pods not protruding. Harvesting was estimated to begin at 46 DAP, followed by 50 DAP, 54 DAP, and the final harvest at 58 DAP.

The collected research data were tabulated and then analyzed using analysis of variance (ANOVA). If the ANOVA results showed significant differences among treatments, the analysis was continued with a Least Significant Difference (LSD) test at a 5% significance level. Kalau kamu ingin versi ini disesuaikan untuk bagian Materials and Methods atau Results and Discussion dalam jurnal atau skripsi, aku bisa bantu menyempurnakannya lebih lanjut. Mau dilanjutkan ke bagian hasil atau grafik analisis?

III. RESULTS AND DISCUSSION

A. Plant Height

Table 3.1. Mean Plant Height of Yard-Long Bean under NPK Petro Ningrat and Phonska Oca Treatments

Treatment	Plant Height (cm)		
	7 DAP	14 DAP	21 DAP
Dosage of NPK Petro Ningrat (N)			
N_0	4,28 a	62,83 a	149,56 a
N_1	4,42 a	64,67 a	150,67 a
N_2	4,51 a	66,67 b	151,56 a
N_3	4,44 a	67,50 b	155.11 a
Dosage of Phonska Oca (P)			
P_0	4,37 a	64,96 a	149,13 a
P_1	4,58 a	65,08 a	152,83 a
P_2	4,29 a	66,21 a	153,21 a

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.2. Mean Plant Height of Yard-Long Bean under Interaction of NPK Petro Ningrat and Phonska Oca Treatments

Perlakuan	N_0	N_1	N_2	N_3
P_0	143,83 a	148,50 abc	153,33 abc	150,67 abc
P_1	148,00 abc	148,50 abc	157,33 c	**157,50 c**
P_2	144,00 ab	155,00 c	156,67 c	157,33 c

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Based on the data in Table 3.1, the application of NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer at 14 days after planting had a highly significant effect on the height of yard-long bean plants. Treatment N3, which involved the application of NPK Petro Ningrat at a dosage of 450 kg/ha, resulted in the highest average plant height of 67.50 cm. This result was not significantly different from treatment N2 (300 kg/ha), which produced an average plant height of 66.67 cm. In contrast, the control treatment (N0) without fertilizer showed the lowest average plant height of 62.83 cm, and was not significantly different from treatment N1 (150 kg/ha), which recorded an average of 64.67 cm.

The interaction between NPK Petro Ningrat and Phonska Oca fertilizers on the plant height parameter of yard-long beans showed a significant effect at 21 days after planting. However, the interaction between the two fertilizers did not show a significant effect at 7 and 14 days after planting. The average plant height resulting from the interaction between NPK Petro Ningrat and Phonska Oca fertilizers was presented in Table 3.2.

As shown in Table 3.2, the interaction treatment between NPK Petro Ningrat and Phonska Oca organic fertilizer had a significant effect on the height of yard-long bean plants at 21 days after planting. Treatment N2P1, which involved the application of 450 kg/ha of NPK Petro Ningrat and 10 ml/l of Phonska Oca, resulted in the highest average plant height of 157.50 cm. Conversely, treatment N0P0, which involved no application of either fertilizer, produced the lowest average plant height of 143.83 cm.

The treatments did not show a significant effect on plant height at 7 and 21 days after planting due to the availability of nutrients in the soil, which were sufficient to meet the plant's early growth requirements and were fulfilled by previously available nutrients. This nutrient availability caused the plants to show no visible response to additional fertilizer application (Angriani et al., 2025).

B. Number of Leaves

Table 3.3. Average Leaf Number of Yard-Long Bean Plants in Response to NPK Petro Ningrat and Phonska Oca Fertilizer Treatments

Treatment	Number of Leaves (Leaf)		
	7 DAP	14 DAP	21 DAP
Dosage of Pupuk NPK Petro Ningrat (N)			
N_0	1,50 a	11,89 a	41,56 a
N_1	1,50 a	12,67 b	41,89 ab
N_2	1,50 a	13,17 b	43,06 bc
N_3	1,50 a	15,11 c	44,44 c

Dosage of Phonska Oca (P)			
P_0	2,00 a	12,83 a	41,17 a
P_1	2,00 a	13,33 a	43,33 b
P_2	2,00 a	13,50 a	43,71 b

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.3 showed that the application of NPK Petro Ningrat fertilizer had a highly significant effect on the number of leaves of yard-long bean plants at 14 and 21 days after planting. Treatment N3, which involved the application of NPK Petro Ningrat at a dosage of 450 kg/ha, resulted in the highest average number of leaves—15.11 leaves at 14 DAP and 44.44 leaves at 21 DAP. Meanwhile, treatment N0, or no fertilizer application, produced the lowest averages—11.89 leaves at 14 DAP and 41.56 leaves at 21 DAP.

