

The Effect of Applying Organic Fertilizer MKP On the Growth and Production of Onion Plants (*Allium Ascalonicum* L)

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DOI: <https://doi.org/10.51583/IJLTEMAS.2025.140500057>

Received: 30 April 2025; Accepted: 03 May 2025; Published: 12 June 2025

Abstract: This research aims to determine the effect and the appropriate dosage of MKP organic fertilizer on the growth and production of red onion plants (*Allium ascalonicum* L). The research was conducted from November 2023 to January 2024 in Huta I Sirube-rube, Dolok Pardamean District, Simalungun Regency, at an altitude of 1400 m above sea level. The research used a non-factorial Completely Randomized Design (CRD). The factor of MKP fertilizer application consists of 5 treatment levels, namely: M0=Without treatment (control) M1=100Kg/ha, (20g/plot) M2=150Kg/ha, (30g/plot) M3=200Kg/ha, (40g/plot) and M4=250Kg/ha, (50g/plot). The parameters observed in this study include: Plant Height (cm), Number of Leaves (strands), Fresh Tubers Weight per Plant (g), Fresh Tubers Weight per Plot (Kg), and Dry Tubers Weight per Plot (Kg). The observation results were analyzed using analysis of variance at a 5% confidence level. The research results show that the application of MKP organic fertilizer has a significant effect on plant height at 2 and 6 MST, fresh tuber weight per plant, fresh tuber weight per plot, and dry tuber weight per plot, but has no significant effect on plant height at 4 MST and the number of leaves. The treatment of MKP organic fertilizer M4 250 kg/ha (50 g/plot) showed the highest plant heights at 2, 4, and 6 MST, which were 10.75 cm, 20.25 cm, and 32.50 cm, respectively. It also resulted in the highest number of leaves at 2, 4, and 6 MST, which were 16.67 leaves, 22.67 leaves, and 28.75 leaves, respectively. The heaviest fresh tuber weight per plant was 77.89 g, the heaviest fresh tuber weight per plot was 2.69 kg, and the heaviest dry tuber weight per plot was 2.50 kg.

Key Words: Organic, plot, sheet, tuber

I. Introduction

Shallots (*Allium ascalonicum* L) are annual plants that grow in clusters, and their bulbs are formed from layers of leaves that enlarge and unite. Shallots are a horticultural commodity that falls under the category of spice vegetables and is used as a seasoning in cooking. Shallots can also be used as traditional medicine because they contain antiseptic effects or saponins that are beneficial for treating inflammation, killing bacteria, and lowering cholesterol and blood sugar levels in the body (Triadiawarman et al., 2022).

Shallots have high economic value, one of the products derived from shallots is fried shallots, which, besides being expensive, can last longer. The nutritional content of red onions per 100 g is 87 ml of water, 1.5 g of protein, 0.5 g of fiber, 11 g of carbohydrates, 30 mg of calcium, and 0.5 g of iron

The production of shallots in Lampung Province in 2014 was 943 tons, an increase of 328.64% from the production in 2013. This increase was due to a rise in productivity of 0.08 tons per hectare (0.87%) and an increase in harvested area of 78 hectares (325%) compared to 2013 (BPS Lampung, 2014). The production of shallots can still be increased through improvements in cultivation techniques, such as the use of proper planting distances and the application of MKP fertilizer. MKP fertilizer or Mono Potassium Phosphate is a type of fertilizer that contains two macronutrients in quite high concentrations.

The content includes phosphate (P) at 52 percent and potassium (K) at 34 percent. This crystalline and white powdered fertilizer has many benefits for plants, making it highly recommended. This research was conducted to determine the effect of MKP fertilizer on the growth and production of shallot plants (*Allium ascalonicum* L.) and to obtain the appropriate dosage of MKP fertilizer for the growth and production of shallot plants (*Allium ascalonicum* L.).

II. Method

The research was conducted from November 2023 to January 2024. This research was conducted in the village of Sirube-rube, Dolok Pardamean District, Simalungun Regency, at an altitude of 1400 meters above sea level. The materials used in this research are Brebes variety red onion seeds, Urea fertilizer, and 5 tons/Ha (1 kg/plot) of chicken manure fertilizer. The tools used for this research include hoes, machetes, measuring tapes, scales, label boards, hand sprayers, ropes, buckets, knives, stationery, and other tools necessary during the research.

