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# The Effect of Doses of Various Types of Manure and NPK Mutiara on the Growth and Production of Pagoda Mustard *(Brassica narinosa L.)*

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**Abstract:** This research was conducted in the Karangsari area, Gunung Maligas District, Simalungun Regency from December 2024 to February 2025. The purpose of this study was to determine the effect of doses of various types of manure and NPK Mutiara on the growth and production of pagoda mustard *(Brassica narinosa L.)*. This study used a factorial Randomized Block Design (RAK) consisting of 2 factors, the first factor was the provision of various types of manure consisting of 4 treatment levels, namely K0 = no treatment, K1 = 2kg / chicken coop plot, K2 = 2kg / cow coop plot, K3 = 2 kg / goat coop plot. The second factor was the provision of NPK Mutiara fertilizer consisting of 3 treatment levels, namely: N1 = 20g / plot, N2 = 40g / plot, N3 = 60g / plot. Observed parameters: plant height (cm) at 14, 21 and 28 days after planting, number of leaves (strands) at 14, 21 and 28 days after planting DAP, gross weight per plant (g), net weight per plant (g), net weight per plot (kg). The results showed that the application of various types of manure, NPK Mutiara fertilizer, and a combination of both treatments on the growth and production of pagoda mustard greens showed a significant effect on plant height (cm) at 14, 21, and 28 DAP, number of leaves (blades) at 14, 21, and 28 DAP, gross weight per plant, gross weight per plot, net weight per plant, and net weight per plot. The best type of manure was chicken manure at a dose of 20 tons/ha, the best dose of NPK Mutiara fertilizer was at 600 kg/ha, and the best combination of both treatments was 20 tons/ha of chicken manure and 600 kg/ha of NPK Mutiara fertilizer.

**Keywords:** Manure; NPK Mutiara; Pagoda Mustard Greens.

## Introduction

Pagoda mustard greens *(Brassica narinosa L.)* are a type of green vegetable known as tatsoi, originating from China. Pagoda mustard greens contain nutrients and vitamins that can boost the human immune system, including 969 mg of vitamin A per 100 g, 0.09 mg of vitamin B per 100 g, 102.0 mg of vitamin C, 210 mg of calcium, 11 mg of magnesium, and 449 mg of potassium. Pagoda mustard greens can grow well in both hot and cold climates, allowing them to be cultivated in both lowlands and highlands (Jayati & Susanti, 2019).

According to Statistics Indonesia (BPS, 2020), green mustard greens production in Indonesia increased by 627,598 tons, 635,982 tons, and 652,723 tons in 2017, 2018, and 2019, respectively. Public demand for green mustard greens is increasing, but production of pagoda mustard greens is currently limited, as they are still very rare on the market. Although some Indonesian farmers have begun cultivating them, production and distribution are not as high as other mustard greens, despite their potential and promising development prospects. Therefore, efforts to achieve this increase can

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be achieved through agricultural intensification and extensification.

Fertilizer is a substance that provides essential elements for plant growth and development. Fertilizer application to plants must take into account the nutrient status of the soil and the amount of nutrients required by the plant. Plant fertilizer is usually applied to the soil, but it can also be applied through the leaves or stems as a solution. Fertilization can be done with inorganic or organic fertilizers (Harahap et al., 2023).

One factor influencing crop production is nutrient availability. Human efforts to meet plant nutrient needs include fertilization. Fertilizing pagoda mustard greens generally uses manure, solid compost, NPK fertilizer, or liquid organic fertilizer (Putri & Koesriharti, 2023). Plants require manure to improve soil properties. Organic fertilizer is a fertilizer composed primarily or entirely of organic material derived from plants and/or animals that has undergone an engineering process. It can be formed into a solid or liquid form and is used to supply organic matter and improve the physical, chemical, and biological properties of the soil (Dewanto et al., 2013).

The effect of manure on soil chemistry and biology, and changes in soil physical properties, is evident. Although manure's nutrient content is not as high as chemical fertilizers, it has the advantage of improving soil properties. The effects of manure on soil properties include: facilitating rainwater absorption, improving the soil's water-holding capacity, reducing erosion, providing a favorable growing environment for seed and root germination, and serving as a source of plant nutrients (Widodo, 2019).

