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Effectiveness of Pearl NPK Fertilizer Application and Rabbit Urine POC Concentration on the Growth and Yield of Pagoda Mustard (*Brassica narinosa* L)

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Abstract. Pagoda Cabbage (Brassica narinosa L), also known as Ta Ke Chai, is a type of horticultural vegetable with convex, circular leaves resembling blooming flowers, belonging to the Brassicaceae family. The objective of this study was to determine the combination dose of NPK Mutiara inorganic fertilizer and POC Rabbit Urine organic fertilizer that could provide the best growth and yield for Pagoda Mustard plants. This study was conducted in Sedayulawas Village, Brondong District, Lamongan Regency, East Java Province, from January to March 2025. The experimental method used was a 2-factor experimental method using a Randomized Block Design (RBD), with 16 treatments and 4 replications. The treatments consisted of the first factor of NPK Mutiara fertilizer application with the symbol A, namely: No NPK fertilizer, 50 ml NPK, 100 ml NPK, 150 ml NPK. The second factor was the application of POC Rabbit Urine with the symbol U, namely: 50 ml POC, 100 ml POC, 150 ml POC, 200 ml POC. The data were analyzed using analysis of variance and followed by BNJ, with the observation variables being plant height, number of leaves, leaf area, root length, wet weight, and dry weight. The results of this study indicate that the Rabbit Urine POC treatment has a significant effect on all observation variables of pagoda mustard plant growth and yield because the higher the concentration of Rabbit Urine POC given, the better the plant growth results. This shows that Rabbit Urine can supply nutrients in the soil because the higher the dose given, the greater the nutrient content received by the plants.

Keywords: Pagoda Mustard, Rabbit Urine POC, Pearl NPK

1 Introduction

The Republic of Indonesia has various types of crops that can be cultivated and developed to meet daily needs. One of the horticultural crops that can be cultivated in Indonesia is mustard greens. One important prospect for mustard cultivation to meet domestic demand is pagoda mustard (Brassica narinosa L.). Pagoda mustard is suitable for cultivation in Indonesia because it is supported by climatic, technical, economic, and social aspects [1]. Pagoda mustard (Brassica narinosa L.) is a vegetable that is becoming popular among the public. This super green vegetable has circular leaves that resemble flowers and stand out on the surface. The prospects for developing pagoda mustard cultivation are enormous in terms of meeting domestic demand. From a climatological, technical, economic, and social perspective, pagoda mustard is suitable for cultivation in Indonesia [2]. The Pagoda Mustard plant is rich in nutrients and antioxidants, which help prevent cancer and maintain overall health. Pagoda mustard is rarely found in the market because, in addition to its high price, it is still cultivated conventionally, resulting in suboptimal yields [3].

Plants that have high economic value and can be a source of income. Pagoda mustard greens (Brassica narinosa L.) contain fiber, vitamins A, B, B2, B6, and C, calcium, phosphorus, copper, magnesium, iron, and protein. Pagoda mustard greens are beneficial for preventing gastritis, treating osteoporosis, reducing inflammation, reducing fever, and strengthening bones and teeth. According to data from the Central Statistics Agency (BPS) in 2021, mustard production in West Java in 2017-2019 declined and increased in 2020. In 2017, mustard production was 216,174 tons, decreasing to 201,004 tons in 2018, and further decreasing to 179,925 tons in 2019. In 2020, production increased to

189,354 tons. The data shows a change in mustard production, which requires an increase in mustard production [4]. Nutrition is one of the factors that can affect a plant's capacity to produce. One method that can be used to provide nutrients to plants is fertilization. Liquid organic fertilizer, manure, or NPK fertilizer are

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often used to fertilize Pagoda Mustard plants [5].