The application of Phonska Oca fertilizer also had a highly significant effect on the number of leaves of yard-long bean plants at 21 days after planting. Treatment P2, which involved Phonska Oca at a dosage of 20 ml/liter of water, resulted in the highest average number of leaves at 43.71 and was significantly different from the other two treatments. In contrast, treatment P0, or no fertilizer application, produced the lowest average of 41.17 leaves. This treatment was not significantly different from treatment P1, which resulted in an average of 43.33 leaves.

Table 3.4. Mean Number of Leaves of Yard-Long Bean under Interaction of NPK Petro Ningrat and Phonska Oca Treatments

Perlakuan	N_0	N_1	N_2	N_3
P_0	40,50 a	42,00 abc	40,67 a	41,50 ab
P_1	41,50 ab	43,50 bc	43,00 abc	46,50 d
P_2	41,17 ab	41,67 ab	45,50 cd	45,33 cd

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

The interaction between NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer treatments had a highly significant effect on the number of leaves of yard-long bean plants observed at 21 days after planting. The average number of leaves resulting from the various treatment combinations was presented in Table 3.4. The highest average number of leaves was obtained from treatment N3P1 (NPK Petro Ningrat at 450 kg/ha combined with Phonska Oca at 10 ml/liter of water), which produced 46.50 leaves. Meanwhile, the lowest average number of leaves was recorded in treatment N0P0 (no application of NPK Petro Ningrat and Phonska Oca), with 40.50 leaves.

This finding aligned with the study conducted by Fadila et al. (2021), which found that the number of leaves in kailan plants increased significantly in proportion to the dosage of NPK fertilizer applied. The result also supported the statement by Murdhiani (2020), who reported that increasing NPK dosage enhanced the availability of nutrients that could be absorbed by the plants.

C. Fresh Biomass Weight

Table 3.4. Mean Fresh Biomass of Yard-Long Bean under NPK Petro Ningrat and Phonska Oca Treatments

Treatment	**Fresh Biomass Weight G (g)**
Dosage of pupuk NPK Petro Ningrat (N)	
N_0	814,33 a
N_1	912,83 b
N_2	1000,11 c
N_3	1074,06 d
Dosage of pupuk Phonska Oca (P)	
P_0	895,71 a
P_1	943,33 b
P_2	1011,96 c

Note : Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Based on Table 3.4, the application of NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer had a highly significant effect on the fresh biomass weight of yard-long bean plants after harvest. Treatment N3, which involved the application of NPK Petro

Ningrat at a dosage of 450 kg/ha, resulted in the highest average fresh biomass weight of 1,074.06 g. In contrast, treatment N0, or no fertilizer application, produced the lowest average of 814.33 g.

The application of Phonska Oca fertilizer also had a highly significant effect on the fresh biomass weight of the plants after harvest. Treatment P2, which involved the application of Phonska Oca at a dosage of 20 ml/liter of water, resulted in the highest average fresh biomass weight of 1,011.96 g and was significantly different from the other two treatments. Treatment P0, or no fertilizer application, showed the lowest average weight of 895.71 g. Meanwhile, treatment P1, with a dosage of 10 ml/liter of water, produced a fresh biomass weight of 943.33 g, which was significantly different from both P0 and P2 treatments

Table 3.5. Interaction of Average Fresh Biomass Weight of Yard-Long Bean Plants in Response to the Combined Effects of NPK Petro Ningrat and Phonska Oca Fertilizers

Treatment	N_0	N_1	N_2	N_3
P_0	786,67 a	827,83 bc	955,83 de	1012,50 f
P_1	814, 17 b	945,83 d	979,50 e	1175,83 h
P_2	842,17 c	964,83 de	1065,00 g	1033,83 f