The short-term application of organic fertilizer alone is insufficient to meet plant nutrient requirements, necessitating the addition of inorganic fertilizers. These artificial fertilizers, called inorganic fertilizers, are produced in factories. One type of artificial fertilizer is NPK fertilizer, which contains 16% N, 16% P, and 16% K. The essential nutrients that are essential for vegetable plants to grow are Nitrogen (N), Phosphorus (P), and Potassium (K). N plays a role in the components of amino acids, proteins, and enzymes. P plays a role in reactions in the dark phase of photosynthesis, respiration, and various other metabolic processes, while K acts as an activator of various enzymes that are essential in photosynthesis and respiration reactions, as well as for enzymes involved in protein and starch synthesis, and regulates cell turgor that helps in the process of opening and closing stomata (Tangkasiang, 2023). The application of NPK fertilizer to plants must be adjusted to land conditions so that it can increase production. Mutiara NPK fertilizer is a fertilizer that contains N, P, K elements that can react quickly. From the description above, it is necessary to study the effect of doses of various types of manure and Mutiara NPK on the growth and production of Pagoda mustard *(Brasicca narinosa L.)*.

## Method

The research was conducted in the Karangsari area of Gunung Maligas District, Simalungun Regency, from December 2024 to February 2025, at an altitude of approximately 250 meters above sea level. The tools used in this experiment were a hoe, watering can, measuring tape, name pamphlets, a camera, scales, stationery, and other supporting equipment. The materials used were F1 TA KE CAI variety pagoda mustard seeds, Curacron 500 EC, Dithane M-45 WP, manure from cows, chickens, goats, and Mutiara NPK fertilizer.

Research Methods: The experimental design used in this study was a factorial Randomized Block Design (RBD) consisting of two treatment factors. Factor I was the application of various types of manure, consisting of 4 levels, namely: K0: No treatment, K1: 20 tons/ha of chicken manure (2 kg/plot), K2: 20 tons/ha of cow manure (2 kg/plot), K3: 20 tons/ha of goat manure (2 kg/plot). Factor II was the application of Mutiara NPK fertilizer, consisting of 3 levels, namely: N1: 200 kg/ha (20 g/plot), N2: 400 kg/ha (40 g/plot), N3: 600 kg/ha (60 g/plot) resulting in 12 treatment combinations. To determine the treatment response to the observed plant parameters, an analysis of variance was performed. If the analysis of variance showed a significant response, a significant difference test (LSD) was conducted at the 5% level.

The parameter observed was plant height (cm), measured at 14 days after planting (DAP), 21 days after planting, and 28 days after planting. Measurements started from the base of the plant to the highest leaf blade. The number of leaves (strands) counted were leaves that had fully opened. Leaf counts were conducted at 14, 21, and 28 days after planting.

Gross weight per plant (g) was calculated at harvest by uprooting the sample plant, removing any soil still attached to the roots, and then weighing it. Net weight per plant (g) was calculated at harvest by uprooting the sample plant, removing any soil still attached to the roots, and cutting the roots, then weighing them. Net weight per plot (kg) was measured at harvest by uprooting all plants per plot, removing the roots and yellow leaves, then cleaning and weighing them.

## Result and Discussion

*Plant Height (cm)*

The results of the analysis of variance for pagoda mustard plant height showed that the application of various types of manure, Mutiara NPK fertilizer, and the interaction of various types of manure with Mutiara NPK fertilizer significantly affected plant height and leaf number of pagoda mustard plants at 14, 21, and 28 days after planting. Differences between treatments were determined using a 5% LSD test, as shown in Table 1.

**Table 1.** Results of the Test of Differences in Average Pagoda Mustard Plant Height at 14, 21, and 28 Days After Planting Due to the Application of Various Types of Manure, Mutiara NPK Fertilizer, and the Combination of Both Treatments