NPK fertilizer is a type of artificial fertilizer in solid or liquid form that contains nitrogen, phosphorus, and potassium nutrients. The three elements in NPK fertilizer can help vegetative growth, root and shoot growth, as well as flowering and fruiting. Adequate fertilization and good growing media for Pagoda mustard development can increase soil fertility and the availability of nutrients in the soil [6]. Therefore, NPK fertilizer is a type of fertilizer that can provide for the needs of plants. It is a fertilizer derived from chemicals, or what can be called an inorganic fertilizer. Mutiara NPK fertilizer is an inorganic fertilizer that can be applied to plants, with nutrient factors of N 16% - P 16% - K 16% [7]. Increased public awareness of health has led to a positive trend in organic farming, resulting in increased use of organic fertilizers. Organic fertilizers consist of agricultural waste or residues such as plant residues, green manure, farmyard manure, kitchen waste, and municipal waste. To meet the increasing demand for organic fertilizers, one alternative is rabbit urine [8].

Rabbit urine is a potential source of liquid organic fertilizer for horticultural crops [9]. The use of rabbit urine as fertilizer is still relatively low. The use of this waste is thought to have a significant effect on the integration of rabbit-based vegetable businesses in production centers. Rabbit urine POC has a fairly high nutrient content, namely 2.72% N, 1.10% P, and 0.50% K [10]. Rabbit urine POC contains higher levels of nitrogen, phosphorus, and potassium than cow and goat urine and has the benefit of helping to increase soil fertility and plant productivity. To make POC from rabbit urine [11], rabbit urine is needed as the base material and other supporting materials [12], such as rice washing water, shallots, pineapple, EM-4, Yakult, and brown sugar. Rice washing water is used as a supporting material that can improve rooting in vegetable plants. Shallots are used as an additional ingredient in rabbit urine POC because they contain auxin hormones that can stimulate root growth and function to facilitate metabolism in plant tissues and can also function as fungicides and bactericides. Pineapple fruit and pineapple peel waste can be processed into local microorganisms (MOL) that function as activators to accelerate the decomposition of organic matter with the help of microbes. Another main ingredient needed in this POC besides nutrients is EM-4, which contains various types of microbes such as Lactobacillus sp., Streptomyces sp., Actinomycetes, yeast, and photosynthetic bacteria. In addition to the microbial source from EM-4, another microbial source, Yakult, which contains Lactobacillus sp. microbes, is also added. The developed microbes require a food source, so another supporting ingredient, brown sugar, is added [13].

In order to achieve sustainable healthy agriculture, it is necessary to reduce the use of chemical fertilizers as much as possible and use organic fertilizers as much as possible. This study examines the efficiency of chemical fertilizer use and the extent to which organic fertilizers can quantitatively substitute chemical fertilizers in supporting optimal plant growth. From this explanation, the objectives of this study are to determine the effect of NPK Mutiara fertilizer on the growth of Pagoda Mustard (Brassica narinosa L) and to determine the concentration of Rabbit Urine liquid organic fertilizer on the growth and yield of Pagoda Mustard (Brassica narinosa L).

From the above description, this study identifies two problems, the first being the effect of the combination of NPK Mutiara fertilizer and POC Rabbit Urine on Pagoda Mustard plants, and the second being the interaction of the combination of NPK fertilizer and POC Rabbit Urine on Pagoda Mustard plants. The purpose of this study is to determine the effect of the combination of NPK Mutiara fertilizer and POC Rabbit Urine on Pagoda Mustard plants and to determine the interaction of the combination of NPK Mutiara fertilizer and POC Rabbit Urine on Pagoda Mustard plants. The objective of this study is to determine the effect of the combination and the interaction of NPK Mutiara fertilizer and rabbit urine POC on Pagoda mustard plants.

2 Research Method

This study was conducted in Sedayulawas Village, Brondong District, Lamongan Regency. The experiment was conducted from January to March 2025. The materials used in this study were pagoda mustard seeds, rabbit urine POC, NPK Mutiara fertilizer (16-16-16), soil, compost, cocopeat, husks, and water. The tools used were seed trays, polybags, buckets, hoes, sacks, trowels, measuring cups, rulers, writing instruments, label paper, scales, and mobile phones.

