THE EFFECT OF DOLOMITE AND NPK FERTILIZER APPLICATION ON GROWTH

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ABSTRACT

This research was conducted at the UPT Benih Induk Palawija located in North Sumatra, precisely at Jl. Pendidikan No. 23, Tanjung Selamat, Sunggal District, Deli Serdang Regency, the research was conducted in the period of June--September 2023. RAK or Randomized Block Design through factorial with two treatment factors was used as the method of this research. Three levels namely: D1 = 0 g / plot (0 kg / ha), D2 = 40 g / plot (270 kg / ha), D3 = 60 g / plot (400 kg / ha), the three of them became the first factor of dolomite (D) dosage which was grouped into three levels. In addition, N1 = 30 g / plot (200 kg / ha), N2 = 45 g / plot (300 kg / ha), N3 = 60 g / plot (400 kg / ha), the three of them became the second factor of NPK Mutiara fertilizer dosage which was divided into three levels. Dolomite application, 60 g/plot produces optimal yield and growth of peanut plants, namely the weight of 100 dry seeds, plant height, pod weight per plot, flowering age, pod weight per plant, number of branches, number of filled pods per plant, number of gynophores per plant, number of empty pods per plant, and total number of pods per plant are significantly affected by dolomite application. Meanwhile, application of NPK Mutiara fertilizer with a dose of 60 g/plot shows the same thing. The combination of dolomite and NPK Mutiara fertilizer only has a significant effect on the number of gynophores per plant.

Keywords *: Dolomite, NPK fertilizer*

ABSTRACT

The examination was done at UPT. Optional Auxiliary Seeds Jl. Instruction No.23, Tanjung Selamat, Sunggal Area, Shop Serdang Rule, North Sumatra Region. This examination was led from June 2023 to September 2023. This exploration strategy utilized a factorial Randomized Gathering Plan (RAK) which consisted of two treatment factors. The main element is Dolomite treatment (D) consisting of 3 levels, specifically: D1 = 0 g/plot (0 kg/ha), D2 = 40 g/plot (270 kg/ha), D3 = 60 g/plot (400 kg/ha). The subsequent variable is the pearl NPK (N) manure treatment consisting of 3 levels, to be specific: N1 = 30 g/plot (200 kg/ha), N2 = 45 g/plot (300 kg/ha), N3 = 60 g/plot (400 kg/ha). The treatment of 60 g of dolomite/plot gave ideal development and creation of peanuts. The outcomes showed that dolomite treatment altogether affected plant level, blossoming age, number of branches, number of gynophores per plant, absolute number of units per plant, number of void cases per plant, number of filled units per plant, case weight per plant, unit weight per plot, weight of 100 dry seeds. The treatment of 60 g of pearl NPK/plot gave ideal development and creation of peanuts give the same result. The blend treatment of dolomite and pearl NPK compost just essentially affected the quantity of gynophores per plant.

Key words: *Dolomite, NPK fertilizer*

INTRODUCTION

In 2021, peanut productivity increased to 1.40 tons/ha with a harvested area of 3,899 hectares, but in 2022, peanut productivity decreased to 1.38 tons/ha with a harvested area that had increased to

4,111 hectares, this can be seen in the data below;

Table 1. Peanut Production in North Sumatra Province

Year Production	Production (ton)	Productivity (tons/ha)	Harvest area (Ha)
2018	4,321	1,279	3,379
2019	4,888	1,274	3,837
2020	5,738	1,272	1,278
2021	5,485	1,407	3,899
2022	5,682	1,382	4.111

Source: Central Statistics Agency (2022)

Factors that can cause low production in North Sumatra include land degradation resulting in reduced soil fertility, which consists of low nutrient levels , organic matter content, and soil acidity levels. Therefore, to increase production, the government is trying to intensify , expand planting areas, use certified seeds, and provide care and fertilization according to plant needs. Fertilization is carried out with the aim of meeting the nutritional needs of the soil, so that plants receive an adequate supply of nutrients for their growth, which in turn will improve the quality and quantity of plant growth (Prasetyo et al., 2006).