| Treatment | Plant Height (cm) | | | Number of leaves (blades) | | |
|---|---|---|---|---|---|---|
| | 14 DAP | 21 DAP | 28 DAP | 14 DAP | 21 DAP | 28 DAP |
| $K_0$ | 7.75 d | 11.61 c | 13.75 c | 5.58 c | 9.50 c | 11.19 c |
| $K_1$ | 9.03 a | 13.31 a | 16.00 a | 8.00 a | 11.89 a | 15.06 a |
| $K_2$ | 8.58 b | 12.53 b | 15.50 b | 7.53 b | 11.00 b | 14.14 b |
| $K_3$ | 8.19 c | 12.72 b | 15.36 b | 7.36 b | 10.83 b | 14.11 b |
| BNT 5% | 0.26 | 0.25 | 0.32 | 0.20 | 0.25 | 0.27 |
| $N_1$ | 8.02 c | 12.25 c | 14.65 c | 6.83 c | 10.44 c | 13.31 c |
| $N_2$ | 8.38 b | 12.48 b | 15.21 b | 7.02 b | 10.81 b | 13.58 b |
| $N_3$ | 8.77 a | 12.90 a | 15.60 a | 7.50 a | 11.17 a | 13.98 a |
| BNT 5% | 0.22 | 0.22 | 0.28 | 0.17 | 0.22 | 0.24 |
| $K_0N_1$ | 7.08 d | 10.75 e | 12.42 e | 5.17 e | 9.08 f | 11.08 e |
| $K_0N_2$ | 8.00 c | 11.25 d | 14.33 d | 5.50 e | 9.67 e | 11.25 e |
| $K_0N_3$ | 8.17 c | 12.25 c | 14.50 d | 6.08 d | 9.75 e | 11.25 e |
| $K_1N_1$ | 8.67 bc | 12.75 bc | 15.50 bc | 7.58 bc | 11.25 c | 14.75 bc |
| $K_1N_2$ | 8.75 bc | 13.00 b | 15.83 b | 7.75 b | 11.83 b | 14.92 b |
| $K_1N_3$ | 9.67 a | 13.83 a | 16.67 a | 8.67 a | 12.58 a | 15.50 a |
| $K_2N_1$ | 8.33 c | 12.50 c | 15.42 bc | 7.42 bc | 10.92 cd | 13.92 cd |
| $K_2N_2$ | 8.50 bc | 12.67 bc | 15.33 bc | 7.50 bc | 11.00 cd | 14.17 c |
| $K_2N_3$ | 8.92 b | 12.75 bc | 15.75 bc | 7.67 bc | 11.08 cd | 14.33 c |
| $K_3N_1$ | 8.00 c | 12.33 c | 15.25 c | 7.17 c | 10.50 d | 13.50 d |
| $K_3N_2$ | 8.25 c | 12.58 bc | 15.33 bc | 7.33 c | 10.75 d | 14.00 c |
| $K_3N_3$ | 8.33 c | 12.75 bc | 15.50 bc | 7.58 bc | 11.25 c | 14.83 b |
| BNT 5% | 0.44 | 0.43 | 0.56 | 0.34 | 0.43 | 0.47 |

**Note:** Numbers followed by different letter notations in the same column indicate a significant difference at the 5% level.

Table 1 shows that the tallest pagoda mustard plants were found in the chicken manure (K1) treatment. This is because the nutrient content of chicken manure is higher than that of cow manure (K2) and goat manure (K3). Chicken manure contains higher levels of nitrogen (N), phosphorus (P), and potassium (K) than cow and goat manure. During plant growth, the need for N from chicken manure increases. This can enhance plant growth because plants have sufficient N. Manure derived from chicken manure produces better yields because the organic matter in chicken manure improves the biological properties of the soil, thus improving the plant's root environment. Furthermore, chicken manure can supply more nutrients, especially N, P, and K, than fertilizers derived from large livestock such as cows and goats (Melati & Andriyani, 2005; Yulianto et al., 2021). The average data on the height of pagoda mustard plants aged 14, 21 and 28 DAP due to the provision of various types of manure and NPK Mutiara can be seen in Figure 1.

Figure 1 shows the average height of pagoda mustard greens at 14, 21, and 28 Days After Planting due to the interaction of manure and Mutiara NPK fertilizer. The tallest plants were found in the K1N3 treatment (2 kg of chicken manure/plot and 60 g of NPK fertilizer/plot), with heights of 9.67 cm, 13.83 cm, and 16.67 cm, respectively. The shortest plants were found in the K0N1 treatment (without manure and 20 g of NPK fertilizer/plot), with heights of 7.08 cm, 10.75 cm, and 12.42 cm, respectively. This is because mustard greens growth is influenced by optimal nutrient absorption, particularly the nitrogen and potassium contained in Mutiara NPK fertilizer, which support plant height. According to (Syifa et al., 2020), nitrogen plays a crucial role in the vegetative phase of plants. Nitrogen is a vital nutrient for cell division and elongation, contributing to the protoplasmic component of tissues such as growing points. This also affects the height of pagoda mustard plants.