The experimental method in this study used a 2-factorial Randomized Block Design (RAK). The first factor involved the application of Mutiara NPK fertilizer, which consisted of 4 levels using the symbol A, namely: without Mutiara NPK fertilizer, 50 ml of Mutiara NPK fertilizer, 100 ml of Mutiara NPK fertilizer, and 150 ml of Mutiara NPK fertilizer. The second factor involved the application of rabbit urine organic fertilizer (POC) consisting of 4 levels using the symbol U, namely: 50 ml of rabbit urine organic fertilizer, 100 ml of rabbit urine organic fertilizer, 150 ml of rabbit urine organic fertilizer, and 200 ml of rabbit urine organic fertilizer.

This study began with the preparation of Rabbit Urine POC using supporting ingredients, namely rice washing water, shallots, pineapple, EM-4, Yakult, and brown sugar. First, 500 grams of shallots and 1 kg of pineapple were blended to make them easier to mix with the other ingredients. Then, 200 grams of brown sugar was dissolved in water. Prepare a large bucket with a capacity of 20 liters or more. Pour 10 liters of rabbit urine

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into the prepared bucket. Pour 10 liters of rice washing water into the bucket containing the rabbit urine. Gradually mix in the blended shallots and pineapple, 5 bottles of Yakult, 1 liter of EM-4, and 200 grams of dissolved brown sugar. Stir all the mixed ingredients until evenly distributed. Put them in a closed jerry can for fermentation. The fermentation process takes at least 21 days for the microbes to develop properly. Every 3 days, open the jerry can slightly to release the gas produced by microbial activity.

After making Rabbit Urine POC, the seedling process begins using seedling trays filled with cocopeat. The seeds are then planted in planting holes in the trays at a depth of about 1 cm. Watering is done in the morning or evening and continues until the plants reach 2 weeks of age or have 4-6 leaves. Then, to prepare the planting medium, the medium used in this study was a mixture of soil, compost, cocopeat, and husks in a ratio of 4:2:1:1, which was mixed evenly and then put into 30 cm x 30 cm polybags. The next stage is planting, which is carried out when the Pagoda Mustard seedlings are 2 weeks old or have 4-6 leaves and is done in the afternoon. Before removing the seedlings, the seedling medium was watered first to make it easier to remove the seedlings without damaging the roots. The seedlings were transferred to 30 cm x 30 cm polybags. Each polybag contained one Pagoda Mustard seedling, which was then watered.

The Pagoda mustard plant care process is carried out by watering regularly in the morning or afternoon, in sufficient amounts, depending on the humidity in the polybag. Then, replanting is carried out if there are plants that die after one week of being transplanted, which have been prepared in advance. Control is carried out manually or using pesticides to keep the plants free from pests and diseases. The final stage is harvesting, which is carried out based on the harvest age of the variety. Harvesting is carried out in the morning or evening to reduce shrinkage and the content of the pagoda mustard plants.

The observation variables in this study were plant height (cm), measured when the plants were 14, 21, 28, 35, and 42 days after planting (DAP); number of leaves (pieces), measured when the plants were 14, 21, 28, 35, and 42 days after planting (DAP); leaf area (mm) measured when the plants were 14, 21, 28, 35, and 42 days after planting (dap), root length (cm) measured at the end of the plant period, wet weight (grams) and dry weight (grams) weighed using all parts of the plant. Data analysis was performed using a variety appropriate to the randomized block design (RBD) method. To determine the treatment given to Pagoda Mustard plants so that there were significant changes, followed by a true difference test (BNJ) if there were significant differences in the growth of Pagoda Mustard plants.

3 Results and Discussion

3.1 Plant Height

The results of the average effect of the interaction between NPK Mutiara and Rabbit Urine POC on the height of Pagoda Mustard plants are presented in Table 1.