The research design used is a Randomized Block Design, non-factorial, namely the application of MKP fertilizer with five levels M0: Without MKP fertilizer, M1: Application of MKP fertilizer 100 kg/ha (20 g/plot), M2: Application of MKP fertilizer 150 kg/ha (30 g/plot), M3: Application of MKP fertilizer 200 kg/ha (40 g/plot), M4: Application of MKP fertilizer 250 kg/ha (50 g/plot). Each treatment level was repeated three times, resulting in 15 experimental plots. The research results show a significant effect, so it will be followed by a further BNT test at a 5% confidence level. The parameters observed were plant height (cm) at 2, 4, and 6 MST, number of leaves (strands) at 2, 4, and 6 MST, fresh tuber weight per plant (g), fresh tuber weight per plot (kg), and dry tuber weight per plot (kg).

III. Result and Discussion

Height Plant (cm)

Table 1 shows that the treatment of organic MKP fertilizer at 2, 4, and 6 MST with the M4 treatment resulted in the highest plant heights, namely 10.75 cm, 20.25 cm, and 32.50 cm. At 2 MST, the M4 treatment was significantly different from the M2, M1, and M0 treatments, while it was not significantly different from the M3 treatment. At 4 MST, the MKP treatment showed no effect on plant height. At 6 MST, the M4 treatment was significantly different from the other treatments.

The differences between treatments were tested using the BNT average difference test at the 5% level, as shown in Table 1.

Table 1. Results of the Average Difference Test of MKP Organic Fertilizer Application on the Height of Red Onion Plants (*Allium ascolonicum* L.)

Treatment	Height Plant (cm)		
	2 WAP	4 WAP	6 WAP
M ₀	6,00 c	15,17	23,08 c
M ₁	6,75 c	16,75	24,42 c
M ₂	9,08 b	17,83	25,17 bc
M ₃	9,58 ab	18,92	27,92 b
M ₄	10,75 a	20,25	32,50 a
Nilai BNT 5%	1,57		2,84

Note: Numbers followed by the same letter in the same column are significantly different at the 5% level.

This is because in that treatment, the available nutrients are present in sufficient quantities and can be absorbed by the plants maximally, so the metabolic processes within the plant body run smoothly, positively affecting the vegetative growth of the plants, including height plant (Lewar et al., 2024). The height of the plants due to the application of MKP organic fertilizer can be seen in figure 1.

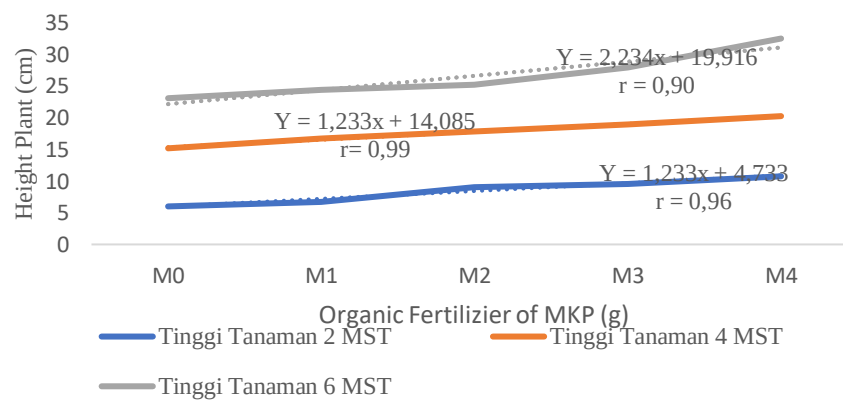


Figure 1. The Relationship Between Onion Plant Height and the Application of MKP Organic Fertilizer

Figure 1 shows that the application of organic fertilizer MKP M4 resulted in the highest plant heights at 2, 4, and 6 MST, which were 10.75 cm, 20.25 cm, and 32.50 cm, respectively, while the lowest heights were found in the M4 treatment, which was 6.00 cm, 15.17 cm, and 23.08 cm.