Table 1 shows that the interaction of various types of manure and Mutiara NPK fertilizer significantly affected pagoda mustard plant height. The highest average plant heights resulting from the interaction of manure and Mutiara NPK fertilizer at 14, 21, and 28 days

after planting were found in the K1N3 treatment (9.67 cm), 13.83 cm, and 16.67 cm), respectively, significantly different from the other interaction treatments. Meanwhile, the shortest plants were found in the K0N1 treatment (7.08 cm), 10.75 cm, and 12.42 cm). This is because the use of NPK fertilizer combined with organic fertilizer can improve overall soil fertility. This combination not only provides nutrients but also improves soil structure, increases water retention capacity, and supports beneficial soil microbes so that it can influence the height of pagoda mustard plants (Sari et al., 2023).

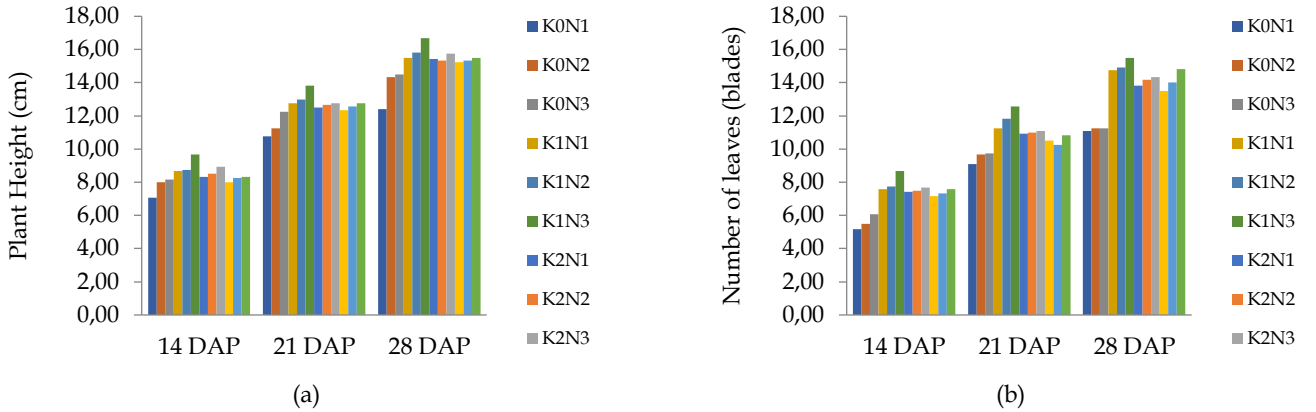


**Figure 1.** Histogram of Plant Height and Leaf Number of Pagoda Mustard Greens at 14, 21, and 28 Days After Planting Due to Application of Various Types of Manure with Mutiara NPK Fertilizer: (a) Plant height; (b) number of leaves

*Number of Leaves (Sheets)*

The results of the analysis of variance (ANOVA) on the number of leaves in pagoda mustard greens indicate that the application of various types of manure, NPK Mutiara fertilizer, and the interaction between the two fertilizer treatments significantly affected leaf number in pagoda mustard greens. Differences between treatments were determined using a LSD test at the 5% level, as shown in Table 1.

Table 1 shows the average number of leaves in pagoda mustard greens at 14, 21, and 28 days after planting (DAP) after planting (DAP) after planting (DAP). The highest number of leaves was found in the K1 treatment (8.00), 11.89, and 15.06 leaves, respectively, significantly different from the other treatments. The lowest number of leaves at 14, 21, and 28 days after planting (DAP) was found in the K0 treatment (5.58), 9.50, and 11.19 leaves, respectively).

The highest number of leaves in pagoda mustard greens was found in the chicken manure treatment (K1). This is because chicken manure contains more organic matter with a finer texture than cow and goat manure, making it easier to decompose and break down. This allows nutrients to be more readily available and easily absorbed by plants for leaf formation, which in turn affects the number of pagoda mustard leaves (Putri & Koesriharti, 2023).