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.5 showed that the interaction between NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer treatments had a highly significant effect on the fresh biomass weight of yard-long bean plants. The highest average fresh biomass weight was obtained from treatment N3P1, which involved the application of NPK Petro Ningrat at a dosage of 450 kg/ha and Phonska Oca at 10 ml/liter of water, resulting in a weight of 1,175.83 g. Meanwhile, the lowest average fresh biomass weight was recorded in treatment N0P0, which involved no application of either fertilizer, with a result of 786.67 g. These findings were consistent with the statement by Murdhiani (2020), who reported that increasing the dosage of NPK fertilizer enhanced the availability of nutrients that could be absorbed by the plants. Along with the increase in leaf number due to higher NPK dosage, photosynthetic activity also increased, directly contributing to the production of photosynthates and fresh biomass weight. Similarly, the study by Fadila et al. (2021) found a significant increase in the fresh biomass weight of kailan plants. For every unit increase in NPK dosage, the fresh biomass weight of kailan rose by 4.04 g.

D. Dry Biomass Weight

Table 3.6. Average Dry Biomass Weight of Yard-Long Bean Plants in Response to NPK Petro Ningrat and Phonska Oca Fertilizer Treatments

Treatment	**Dry Biomass Weight (g)**
Dosage of pupuk NPK Petro Ningrat (N)	
N_0	217,78 a
N_1	252,56 b
N_2	305,34 c
N_3	329,05 d
Dosage of Phonska Oca (P)	
P_0	259,17 a
P_1	279,85 b
P_2	289,84 b

Note : Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.6 showed that the application of NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer had a highly significant effect on the dry biomass weight of yard-long bean plants after harvest. Treatment N3, which involved the use of NPK Petro Ningrat at a dosage of 450 kg/ha, resulted in the highest average dry weight of 329.05 grams. In contrast, treatment N0, or no fertilizer application, showed the lowest average dry weight of 217.78 grams.

The single application of Phonska Oca fertilizer also had a significant effect on the dry biomass weight of the plants after harvest. Treatment P2, which involved the application of Phonska Oca at a dosage of 20 ml/liter of water, produced the highest average dry weight of 304.81 grams, although it was not significantly different from treatment P1, which used a dosage of 10 ml/liter of water. Meanwhile, treatment P0, with no fertilizer application, recorded the lowest average dry weight of 259.17 grams.

Table 3.7. Average Dry Biomass Weight of Yard-Long Bean Plants in Response to the Interaction Between NPK Petro Ningrat and Phonska Oca Fertilizers

Perlakuan	N_0	N_1	N_2	N_3
P_0	206,91 a	224,48 ab	298,13 ef	307,16 f
P_1	214,02 ab	255,59 cd	279,23 de	370,55 h
P_2	232,42 bc	277,62 cd	338,66 g	309,44 f

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.7 showed that the interaction between NPK Petro Ningrat and Phonska Oca fertilizers had a significant effect on the dry biomass weight of yard-long bean plants. The highest average dry biomass weight was obtained from treatment N3P1 (NPK Petro Ningrat at 450 kg/ha combined with Phonska Oca at 10 ml/liter of water), which resulted in a weight of 370.55 g. The lowest average was recorded in treatment N0P0 (no NPK Petro Ningrat and no Phonska Oca), with a weight of 206.91 g. These findings were in line with the study conducted by Amir et al. (2022), which reported that the application of NPK fertilizer at a dosage of 300 kg/ha produced the most optimal yield of sweet corn compared to dosages of 100 kg/ha and 500 kg/ha. This dosage led to a 36.23% increase in production and resulted in the highest values for both dry biomass weight and dry seed weight. This outcome demonstrated the efficiency of NPK fertilizer use by up to 200%.

E. Fresh Pod Weight

Table 3.8. Average Fresh Pod Weight of Yard-Long Bean Plants in Response to NPK Petro Ningrat and Phonska Oca Fertilizer Treatments

Treatment	Fresh Pod Weight (g)			
	46 DAP (Day)	50 DAP (Day)	54 DAP (Day)	58 DAP (Day)
Dosage of NPK Petro Ningrat (N)				
N_0	84,06 a	85,84 a	90,31 a	89,99 a
N_1	93,85 b	94,69 b	101,36 b	104,79 b
N_2	116,29 c	118,39 c	128,19 c	126,65 c
N_3	133,66 d	141,59 d	139,53 d	138,39 d
Dosage of Phonska Oca (P)				
P_0	99,51 a	101,30 a	105,96 a	105,00 a
P_1	106,50 b	111,45 b	118,88 b	119,69 b
P_2	114,88 c	117,63 c	119,71 b	120,18 b

Table 3.8 showed that the application of NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer had a highly significant effect on the fresh pod weight of yard-long bean plants at 46, 50, 54, and 58 days after planting. Treatment N3, which involved the application of NPK Petro Ningrat at a dosage of 450 kg/ha, resulted in the highest average fresh pod weight of 138.39 grams. In contrast, treatment N0, with no fertilizer application, produced the lowest average of 89.99 grams.