Table 1. Average Effect of Interaction on Pagoda Mustard Plant Height

Treatment	Average Plant Height (cm)				
	14 days after sowing	21 hst	28 days	35 days	42 days
NPK Mutiara 0 ml + POC Rabbit Urine 50 ml	19.45 a	25.58 a	29.14 a	30.58 a	30.00 a
NPK Mutiara 50 ml + Rabbit Urine POC 50 ml	20.68 ab	28.38 a	31.14 a	31.08 ab	31.20 a
NPK Mutiara 100 ml + Rabbit Urine POC 50 ml	21.13 b	33.43 b	37.61 b	33.61 abc	36.35 b
NPK Mutiara 150 ml + Rabbit Urine POC 50 ml	21.83 bcde	35.48 bc	38.23 b	36.35 bcde	41.80 c
NPK Mutiara 0 ml + Rabbit Urine POC 100 ml	22.15 bcdef	36.08 BC	38.21 b	33.65	37.35 b
NPK Mutiara 50 ml + Rabbit Urine POC 100 ml	21.50 bcd	35.88 bc	40.94 bc	36.10 bcd	36.60 b
NPK Pearl 100 ml + Rabbit Urine POC 100 ml	21.35 bc	37.05 bc	41.14 bc	38.75 cdefg	37.79 bc
NPK Mutiara 150 ml + POC Rabbit Urine 100 ml	21.90 bcde	36.63 bc	42.49 bcd	40.00 defg	37.58 bc
NPK Mutiara 0 ml + Rabbit Urine POC 150 ml	22.75 cdef	36.55 bc	44.45 cd	40.09 defg	39.71 bc

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NPK Mutiara 50 ml + POC Rabbit Urine 150 ml	22.85 cdef	36.75 bc	43.73 cd	40.11 defg	36.53 b
NPK Mutiara 100 ml + Rabbit Urine POC 150 ml	22.28 bcdef	37.50 c	46.06 cd	41.49 defg	39.00 bc
NPK Mutiara 150 ml + Rabbit Urine POC 150 ml	23.13 ef	37.13 bc	46.39 d	43.45 g	39.09 bc
NPK Mutiara 0 ml + Rabbit Urine POC 200 ml	23.28 ef	36.55 bc	45.59 cd	42.19 fg	37.19 b
NPK Mutiara 50 ml + Rabbit Urine POC 200 ml	23.10 def	35.93 bc	45.51 cd	41.65 efg	38.70 bc
NPK Mutiara 100 ml + Rabbit Urine POC 200 ml	22.95 cdef	36.95 bc	44.26 cd	37.03 cdef	40.38 bc
NPK Mutiara 150 ml + Rabbit Urine POC 200 ml	23.73 f	38.33 c	47.05 d	42.53 g	40.05 bc
BNJ	1.60	3.92	5.16	5.44	4.32

Note: Average numbers accompanied by the same letter in the same column indicate no significant difference.

The average plant height was measured when the plants were 14 to 42 days old. The data shown in Table 1 on the effect of the interaction of pagoda mustard plant height shows that at 28 days old, the treatment of 150 ml of NPK Mutiara + 200 ml of rabbit urine POC gave the highest results compared to the other treatments. Meanwhile, the lowest result in the interaction effect of plant height was observed at 14 days after sowing with the treatment of 0 ml NPK Mutiara + 50 ml POC Rabbit Urine. In the observation of pagoda mustard plant height, the combination of NPK Mutiara and POC Rabbit Urine, based on analysis at 14 to 42 days after sowing, showed a significant effect.

3.2 Number of Leaves

The results of the average interaction effect of NPK Mutiara and POC Rabbit Urine on the number of leaves of Pagoda Mustard plants are presented in Table 2. The average results of the effect of NPK Mutiara and POC Rabbit Urine on the number of leaves of plants are presented in Table 3.