Table 1 shows the average number of pagoda mustard leaves at 14, 21, and 28 days after planting (DAP) following application of Mutiara NPK fertilizer. The highest number was found in the N3 treatment, with 7.50, 11.17, and 13.98 leaves, respectively, significantly different from the N2 treatment (7.02), 10.81, 13.58 leaves), and the N1 treatment (6.83), 10.44, and 13.31 leaves). This is because the nutrient content in NPK Mutiara fertilizer is beneficial for the growth of pagoda mustard plants. Phosphorus (P) plays a role in the formation of ATP, which is used for cell growth, and potassium (K), which acts as an enzyme activator involved in protein and carbohydrate synthesis. Increasing the absorption of K by plant roots can increase carbohydrate production, thereby increasing the number of pagoda mustard leaves (Syifa et al., 2020).

Table 1 shows that the number of pagoda mustard leaves is significantly affected by the interaction of various types of manure and NPK Mutiara fertilizer. The highest average number of leaves resulting from the interaction of manure and NPK Mutiara fertilizer at 14, 21, and 28 days after planting was found in the K1N3 treatment (8.67 leaves), 12.58 leaves, and 15.50 leaves, respectively), which were significantly different from the other interaction treatments. Meanwhile, the lowest number of leaves was found in the K0N1 treatment (5.17 leaves), 9.08 leaves, and 11.08 leaves, respectively.

According to Purnamasari et al. (2023), factors influencing leaf growth include the availability of water, nutrients, and sunlight for photosynthesis. Leaves are the part of the plant that synthesizes food for the plant's needs and stores food reserves. They contain chlorophyll, which plays a role in photosynthesis. The greater the number of leaves, the greater the photosynthesis rate.

Figure 1 shows the number of leaves in pagoda mustard plants at 14, 21, and 28 days after planting

(DAP) due to the interaction of various types of manure and Mutiara NPK fertilizer. The highest number of leaves was found in the K1N3 treatment (2 kg of chicken manure/plot and 60 g of NPK fertilizer/plot), with 8.67, 12.58, and 15.50 leaves, respectively. The fewest leaves were found in the K0N1 treatment (without manure and 20 g NPK fertilizer/plot), with 5.17, 9.08, and 11.08 leaves, respectively.

*Gross Weight Per Plant (g)*

The results of the analysis of variance (ANOVA) of gross weight per pagoda mustard plant showed that the gross weight per pagoda mustard plant was significantly affected by the application of various types of manure, the application of Mutiara NPK fertilizer, and the interaction between the two fertilizer treatments. Differences between treatments were determined by conducting a t-test with a difference in the average LSD at the 5% level, as shown in Table 2.

**Table 2.** Results of the Test of Differences in Average Gross Weight Per Plant and Net Weight Per Pagoda Mustard Plant Due to the Application of Various Types of Manure, Mutiara NPK Fertilizer, and the Combination of the Two Treatments

| Treatment | Gross Weight Per Plant (g) | Net Weight Per Plant (g) |
|---|---|---|
| $K_0$ | 193.06 c | 186.94 c |
| $K_1$ | 251.39 a | 241.67 a |
| $K_2$ | 216.39 b | 200.28 b |
| $K_3$ | 210.56 b | 197.78 b |
| BNT 5% | 8.35 | 8.96 |
| $N_1$ | 208.54 c | 197.08 c |
| $N_2$ | 216.25 b | 205.42 b |
| $N_3$ | 228.75 a | 217.50 a |
| BNT 5% | 7.23 | 7.76 |
| $K_0N_1$ | 184.17 e | 178.33 e |
| $K_0N_2$ | 200.00 d | 197.50 cd |
| $K_0N_3$ | 195.00 de | 185.00 de |
| $K_1N_1$ | 243.33 b | 233.33 b |
| $K_1N_2$ | 248.33 b | 234.17 b |
| $K_1N_3$ | 264.17 a | 253.33 a |
| $K_2N_1$ | 203.33 cd | 189.17 de |
| $K_2N_2$ | 205.00 cd | 191.67 de |
| $K_2N_3$ | 240.83 b | 220.00 bc |
| $K_3N_1$ | 203.33 cd | 187.50 de |
| $K_3N_2$ | 211.67 cd | 194.17 d |
| $K_3N_3$ | 216.67 c | 211.67 c |
| BNT 5% | 14.59 | 15.52 |

**Note:** Numbers followed by different letter notations in the same column indicate a significant difference at the 5% level.