Suryono and Sumaryo (2012) argue that the soil will have a better structure and be looser if dolomite is added, which can increase the magnesium and calcium nutrient content in the soil, thereby improving growth. (Ristianah et al., 2024)

According to Sutriadi and Setroyini (2012), dolomite contains calcium and magnesium nutrients and can increase soil pH. Dolomite is widely used in acidic soils to improve the pH to a more neutral level, making it more suitable for plant growth (Handayanto et al., 2017).

Other nutrients that are often deficient in the soil and are also the ones most needed by plants include phosphorus, nitrogen, and potassium. If these nutrients are insufficient, there will be a decrease in peanut yields.

RESEARCH MATERIALS AND METHODS

1. LOCATION AND TIME OF RESEARCH

research took place at the Secondary Crops Seed Unit (UPT), located at Jalan Pendidikan No. 23, Tanjung Selamat, Sunggal District, Deli Serdang Regency, North Sumatra Province. The soil at this location is classified as red-yellow podzolic. This research began in June 2023 and continued until September 2023.

2. RESEARCH TOOLS AND MATERIALS

This research uses tools such as: hoes, buckets, wooden stakes, pieces of bamboo, nails, meters, hammers, scales, plastic ropes, and sprayers.

Research materials such as: Hypoma 1 variety seeds, dolomite lime, NPK pearl 16:16:16, insecticide, fungicide. (Ristianah et al., 2024)

3. RESEARCH METHODS

This study used a Randomized Block Design (RBD) method involving two treatment factors. The first factor relates to the dolomite application, which has three treatment levels:

D_1 = 0 g/plot (control)

D_2 = 40 g/plot equivalent to 270 kg/ha (recommended dose)

The second factor is the provision of NPK Mutiara 16:16:16 with three levels of treatment, including :

N_1 = 30 g/plot equivalent to 200 kg/ha

N_2 = 45 g/plot equivalent to 300 kg/ha (recommended dose)

N_3 = 60 g/plot equivalent to 400 kg/ha (Munir et al., 2025)

3. Data Analysis Method

The data analysis method for the factorial RAK (Randomized Block Design) uses the additive linear method:

$Y_{ijk} = \mu + \boldsymbol{\rho}_i + \alpha_j + \beta_k + (\alpha\beta)_{jk} + \varepsilon_{ijk}$

To determine the effects of dolomite, NPK fertilizer, and their interactions, the research data were analyzed using analysis of variance. If the analysis of variance showed a significant or very significant effect, a Duncan's range test was performed at the 5% significance level.

RESULTS AND DISCUSSION

RESEARCH RESULT

1. Plant Height (cm)

The growth rate of plant height in the dolomite treatment at the age of 2 – 8 WAP is shown in Figure 1.

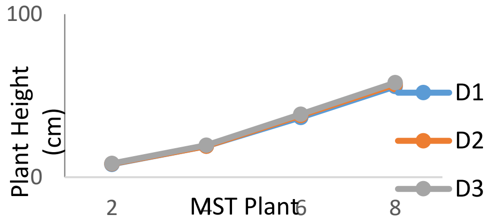


Figure 1. Graph of the effect of dolomite administration on plant height growth at the age of 2 – 8 MST.

Figure 1 shows the effect of dolomite on the relatively rapid growth rate of peanut plants. The growth rate of peanut plants in treatment D3 appears to be higher than in treatments D2 and D1 .

The growth rate of plant height in the NPK Mutiara treatment at the age of 2 – 8 WAP is shown in Figure 2.

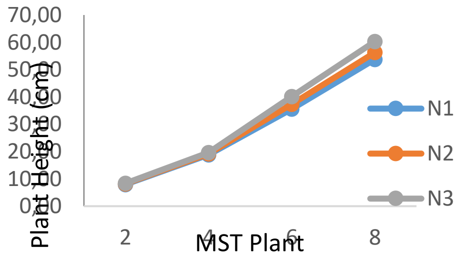


Figure 2. Graph of the effect of giving Mutiara NPK on plant height growth at the age of 2 – 8 MST

Figure 2 shows that the application of Mutiara NPK fertilizer had a positive impact on the rapid growth rate of peanut plants. The peanut plant height growth rate in the N3 treatment was higher than in the N2 and N1 treatments.