Table 2. Average Effect of Interaction on the Number of Pagoda Mustard Leaves

Treatment	Average Interaction Number of Leaves (pieces)	
	14 days after sowing	42 days
NPK Mutiara 0 ml + Rabbit Urine POC 50 ml	3.75 a	18.50 a
NPK Mutiara 50 ml + Rabbit Urine POC 50 ml	4.63 abc	19.00 a
NPK Pearl 100 ml + Rabbit Urine POC 50 ml	4.50 ab	22.75 b
NPK Mutiara 150 ml + POC Rabbit Urine 50 ml	5.63 bcd	23.75 bcd
NPK Mutiara 0 ml + POC Rabbit Urine 100 ml	5.88 cd	23.38 b
NPK Pearl 50 ml + Rabbit Urine POC 100 ml	5.50 bcd	23.50 bc
NPK Mutiara 100 ml + POC Rabbit Urine 100 ml	5.50 bcd	25.00 bcde
NPK Pearl 150 ml + Rabbit Urine POC 100 ml	6.25 d	24.63 bcde
NPK Pearl 0 ml + Rabbit Urine POC 150 ml	5.50 bcd	26.88 ef
NPK Mutiara 50 ml + Rabbit Urine POC 150 ml	5.00 abcd	26.50 cdef
NPK Pearl 100 ml + Rabbit Urine POC 150 ml	5.75 bcd	27.38 ef
NPK Pearl 150 ml + Rabbit Urine POC 150 ml	5.75 bcd	26.63 def
NPK Mutiara 0 ml + POC Rabbit Urine 200 ml	5.13 bcd	27.38 ef
NPK Pearl 50 ml + Rabbit Urine POC 200 ml	5.25 bcd	27.25 ef
NPK Mutiara 100 ml + POC Rabbit Urine 200 ml	5.75 bcd	26.75 def
NPK Pearl 150 ml + Rabbit Urine POC 200 ml	5.75 bcd	28.25 f
BNJ	1.25	3.07

Note: Average numbers accompanied by the same letter in the same column indicate no significant difference.

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The average number of leaves was measured when the plants were 14 to 42 days old. The data shown in Table 2 on the effect of the interaction between the number of pagoda mustard leaves and the observation age of 42 days shows that the NPK Mutiara treatment

150 ml + POC Rabbit Urine 200 ml treatment yielded the highest results compared to other treatments. Meanwhile, the lowest results in the interaction effect on the number of leaves were observed at 14 days after sowing with the NPK Mutiara 0 ml + POC Rabbit Urine 50 ml treatment. In the observation of the number of pagoda mustard leaves, the combination of NPK Mutiara and POC Rabbit Urine, based on analysis at observation ages of 14 hst and 42 hst, showed a significant effect.

Table 3. Average Effect of Each Factor on the Number of Pagoda Mustard Leaves

Treatment	Average Number of Leaves (pieces)	
	21 days after sowing	35 hst
NPK Mutiara 0 ml	9.22 a	18.91 a
NPK Mutiara 50 ml	9.50 ab	19.81 ab
NPK Mutiara 100 ml	10.25 bc	20.97 bc
NPK Mutiara 150 ml	10.44 c	21.59 c
BNJ 1%	0.93	1.59
Rabbit Urine POC 50 ml	8.41 a	16.72 a
Rabbit Urine POC 100 ml	9.53 b	20.63 b
Rabbit Urine POC 150 ml	10.41 bc	20.97 b
POC Rabbit Urine 200 ml	11.06 c	22.97 c
BNJ 1%	0.93	1.59

Note: Average values accompanied by the same letter in the same column indicate no significant difference.

The data presented in Table 3 shows the average results of the effect of the NPK Mutiara and POC Rabbit Urine factors on the number of leaves measured when the plants were 14 to 42 days old. The data shows that the treatment with 150 ml of NPK Mutiara at 35 days after planting yielded the highest results, while the treatment with 0 ml of NPK Mutiara at 21 days after planting yielded the lowest results. Meanwhile, for Rabbit Urine POC, the highest result was shown in the Rabbit Urine POC factor treatment of 200 ml at an observation age of 35 days after planting, and the lowest result was shown in the Rabbit Urine POC factor treatment of 50 ml at an observation age of 21 days after planting. In the observation of the number of Pagoda mustard leaves in the combination of NPK Mutiara and Rabbit Urine POC, based on analysis at observation ages of 21 hst and 35 hst, significant effects were observed.