Table 2 shows the average gross weight per pagoda mustard plant resulting from the application of various types of manure. The highest gross weight per plant was found in the K1 treatment (251.39 g), significantly different from the other treatments, namely K2 (216.39 g), K3 (210.56 g), and K0 (193.06 g). The highest gross weight per pagoda mustard plant was found in the chicken manure treatment (K1). This is because pagoda mustard plants fed with chicken manure showed better growth in terms of height and number of leaves, which in turn increased the gross weight per pagoda mustard plant. According to Nurjanah et al. (2022), gross weight per plant is influenced by plant height, number of leaves, leaf length, and leaf width. Higher values for these parameters indicate greater weight production by pagoda mustard plants. Furthermore, gross weight per plant is influenced by water and nutrient content, which play a significant role in cell turgidity, resulting in leaf cell enlargement (Pirzad et al., 2011).

Table 3 shows the average gross weight per pagoda mustard plant following application of Mutiara NPK fertilizer. The highest was in the N3 treatment (228.75 g), significantly different from N2 (216.39 g) and N1 (208.54 g). This is due to the precise fertilizer dosage used, which ensures nutrient availability to the plant, which can influence the gross weight per pagoda mustard plant. This is in accordance with Mahendra et al. (2023) statement that plants will thrive if the necessary nutrients are available in sufficient quantities and in an absorbable form.

Table 3 shows the average gross weight per pagoda mustard plant resulting from the interaction of various types of manure and Mutiara NPK fertilizer. The highest was in the K1N3 treatment (264.17 g), significantly different from the other treatments. This is because a supportive environment influences the gross weight of pagoda mustard plants, such as the amount of light absorbed by the leaves (Hapsari & Suparno, 2023),

which leads to more efficient photosynthesis and higher photosynthate production, which is then accumulated in the total plant weight. The more leaves produced, the heavier the pagoda mustard plant (Purnamasari et al., 2023).

Data on the average gross weight per plant and net weight per pagoda mustard plant resulting from the interaction of various types of manure and Mutiara NPK fertilizer can be seen in Figure 2.

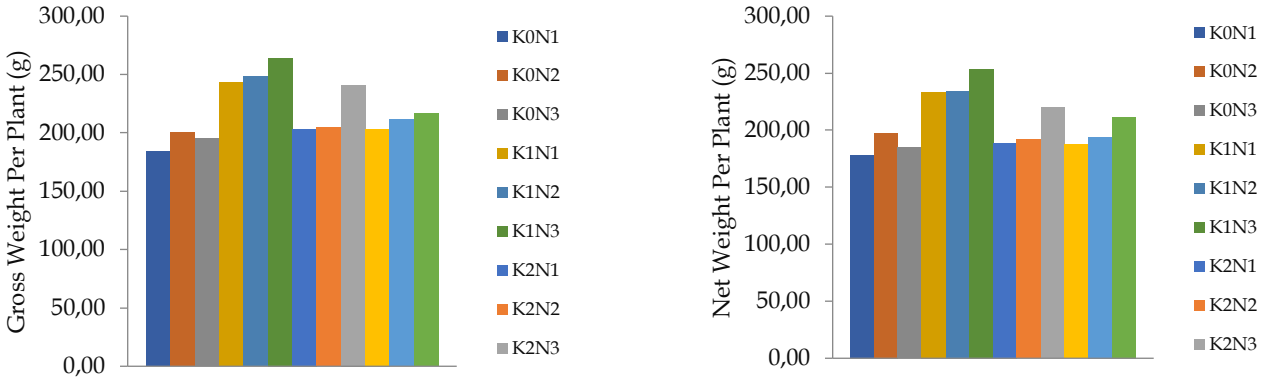


**Figure 2.** Histogram of Gross Weight Per Plant and Net Weight Per Pagoda Mustard Plant Due to the Application of Combinations of Various Types of Manure and Mutiara NPK Fertilizer: (a) Gross Weight Per Plant; (b) Net Weight Per Plant

Figure 2 shows the gross weight per pagoda mustard plant due to the interaction of various types of manure and Mutiara NPK fertilizer. The highest weight was found in the K1N3 treatment (2 kg chicken manure/plot and 60 g NPK fertilizer/plot) at 264.17 g, while the lowest was found in the K0N1 treatment (no manure and 20 g NPK fertilizer/plot) at 184.17 g.

*Net Weight Per Plant (g)*

The results of the analysis of variance (ANOVA) of net weight per pagoda mustard plant showed that the net weight per pagoda mustard plant was significantly affected by the application of various types of manure, Mutiara NPK fertilizer, and the interaction between the two fertilizer treatments. Differences between treatments were determined by conducting a 5% LSD test, as shown in Table 2.