Number of leaves (sheets)

The results of the analysis of variance for the treatment of MKP organic fertilizer application showed no significant effect on the number of leaves at 2, 4, and 6 MST. M4 produced the highest number of leaves, namely 16.67 leaves, 22.67 leaves, and 28.75 leaves compared to the other treatments. The differences between treatments can be seen in Table 2.

Table 2. Average Number of Leaves (Strands) of Red Onion (*Allium ascolonicum* L.) Due to the Application of MKP Organic Fertilizer

Treatment	Number of Leaves (strands)		
	2 WAP	4 WAP	6 WAP
M ₀	12,75	20,42	27,00

M ₁	14,17	21,33	27,50
M ₂	14,92	19,50	26,32
M ₃	14,92	21,25	26,92
M ₄	16,67	22,67	28,75

This is because if one of the treatment factors has a stronger influence on another factor, then that factor becomes more dominant over the other factor, but each factor shows a positive influence on growth and production results (Nursanti et al., 2018).

Figure 2 shows that the application of organic fertilizer MKP M₄ resulted in the highest number of leaves, namely 16.67 leaves, 22.67 leaves, and 28.75 leaves, while the lowest was in the M₀ treatment, which had 12.75 leaves, 20.42 leaves, and 27.00 leaves.

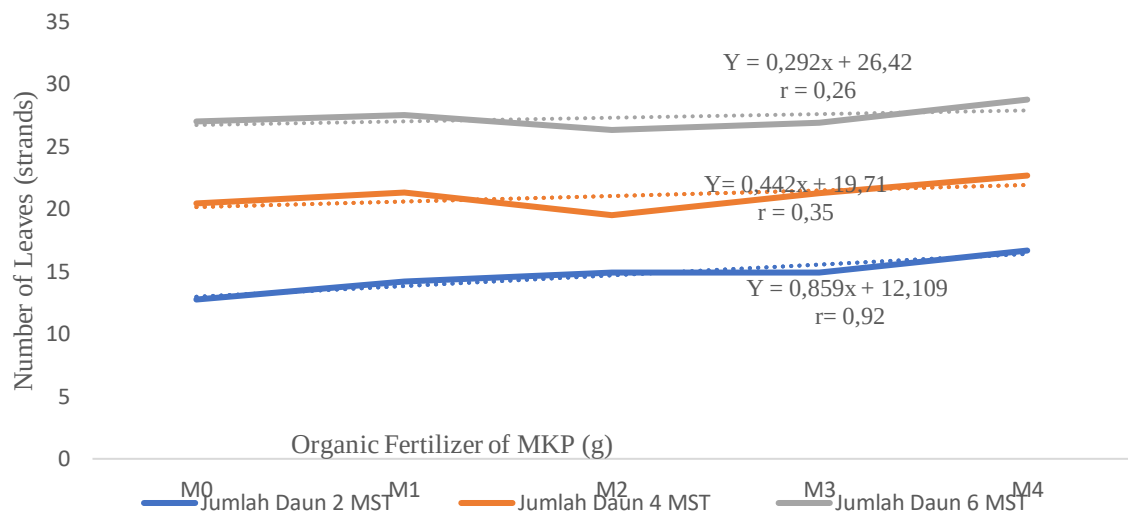


Figure 2. The Relationship Between the Number of Green Onions and the Application of MKP Organic Fertilizer

Fresh Tuber Weight per Plant

The results of the analysis of variance on the treatment of MKP organic fertilizer showed a significant effect on the fresh tuber weight per plant. M₄ produced the heaviest fresh tuber weight per plant, which was 77.89 g, significantly different from the other treatments. The differences between treatments were tested using the BNT average difference test at the 5% level, as shown in Table 3.

Table 3. Results of the Average Difference Test of MKP Organic Fertilizer Application on Fresh Bulb Weight per Plant (g) Red Onion (*Allium asconicum* L) analysis results

Treatment	Weight per Plant (g)
M ₀	55,21 b
M ₁	52,50 b
M ₂	52,98 b
M ₃	62,41 b
M ₄	77,89 a
BNT 5%	14,22

Note: Numbers followed by the same letter in the same column are significantly different at the 5% level.