3.3 Leaf Area

The results of the average interaction effect of NPK Mutiara and Rabbit Urine POC on the leaf area of Pagoda Mustard plants are presented in Table 4.

Table 4. Average Effect of Interaction on Pagoda Mustard Leaf Area

Treatment	Average Leaf Area Interaction (mm)				
	14 hst	21 hst	28 hst	35 days	42 days after sowing
NPK Mutiara 0 ml + Rabbit Urine POC 50 ml	14.95 a	32.61 a	46.01 a	80.50 a	87.88
NPK Mutiara 50 ml + POC Rabbit Urine 50 ml	17.36 b	34.88 ab	46.76 a	95.00 c	89.50 ab
NPK Mutiara 100 ml + Rabbit Urine POC 50 ml	17.56 b	36.61 bc	47.19 a	84.38 ab	104.50 cd
NPK Mutiara 150 ml + Rabbit Urine POC 50 ml	20.86 c	38.54 cd	48.19 ab	83.38 ab	122.25 f

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NPK Mutiara 0 ml + Rabbit Urine POC 100 ml	20.81 c	37.04 bcd	48.23 abc	80.50 a	87.38 a
NPK Mutiara 50 ml + Rabbit Urine POC 100 ml	22.26 cd	37.28 bcd	50.55 bcdef	94.63 c	93.88 abc
NPK Mutiara 100 ml + POC Rabbit Urine 100 ml	21.96 cd	38.43 cd	48.11 ab	84.38 ab	104.13 cd
NPK Mutiara 150 ml + Rabbit Urine POC 100 ml	22.21 cd	39.73 de	50.05 bcd	86.13 ab	100.38 bcd
NPK Mutiara 0 ml + Rabbit Urine POC 150 ml	22.35 cd	41.63 ef	50.35 bcde	87.13 abc	103.38 cd
NPK Mutiara 50 ml + Rabbit Urine POC 150 ml	22.55 cd	41.89 efg	50.65 cdef	85.38 ab	104.25 cd
NPK Mutiara 100 ml + POC Rabbit Urine 150 ml	22.35 cd	43.78 fgh	50.85 def	112.63 d	117.50 ef
NPK Mutiara 150 ml + Rabbit Urine POC 150 ml	22.43 cd	43.06 fgh	52.83 f	113.88 d	123.00 f
NPK Mutiara 0 ml + Rabbit Urine POC 200 ml	24.05 de	44.15 fgh	52.25 def	87.38 abc	97.13 abcd
NPK Mutiara 50 ml + Rabbit Urine POC 200 ml	23.65 cde	44.61 fgh	50.95 def	91.38 bc	95.75 abcd
NPK Mutiara 100 ml + Rabbit Urine POC 200 ml	25.16 e	44.73 gh	51.08 def	108.63 d	106.50 de
NPK Mutiara 150 ml + Rabbit Urine POC 200 ml	30.09 f	45.98 h	52.78 ef	109.00 d	117.63 ef
BNJ	2.13	3.09	2.44	8.11	11.19

Note: Average values accompanied by the same letter in the same column indicate no significant difference.

The average leaf area was measured when the plants were 14 to 42 days old. The data shown in Table 4 on the effect of the interaction between leaf area and observation age at 42 days shows that the treatment with 150 ml of NPK Mutiara + 50 ml of rabbit urine POC gave the highest results compared to the other treatments. Meanwhile, the lowest result in the interaction effect on leaf area was observed at 14 days after sowing with the treatment of 0 ml NPK Mutiara + 50 ml POC Rabbit Urine. In the observation of pagoda mustard leaf area, the combination of NPK Mutiara and POC Rabbit Urine, based on analysis at 14 to 42 days after sowing, showed a significant effect.

3.4 Root Length

The results of the average effect of each factor on the root length of Pagoda Mustard plants are presented in Table 5.