In addition, the application of Phonska Oca fertilizer also had a significant effect on the fresh pod weight of the plants. Treatment P2, which involved the application of Phonska Oca at a dosage of 20 ml/liter of water, yielded the highest average fresh pod weight of 120.18 grams. This result was not significantly different from treatment P1 (10 ml/liter of water), which recorded an average of 119.69 grams. Meanwhile, treatment P0, with no fertilizer application, showed the lowest average of 105 grams.

Table 3.9. Average Fresh Pod Weight of Yard-Long Bean Plants in Response to the Interaction Between NPK Petro Ningrat and Phonska Oca Fertilizers

Treatment	N_0	N_1	N_2	N_3
P_0	89,70 **a**	92,30 a	115,84 bc	115,84 bc
P_1	**89,33 a**	109,41 b	123,22 c	**123,22 c**
P_2	90,95 a	112,67 b	140,88 d	140,88 d

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

The Effect of NPK Petro Ningrat and Phonska Oca Fertilizer Doses on Growth and Yield of Yard long Bean Plants (Vigna Sinensis L.)

Table 3.9 showed that the interaction between NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer treatments had a highly significant effect on the fresh pod weight of yard-long bean plants. The highest average fresh pod weight was obtained from the N3P1 treatment, which involved the application of NPK Petro Ningrat at 450 kg/ha combined with Phonska Oca at 10 ml/liter of water, resulting in a weight of 123.22 grams. In contrast, the lowest average was recorded in the N0P1 treatment, which involved no NPK Petro Ningrat and Phonska Oca at 10 ml/liter of water, producing a fresh pod weight of 89.33 grams. This result was not significantly different from three other treatments: N0P0, N0P2, and N1P0.

These findings aligned with the theory proposed by Handayani and Elfarisna (2021), who stated that plants with an optimal number of leaves and well-developed stems possessed higher photosynthetic capacity, thereby enhancing pod formation and filling more effectively.

Treatments N0P0, N0P2, and N1P0 showed the lowest values. This condition indicated that the yard-long bean plants experienced nutrient deficiencies, particularly in NPK, and the absence of liquid organic fertilizer (LOF) resulted in no improvement in the physical, chemical, and biological properties of the soil. Furthermore, the low availability of essential nutrients, including NPK, in the soil prevented the root system from developing optimally to absorb nutrients. As a result, plant growth and yield were hindered. Sudding et al. (2021) emphasized that if these three nutrients are not available in sufficient quantities or are imbalanced, plant growth and development will be constrained, especially in pod or fruit formation and filling

F. Dry Pod Weight

Table 3.10. Average Dry Pod Weight of Yard-Long Bean Plants in Response to NPK Petro Ningrat and Phonska Oca Fertilizer Treatments

Treatment	Dry Pod Weight (g)			
	46 DAP	**50 DAP**	**54 DAP**	**58 DAP**
Dosage of NPK Petro Ningrat (N)				
N_0	34,80 a	16.02 a	22.15 a	21.54 a
N_1	54,67 b	24.89 b	32.14 b	36.08 b
N_2	104,64 c	48.03 c	58.34 c	57.33 c
N_3	123,13 d	71.87 d	69.39 d	**68.19 d**
Dosage of Phonska Oca (P)				
P_0	66,00 a	31.52 a	37.14 a	35.96 a
P_1	83,44 b	41.53 b	49.31 b	**50.93 b**
P_2	88,19 b	47.55 c	50.07 b	50.47 b

Note: Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

Table 3.10 showed that the application of NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer had a significant effect on the dry pod weight of yard-long bean plants at 46, 50, 54, and 58 days after planting. Treatment N3, which involved the application of NPK Petro Ningrat at a dosage of 450 kg/ha, resulted in the highest average dry pod weight of 68.19 grams at 58 days after planting (DAP). In contrast, treatment N0, with no fertilizer application, recorded the lowest average of 34.80 grams at 58 DAP. In addition, the application of Phonska Oca fertilizer also showed a significant effect on dry pod weight. Treatment P1, with a dosage of 10 ml/liter of water, produced the highest average dry pod weight of 50.93 grams. This result was not significantly different from treatment P2 (20 ml/liter of water), which recorded an average of 50.47 grams. Meanwhile, treatment P0 at 58 DAP, with no fertilizer application, showed the lowest average of 66.00 grams and was significantly different from the other two treatments.