Based on data analysis conducted on the growth of peanut plant height, it was found that dolomite application had a significant impact at the ages of 2, 4, 6, and 8 WAP, as well as the application of Mutiara NPK fertilizer which also had a significant effect at the same ages. However, there was no significant effect of the interaction between dolomite and NPK fertilizer on plant height at all observation ages. The average plant height of the dolomite and Mutiara NPK fertilizer treatments at the ages of 2, 4, 6, and 8 WAP can be found in Table 2.

Table 2. Average Results of Plant Height (cm) for Dolomite and Mutiara NPK Fertilizer Treatments at 2, 4, 6, and 8 MST.

Treatment	Plant Height			
	2 MST	4 MST	6 MST	8 MST
D1	7.96a	18.95a	31.71a	45.63a
D2	8.18ab	19.12ab	32.88ab	46.82b
D3	8.42b	19.54b	33.74b	47.97b
N1	7.97a	18.84a	30.56a	43.79a
N2	8.20ab	19.18ab	32.37b	46.30b
N3	8.38b	19.59b	35.41c	50.33c

Description: In the same treatment with numbers followed by the same letter, there is no significant difference at the 5% Duncan test level.

From Table 2, it can be seen that the provision of dolomite resulted in the highest plant growth rate at the age of 8 WAP with D3 reaching 47.97 cm, followed by D2 at 46.82 cm, and the lowest was at D1 with a height of 45.63 cm. Figure 3 shows the relationship between plant height at the age of 8 WAP and the provision of dolomite.

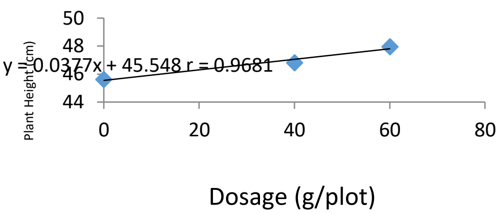


Figure 3. Curve of the effect of dolomite application on the height of peanut plants at 8 weeks after planting.

The regression analysis results from Figure 3 indicate that the relationship between dolomite dosage and plant height at 8 WAP forms a positive linear regression curve. The equation is $y = 0.0377x + 45.548$, and the correlation coefficient (r) is 0.9681 . This means that every 1 g increase in dolomite dosage per plot will increase plant height by approximately 0.0377 cm.

Table 2 shows that the dolomite application that provided the highest growth rate at 8 weeks after planting was N_3 (50.33 cm), followed by N_2 (46.30 cm), and the lowest was N_1 (43.79 cm). The relationship between plant height at 8 weeks after planting and the application of Mutiara NPK is shown in Figure 4.

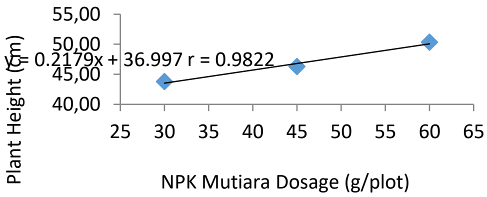


Figure 4. Curve of the effect of giving Mutiara NPK fertilizer on the height of peanut plants at the age of 8 weeks after planting.

The results of the regression analysis in Figure 4 show that the relationship between plant height and NPK Mutiara application at 8 WAP forms a positive linear regression curve. The equation is $y = 0.2179x + 36.997$, and the correlation coefficient (r) is 0.9822 . This means that every 1 g increase in NPK fertilizer dose per plot will increase plant height by approximately 0.2197 cm.

2. Flowering Age (days)

Observational data on the effects of dolomite and NPK Mutiara fertilizer application showed that dolomite and NPK Mutiara fertilizer application significantly affected the flowering age of plants, but the interaction between the two treatments did not have a significant impact on the flowering age of plants. Table 3 lists the average flowering age of plants from various dolomite and NPK Mutiara fertilizer application treatments.