Table 5. Average Effect of Each Factor on Pagoda Mustard Root Length

Treatment	Average Root Length Factor (cm)
NPK Mutiara 0 ml	14.00 a
NPK Mutiara 50 ml	13.81 a
NPK Mutiara 100 ml	14.16 a
NPK Mutiara 150 ml	14.44 a
BNJ 1%	0.86
POC Rabbit Urine 50 ml	14.99 b
Rabbit Urine POC 100 ml	14.78 b
Rabbit Urine POC 150 ml	13.66 a
POC Rabbit Urine 200 ml	12.98 a
BNJ 1%	0.68

Note: Average values accompanied by the same letter in the same column indicate no significant difference.

The data presented in Table 5 shows the average results of the effects of the NPK Mutiara and Rabbit Urine POC factors on root length measured when the plants were 14 to 42 days old. The data shows that the NPK Mutiara 150 ml treatment gave the highest results and the NPK Mutiara 50 ml treatment gave the lowest results. Meanwhile, for Rabbit Urine POC, the highest result was shown in the Rabbit Urine POC 50 ml treatment, and

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the lowest result was shown in the Rabbit Urine POC 200 ml treatment. In the observation of the root length of pagoda mustard using a combination of NPK Mutiara and Rabbit Urine POC, the analysis showed a significant effect.

3.5 Fresh Weight

The results of the average interaction effects on the wet weight and dry weight of Pagoda Mustard plants are presented in Table 6.

Table 6. Average Interaction Effect on Wet Weight and Pagoda Mustard

Treatment	Average Wet Weight Interaction (grams)
NPK Mutiara 0 ml + Rabbit Urine POC 50 ml	43.97 abcd
NPK Mutiara 50 ml + Rabbit Urine POC 50 ml	41.54 a
NPK Mutiara 100 ml + Rabbit Urine POC 50 ml	42.00 ab
NPK Mutiara 150 ml + POC Rabbit Urine 50 ml	42.66 abc
NPK Mutiara 0 ml + POC Rabbit Urine 100 ml	42.36 abc
NPK Mutiara 50 ml + POC Rabbit Urine 100 ml	42.22 abc
NPK Mutiara 100 ml + Rabbit Urine POC 100 ml	42.59 abc
NPK Mutiara 150 ml + POC Rabbit Urine 100 ml	42.85 abcd
NPK Mutiara 0 ml + POC Rabbit Urine 150 ml	43.03 abcd
NPK Pearl 50 ml + POC Rabbit Urine 150 ml	43.58 abcd
NPK Mutiara 100 ml + Rabbit Urine POC 150 ml	44.57 abcd
NPK Mutiara 150 ml + POC Rabbit Urine 150 ml	44.77 bcde
NPK Mutiara 0 ml + POC Rabbit Urine 200 ml	44.13 abcd
NPK Mutiara 50 ml + POC Rabbit Urine 200 ml	45.13 cde
NPK Mutiara 100 ml + Rabbit Urine POC 200 ml	45.88
NPK Mutiara 150 ml + Rabbit Urine POC 200 ml	47.70 e
BNJ	3.07

Note: Average values accompanied by the same letter in the same column indicate no significant difference.

The average wet weight was measured after harvesting the plants. The data shown in Table 6 on the interaction effect of wet weight of pagoda mustard shows that the treatment of NPK Mutiara 150 ml + POC Rabbit Urine 200 ml gave the highest results compared to other treatments. Meanwhile, the lowest result in the interaction effect of wet weight of pagoda cabbage was shown in the treatment of NPK Mutiara 50 ml + POC Rabbit Urine 50 ml.

3.6 Dry Weight

The results of the average interaction effects on the wet weight and dry weight of Pagoda mustard plants are presented in Table 7.

Table 7. Average Effect of Each Factor on Dry Weight of Pagoda Mustard

Treatment	Average Factor for Dry Weight (grams)
NPK Mutiara 0 ml	22.20 a
NPK Mutiara 50	22.59 ab

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ml	
NPK Mutiara 100 ml	22.57
NPK Mutiara 150 ml	22.93 b
BNJ 1%	0.61
POC Rabbit Urine 50 ml	22.15 a
Rabbit Urine POC 100 ml	22.67 ab
Rabbit Urine POC 150 ml	22.35 a
Rabbit Urine POC 200 ml	23.11 b
BNJ 1%	0.61

Note: Average values accompanied by the same letter in the same column indicate no significant difference.