Table 3.11. Average Dry Pod Weight of Yard-Long Bean Plants in Response to the Interaction Between NPK Petro Ningrat and Phonska Oca Fertilizers

Treatment	N_0	N_1	N_2	N_3
P_0	**21,02 a**	23,12 a	46,67 bc	53,02 c
P_1	22,03 a	41,77 b	53,87 c	**86,07 e**
P_2	21,57 a	43,35 b	71,47 d	65,48 d

Note : Treatments sharing the same letter in the same column are not significantly different from each other based on statistical analysis.

The Effect of NPK Petro Ningrat and Phonska Oca Fertilizer Doses on Growth and Yield of Yard long Bean Plants (Vigna Sinensis L.)

Table 3.11 showed that the interaction between NPK Petro Ningrat fertilizer and Phonska Oca organic fertilizer treatments had a highly significant effect on the dry pod weight of yard-long bean plants. The highest average dry pod weight was obtained from the N3P1 treatment, which combined the application of NPK Petro Ningrat at 450 kg/ha with Phonska Oca at a dosage of 10 ml/liter of water, resulting in a weight of 86.07 grams. Meanwhile, the lowest average was recorded in the N0P0 treatment, which involved no application of either fertilizer, with a result of 21.02 grams. This value was not significantly different from three other treatments: N0P1, N0P2, and N1P0.

The use of liquid organic fertilizer (LOF) derived from organic waste in liquid form proved to significantly increase the availability of total nitrogen (N) in the soil (Wang et al., 2019; Wisuthiphaet et al., 2015). This increase in nitrogen content was attributed to the heightened microbial activity stimulated by the application of LOF from organic waste (Enujeke & Ojeifo, 2013; Ranasinghe et al., 2021). The higher nitrogen availability contributed to an increase in chlorophyll content in the leaves, which in turn enhanced the intensity of photosynthesis and supported carbohydrate accumulation in leaf tissues, thereby optimizing pod formation.

Consistent with the findings of Sudding et al. (2021) and Firmansyah et al. (2017), the application of NPK nutrients at a dosage of 300 kg/ha played a synergistic role in supporting the photosynthetic process and its final products. These nutrients also contributed to improved plant growth through the conversion of NPK nutrients into organic compounds or energy via metabolic processes. Meanwhile, Nurnawati et al. (2022) added that the use of liquid organic fertilizer in purple corn cultivation reduced the need for inorganic fertilizer by up to 25%.

IV. CONCLUSIONS

NPK Petro Ningrat and Phonska Oca fertilizers have a highly significant effect on the variables of leaf number, fresh and dry biomass weight, and fresh and dry pod weight at specific dosages. The NPK Petro Ningrat treatment shows the highest values at a dosage of 450 kg/ha for the variables of leaf number, fresh biomass weight, dry biomass weight, fresh pod weight, and dry pod weight. The optimal dosage of Phonska Oca fertilizer is 20 ml/liter of water, as indicated by the highest values in leaf number, fresh and dry biomass weight, and dry pod weight. The best interaction between NPK Petro Ningrat and Phonska Oca fertilizers occurs at a combination of 450 kg/ha and 10 ml/liter of water. This combination has a highly significant effect on the variables of leaf number, fresh and dry biomass weight, and fresh and dry pod weight.