Table 2 shows the average net weight per pagoda mustard plant resulting from the application of various types of manure. The highest net weight was found in the K1 treatment (241.67 g), significantly different from the K2 (200.28 g), K3 (197.78 g), and K0 (186.94 g). The highest net weight per pagoda mustard plant was found in the chicken manure treatment (K1). This is because pagoda mustard plants fed with chicken manure showed better growth in terms of plant height and number of leaves, which in turn increased the net weight per pagoda mustard plant. According to Indriyani (2016), leaves are an important part of vegetable plants. They function in the process of photosynthesis, while the product of photosynthesis, or photosynthates, is used for plant growth. Plants with larger leaf areas and more effective absorption of sunlight, which is useful for photosynthesis, will affect the net weight per plant (Umesh et al., 2023). Mustard greens are a type of vegetable whose primary crop is leaves, so they require an adequate supply of nutrients during the vegetative phase.

Table 2 shows the average net weight per pagoda mustard plant following application of Mutiara NPK fertilizer. The highest weight was found in the N3 treatment (217.50 g), significantly different from the N2 treatment (205.42 g) and N1 treatment (197.08 g). This is because different dosage levels result in different leaf yields, and the correct fertilizer dosage will accelerate leaf formation, thus affecting the net weight of pagoda mustard plants. According to Arief & Nursangadji (2022) the macronutrient content of Mutiara NPK fertilizer is essential for plant growth, particularly in leaves. It provides nutrients relatively quickly, resulting in readily available nutrients for plant absorption, and a higher nutrient content.

Table 2 shows the average net weight per pagoda mustard plant resulting from the interaction of various types of manure and Mutiara NPK fertilizer. The highest weight was found in the K1N3 treatment (253.33 g), significantly different from the other treatments. This is due to the availability of nutrients in the combination of manure and inorganic fertilizers needed by pagoda mustard plants, as well as a supportive environment, which will affect the net weight per pagoda mustard plant.

Figure 2 shows the net weight per pagoda mustard plant resulting from the interaction of various types of

manure and Mutiara NPK fertilizer. The highest weight was found in the K1N3 treatment (2 kg chicken manure/plot and 60 g NPK fertilizer/plot) at 253.33 g, while the lowest was found in the K0N1 treatment (no manure and 20 g NPK fertilizer/plot) at 178.33 g.

*Net Weight Per Plot (kg)*

The analysis of variance (ANOVA) of net weight per plot of pagoda mustard greens showed that the net weight per plot of pagoda mustard greens was significantly affected by the application of various types of manure, the application of Mutiara NPK fertilizer, and the interaction between the two fertilizer treatments. Differences between treatments were determined by conducting a t-test for differences in the average BNT at the 5% level, as shown in Table 3.

**Table 3.** Results of the Test for Differences in Average Net Weight per Plot of Pagoda Mustard Greens Due to the Application of Various Types of Manure, Mutiara NPK Fertilizer, and the Combination of the Two Treatments

| Treatment | Fruit Production Per Plot Conversion of tons to sahur (kg) | Conversion Ton/ha |
|---|---|---|
| $K_0$ | 2.60 c | 26.00 |
| $K_1$ | 3.34 a | 33.44 |
| $K_2$ | 2.78 b | 27.78 |
| $K_3$ | 2.76 b | 27.56 |
| BNT 5% | 0.12 | |
| $N_1$ | 2.72 c | 27.17 |
| $N_2$ | 2.85 b | 28.50 |
| $N_3$ | 3.04 a | 30.42 |
| BNT 5% | 0.10 | |
| $K_0N_1$ | 2.47 e | 24.67 |
| $K_0N_2$ | 2.77 cd | 27.67 |
| $K_0N_3$ | 2.57 de | 25.67 |
| $K_1N_1$ | 3.20 b | 32.00 |
| $K_1N_2$ | 3.30 b | 33.00 |
| $K_1N_3$ | 3.53 a | 35.33 |
| $K_2N_1$ | 2.60 de | 26.00 |
| $K_2N_2$ | 2.63 de | 26.33 |
| $K_2N_3$ | 3.10 bc | 31.00 |
| $K_3N_1$ | 2.60 de | 26.00 |
| $K_3N_2$ | 2.70 d | 27.00 |
| $K_3N_3$ | 2.97 c | 29.67 |
| BNT 5% | 0.20 | |

**Note:** Numbers followed by different letter notations in the same column indicate significant differences at the 5% level.