The average dry weight was measured after the baking process. In the data shown in Table 7, the average NPK Mutiara factor for the dry weight of pagoda mustard with 150 ml of NPK Mutiara treatment gave the highest results, and the lowest results were shown in the 0 ml NPK Mutiara treatment. Meanwhile, for the POC Rabbit Urine factor, the dry weight of pagoda mustard with the POC Rabbit Urine 200 ml treatment yielded the highest result, and the lowest result was shown in the POC Rabbit Urine 50 ml treatment.

3.7 Discussion

After conducting observations and data analysis using the BNJ test, it was found that the treatment with rabbit urine POC had a significant effect on all variables observed in the growth and yield of pagoda mustard plants. This is because the higher the concentration of rabbit urine POC given, the better the plant growth. The results of this study show that the POC rabbit urine dosage treatment has a significant effect on the height growth of pagoda mustard plants. This occurs because the POC rabbit urine content is relatively higher during the growth period of pagoda mustard plants [14]. This is due to the large amount of nutrients received by pagoda mustard plants in each treatment, which affects plant growth. The application of nutrients using NPK Mutiara and rabbit urine POC must be in accordance with the needs of the plants in order to produce better results [15]. The application of NPK Mutiara and rabbit urine POC fertilizer doses resulted in the highest leaf area index compared to other fertilizer dose treatments. This is because the nutrient requirements of N, P, and K for plants are abundant and well absorbed by the plants. Nitrogen (N) plays an important role in the vegetative growth of plants in leaf expansion, especially in leaf width and area [16]. The process of plant growth and development requires nutrients, one of which is for root growth. Roots are plant organs that are useful for absorbing water and nutrients needed during the growth period. Based on observations, the interaction effects of the NPK Mutiara and POC Rabbit Urine treatments did not show any significant differences. This is because other organs, such as leaves and stems, are prioritized, so root growth is slightly affected [17]. Fresh weight and dry weight are the parameters observed in this study. The higher the fertilizer treatment given, the heavier the fresh weight of the plant. The dry weight parameter of the plant is obtained after harvesting and weighing the fresh weight, then oven-drying at 50°C until a constant weight is reached [18]. Fresh weight is also influenced by the number of leaves. In this study, there was no significant difference between treatments due to a decrease in wet weight in line with inhibited cell elongation and enlargement, where the environmental conditions around the plants were not supportive, such as temperature and light intensity [19]. Dry weight provides a balance between CO return (photosynthesis) and CO (respiration). If respiration is greater than photosynthesis, the dry weight of the plant will decrease [20]. This shows that rabbit urine can supply nutrients in the soil. The higher the dose given, the greater the nutrient content received by the plants. Hairuddin and Mawardi (2015) stated that rabbit urine made into POC had an effect on the growth of green mustard plants and the number of leaves. The results of the above observations are in line with the research by Syamsuddin Laude, Chitra Anggraini Salingkat, and Rahmat (2021), where rabbit urine at various doses on pagoda mustard plants had a significant effect on all observation variables, namely plant height, number of leaves, leaf area, root length, wet weight, and dry weight of pagoda mustard plants.

4 Conclusion

Based on this study, it can be concluded that there is a significant effect of the combination of Mutiara NPK fertilizer and rabbit urine POC on the growth and yield of pagoda mustard plants (Brasicca narinosa L) in terms of plant height, number of leaves, leaf area, root length, wet weight, and dry weight. The application of POC Rabbit Urine showed the best results in all growth variables of Pagoda Mustard plants compared to the application of NPK Mutiara fertilizer. In terms of interaction effects, NPK Mutiara fertilizer provided a good combination for the growth and yield of Pagoda Mustard plants in several average variables, such as plant height at 35 days after sowing, number of leaves at 42 days after sowing, leaf area at 42 days after sowing, and wet weight.

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