REFERENCES

1) Angriani, H., Hastuti, & Syahruni, K. 2025. Pengaruh Penggunaan Pupuk Organik Cair Terhadap Petumbuhan dan Produksi Kacang Panjang (*Vigna Sinensis L.*). *SCIENCE : Jurnal Inovasi Pendidikan Matematika Dan IPA*, *4*(4). https://jurnalp4i.com/index.php/science
2) Amir, H. M., Yusuf, M., & Sari, N. A. (2022). *Pengaruh dosis pupuk NPK terhadap pertumbuhan dan hasil jagung manis (Zea mays saccharata Sturt.)*. Jurnal Agroteknologi Tanaman, 7(1), 25–32.
3) Bastiana, B., Karim, A., & Sari, N. M. **(**2013). *Pengaruh pemberian pupuk organik cair terhadap pertumbuhan dan hasil*
4) Enujeke, E. C., & Ojeifo, I. M. (2013). Effects of organic manure types on soil properties and yield of okra (Abelmoschus esculentus L.) in Delta State, Nigeria. *International Journal of Agriculture and Rural Development, 16*(2), 1455–1463
5) Est Wess Seed. (2023). *Deskripsi varietas kacang panjang Guarda*. Panah Merah – East West Seed Indonesia
6) Fadila, N., Zulkifli, L., & Hasbi, M. (2021). *Pengaruh dosis pupuk NPK terhadap pertumbuhan dan hasil tanaman kailan (Brassica oleracea var. alboglabra)*. Jurnal Agroteknologi, 12(2), 88–94.
7) Fahrurrozi, M., Nugroho, A., & Handayanto, E. (2019). *Efektivitas aplikasi pupuk organik cair terhadap pertumbuhan dan hasil jagung manis (Zea mays saccharata L.) melalui pemberian ke tanah dan penyemprotan daun*. Jurnal Tanah dan Sumberdaya Lahan, 6(2), 755–762.
8) Firmansyah, D., Subagio, H., & Suwignyo, R. A. (2017). Respons pertumbuhan dan hasil tanaman padi (Oryza sativa L.) terhadap pemberian pupuk NPK dan pupuk organik. *Jurnal Produksi Tanaman, 5*(8), 1413–1420
9) Handayani, I., & Elfarisna. (2021). Efektivitas Penggunaan Pupuk Organik Cair Kulit Pisang Kepok Terhadap Pertumbuhan Dan Produksi Tanaman Pakcoy. *Jurnal Agrosains dan Teknologi*, *6*(1), 25-34.
10) Ilmam, M., & Bambang, S. (2023). *Pengaruh kombinasi pupuk nitrogen dan kalium terhadap pertumbuhan dan hasil kacang panjang (Vigna unguiculata subsp. sesquipedalis)*. Jurnal Agronomi Tanaman Hortikultura, 8(1), 33–40.
11) Murdhiani, I. (2020). *Pengaruh dosis pupuk NPK terhadap ketersediaan hara dan pertumbuhan tanaman sawi (Brassica juncea L.)*. Jurnal Agroekoteknologi Tropika, 5(1), 45–51
12) Nurnawati, L., Risfaheri, R., & Sulastri, S. (2022). Efektivitas pupuk organik cair terhadap pertumbuhan dan hasil jagung ungu serta efisiensi penggunaan pupuk anorganik. *Jurnal Penelitian Pertanian Tanaman Pangan, 6*(2), 135–143.

13) Petrokimia Gresik. (2021). *Phonska Oca: Pupuk organik cair hayati berbasis hara makro dan mikro*
14) Purwanto, Iswahyudi., Hasnelly., dan Subagiono. 2019. Pengaruh Pemberian Pupuk NPK Terhadap Pertumbuhan dan Hasil Kacang panjang (*Vigna sinensis L*.). *Jurnal Sains Agro*, 4(1), https://ojs.umb-bungo.ac.id/i
15) Ranasinghe, R. A. S. N., Jayasekara, J. M. K. P., & Wasala, W. M. C. B. (2021). Effect of organic liquid fertilizers on soil microbial activity and nitrogen availability in vegetable cultivation. *Journal of Agricultural Sciences – Sri Lanka, 16*(2), 282–290
16) Sudding, Y., Yusuf, M., & Abbas, M. H. (2021). *Pengaruh pemberian pupuk NPK terhadap pertumbuhan dan hasil tanaman jagung (Zea mays L.)*. Jurnal Agrotekbis, 9(3), 289–296
17) Triastuti, F., Wardati, dan Yulia, A.E. 2016. Pengaruh Pupuk Kascing Dan Pupuk Npk Terhadap Pertumbuhan Bibit Tanaman Kakao (Theobroma cacao L.) JOM FAPERTA Vol 3 1 Februari 2016.ndex.php/saingro/article/view/246/269.
18) Wisuthiphaet, N., Khamwichit, A., & Saengkerdsub, S. (2015). Utilization of organic waste for liquid fertilizer production and its effect on plant growth. *International Journal of Environmental and Rural Development, 6*(2), 126–131