Plants will bear fruit well if all the necessary nutrients are sufficiently absorbed by the plant, especially Phosphorus and Potassium, which are important for the generative phase. Providing the right concentration will affect the number of fruits per plant and can increase the number of fruits and prevent flower drop (Qibtiyah et al., 2023).

Figure 3 shows that the application of organic fertilizer MKP M₄ resulted in the heaviest fresh tuber weight per plant, which was 77.89 g, while the lowest was in the M₁ treatment, which was 52.50 g.

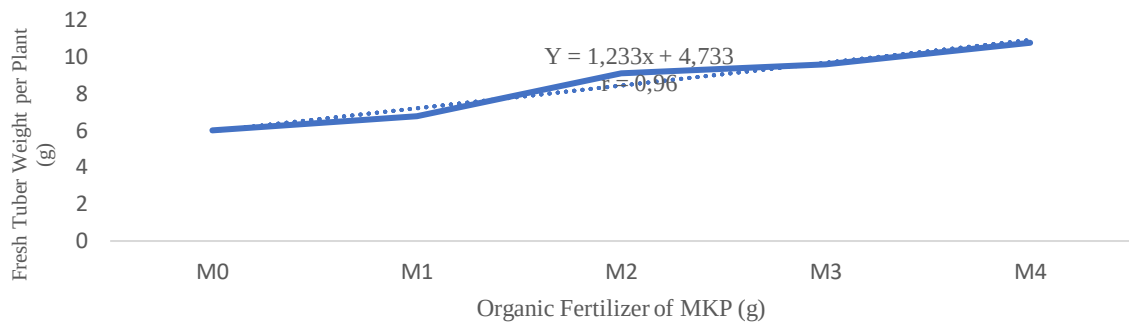


Figure 3. The Relationship Between Fresh Tuber Weight per Plant and the Application of MKP Organic Fertilizer

Fresh Tuber Weight per Plot (kg)

The results of the analysis of variance of the MKP organic fertilizer treatment show a significant effect on the fresh tuber weight per plot. M4 produced the heaviest fresh tuber weight per plot, which was 2.69 Kg, significantly different from the other treatments. The differences between treatments were tested using the BNT average difference test at the 5% level, as shown in Table 4.

Table 4. Results of the Average Difference Test of MKP Organic Fertilizer Application on Fresh Bulb Weight per Plot (Kg) Red Onion (*Allium ascalonicum* L)

Treatment	Weight per Plot (kg)
M ₀	1,00 c
M ₁	1,40 c
M ₂	1,71 bc
M ₃	1,76 b
M ₄	2,69 a
BNT 5%	0,32

Note: Numbers followed by the same letter in the same column are significantly different at the 5% level.

This is due to the sufficient absorption of nutrients, allowing the development from the flowering phase to the fruit formation process to proceed quite well (Maharani et al., 2024). The weight of fresh tubers per plot due to the application of MKP organic fertilizer can be seen in Figure 4.

Figure 4 shows that the application of organic fertilizer MKP M₄ resulted in the heaviest fresh tuber weight per plot, which was 2.69 Kg, while the lowest was in the M₁ treatment, which was 1.00 Kg.