Table 3 shows the average net weight per plot of pagoda mustard plants resulting from the application of various types of manure. The heaviest was in the K1 treatment (3.34 kg), which was significantly different from K2 (2.78 kg), K3 (2.76 kg), and K0 (2.60 kg). The heaviest net weight per plot of pagoda mustard plants was in the chicken manure treatment (K1). This is because pagoda mustard plants fertilized with chicken manure showed better growth in terms of plant height, number of leaves, gross weight per plant, and net weight per plant, thus contributing to an increase in net weight per plot of pagoda mustard plants (da Silva et al., 2019).

Table 5 shows the average net weight per plot of pagoda mustard plants resulting from the application of Mutiara NPK fertilizer. The heaviest was in the N3 treatment (3.04 kg), which was significantly different from N2 (2.85 kg) and N1 (2.72 kg). This is because NPK fertilizer is water-soluble, so when applied, the nutrients dissolve quickly and can be absorbed by plant roots. This reduces the risk of nutrient leaching, especially during rainfall. Plants can quickly utilize the nutrients before they are completely dissolved in the soil, which ultimately affects the weight of pagoda mustard plants (Ariesta et al., 2021; Chotimah et al., 2024; Ikhsan et al., 2023).

Table 3 shows the average net weight per plot of pagoda mustard plants due to the interaction of various types of manure and Mutiara NPK fertilizer. The heaviest weight was found in the K1N3 treatment (3.53 kg), significantly different from all other treatments. This is because the availability of nutrients needed by plants and a supportive environment will influence the net weight per plot of pagoda mustard plants (Fauzi et al., 2024; Rosalyne et al., 2025). Data on the average net weight per plot of pagoda mustard plants due to the interaction of various types of manure and Mutiara NPK fertilizer can be seen in Figure 3.

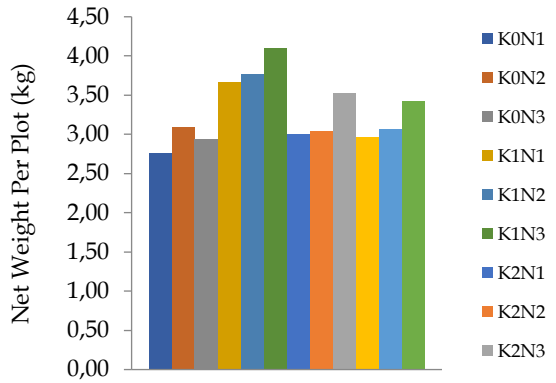


**Figure 3.** Histogram of Net Weight Per Plot of Pagoda Mustard Greens Due to Combinations of Various Types of Manure and Mutiara NPK Fertilizer

Figure 3 shows the net weight per plot of pagoda mustard greens due to the interaction of various types of manure and Mutiara NPK fertilizer. The heaviest weight was found in the K1N3 treatment (2 kg of chicken manure/plot and 60 g of NPK fertilizer/plot) at 3.53 kg, while the lightest weight was found in the K0N1 treatment (no manure and 20 g of NPK fertilizer/plot) at 2.47 kg.

## Conclusion

The application of various types of chicken manure to the growth and production of pagoda mustard greens showed a significant effect on plant height (cm) at 14, 21, and 28 days after planting, the number of leaves (blades) at 14, 21, and 28 days after planting, the gross weight per plant, the gross weight per plot, the net weight per plant, and the net weight per plot. The best type of manure was chicken manure at a dose of 20 tons/ha. Application of Mutiara NPK fertilizer showed a significant effect on plant height (cm) at 14, 21, and 28 days after planting, the number of leaves (blades) at 14, 21, and 28 days after planting, the gross weight per plant (g), the gross weight per plot (kg), the net weight per plant (g), and the net weight per plot (kg). The best dose of Mutiara NPK fertilizer was 600 kg/ha. The combination of various types of manure with NPK Mutiara fertilizer showed a significant effect on plant height (cm) at 14, 21, and 28 DAP, number of leaves (blades) at 14, 21, and 28 DAP, gross weight per plant (g), gross weight per plot (kg), net weight per plant (g), and net weight per plot (kg). The best combination dose was 20 tons/ha of chicken manure and 600 kg/ha of NPK Mutiara fertilizer.

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