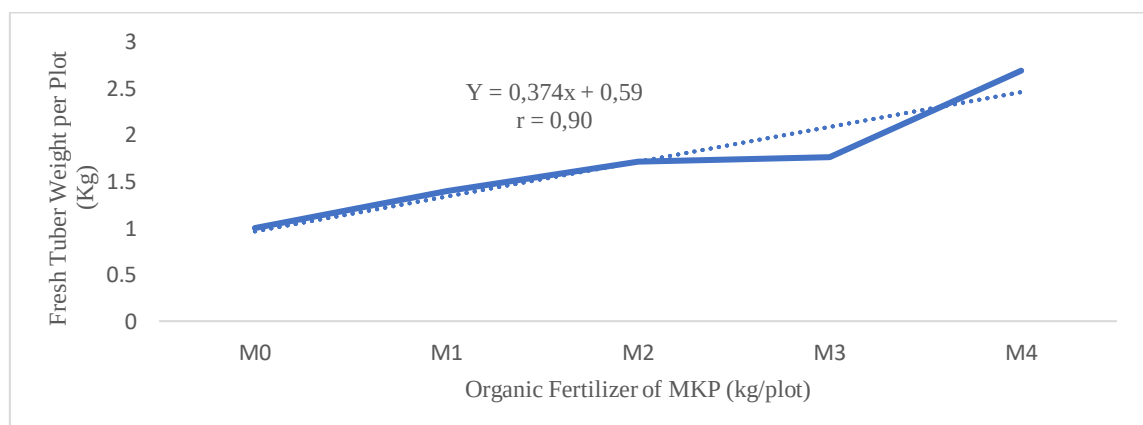


Figure 4. The Relationship Between Fresh Tuber Weight per Plot and the Application of MKP Organic Fertilizer

Dry Tuber Weight per Plot (Kg)

The results of the analysis of variance for the treatment of MKP organic fertilizer application show a significant effect on the dry tuber weight per plot. The results of the BNT test analysis in Table 5 show that the treatment with MKP organic fertilizer, M₄, produced the heaviest dry tuber weight per plot, which was 2.50 Kg, significantly different from the other treatments. M₃ is significantly different from M₀ but not significantly different from M₁ and M₂. The differences between treatments were tested using the BNT average difference test at the 5% level, as shown in Table 5.

Table 5. Results of the Average Difference Test of MKP Organic Fertilizer Application on Dry Bulb Weight per Plot (Kg) Red Onion (*Allium ascalonicum* L)

Treatment	Weight per Plot (Kg)
M ₀	0,80 d
M ₁	1,18 bc
M ₂	1,47 bc
M ₃	1,55 b
M ₄	2,50 a
BNT 5%	0,38

Note: Numbers followed by the same letter in the same column are significantly different at the 5% level.

This is in agreement with Sihalohe et al., (2023), that the optimum availability of nutrients in a plant will support each other in the photosynthesis process, allowing the plant to produce higher and quality plant weight. The dry tuber weight per plot due to the application of MKP organic fertilizer can be seen in Figure 5.

Figure 5 shows that the application of organic fertilizer MKP M4 resulted in the heaviest dry tuber weight per plot, which was 2.50 Kg, while the lowest was in the M0 treatment, which was 0.80 Kg.

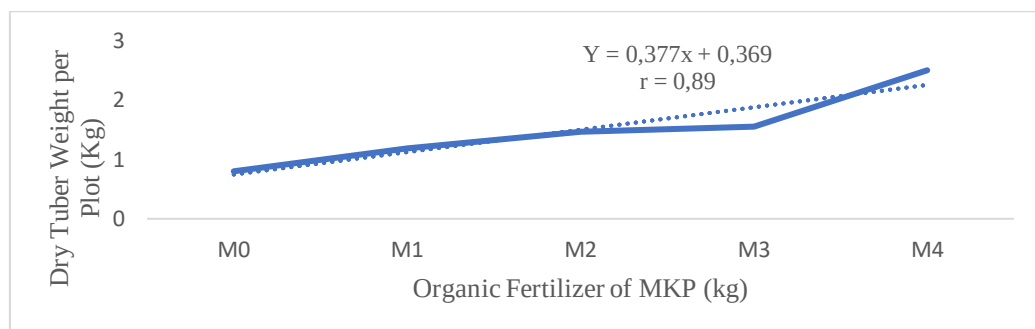


Figure 5. The Relationship Between Dry Bulb Weight per Plot and the Application of MKP Organic Fertilizer

IV. Conclusion

Based on the research results, it can be concluded that:

The application of MKP organic fertilizer significantly affects plant height at 2 and 6 MST, fresh tuber weight per plant, fresh tuber weight per plot, and dry tuber weight per plot, but does not significantly affect plant height at 4 MST and the number of leaves. The treatment of MKP organic fertilizer M4 250 kg/ha (50 g/plot) showed the highest plant heights at 2, 4, and 6 MST, which were 10.75 cm, 20.25 cm, and 32.50 cm, respectively. The highest number of leaves at 2, 4, and 6 MST were 16.67 leaves, 22.67 leaves, and 28.75 leaves, respectively. The heaviest fresh tuber weight per plant was 77.89 g, the heaviest fresh tuber weight per plot was 2.69 kg, and the heaviest dry tuber weight per plot was 2.50 kg.

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