Table 3. Average Flowering Age Results for Dolomite and Mutiara NPK Fertilizer Treatments

Treatment	N_1	N_2	N_3	Average
D_1	26.33	25.67	25.33	25.77c
D_2	25.33	25.00	24.67	25.00ab
D_3	25.00	24.67	24.33	24.66a
Average	25.55b	25.11ab	24.77a	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

In Table 3 it can be seen that the dolomite treatment that gave the fastest flowering age was treatment D_3 (24.66 days), followed by treatment D_2 (25.00 days), and followed by treatment D_1 (25.77 days). The relationship between flowering age and dolomite treatment is shown in Figure 5.

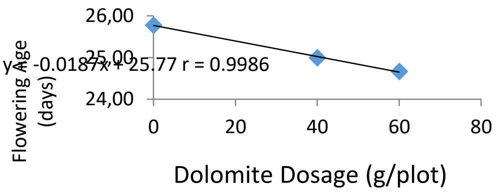


Figure 5. Response Curve of the Effect of Dolomite Application on Flowering Age.

Based on the results of the regression analysis in Figure 5, it shows that the relationship between dolomite dosage and the flowering age of plants forms a negative linear regression curve, with the equation $y = -0.0187x + 25.77$; $r = 0.9986$, which means that increasing the dolomite dosage by 1 g/plot accelerates the flowering age of plants by 0.0187 days.

In Table 3 it can be seen that the NPK pearl fertilizer treatment that gave the fastest flowering age was the $N_{3\ \text{treatment}}$ (24.77 days), followed by the $N_{2\ \text{treatment}}$ (25.11 days) then followed by the N

1 treatment (25.55 days). The relationship between flowering age and pearl NPK fertilizer treatment is shown in Figure 5.

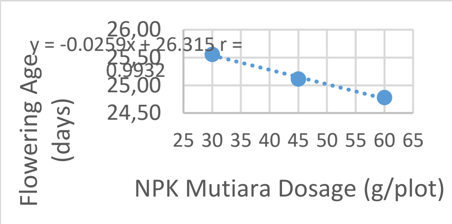


Figure 6. Curve of the Effect of NPK Mutiara Fertilizer on Flowering Age

The results of the regression analysis based on Figure 6 reveal that the relationship between the application of Mutiara NPK fertilizer and flowering age forms a negative linear regression curve. The equation is $y = -0.0259x + 26.315$, and the correlation coefficient (r) value is 0.9932 . This means that increasing the dose of Mutiara NPK fertilizer by 1 g per plot will accelerate the flowering age of the plant by approximately 0.0259 days.

3. Number of Main Branches (branches)

Observation data on the effects of dolomite and NPK Mutiara fertilizer from variability analysis showed that dolomite and NPK Mutiara fertilizer at 6 WAP had a significant impact on the number of main branches, but the interaction between the two treatments at 6 WAP had no significant effect on the number of main branches. Table 4 contains the average number of plant branches from various dolomite and NPK Mutiara fertilizer treatments.

Table 4. Average Results of the Number of Branches for Dolomite and Mutiara NPK Fertilizer Treatments

Treatment	N_1	N_2	N_3	Average
D_1	4.73	4.93	5.00	4.89a
D_2	5.20	5.33	5.47	5.33b
D_3	5.33	5.40	5.73	5.49b
Average	5.09a	5.22ab	5.40b	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

In Table 4, it can be seen that the dolomite treatment that gave the highest number of branches was treatment D_3 (5.49 branches), followed by treatment D_2 (5.33 branches), and the lowest value was followed by treatment D_1 (4.89 branches). The relationship between the number of branches and the dolomite treatment is shown in Figure 7.

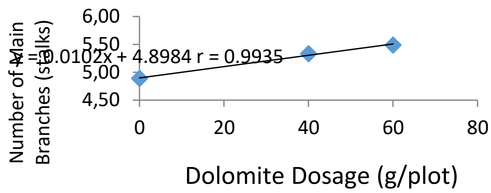


Figure 7. Curve of the Effect of Dolomite Application on the Number of Main Branches.

From the results of the regression analysis in Figure 7, it can be concluded that the correlation between dolomite dosage and the number of plant branches forms a positive linear regression curve. The equation is $y = 0.0102x + 4.898$, and the correlation coefficient (r) is 0.9935 . This means that every 1 g increase in dolomite dosage per plot will increase the number of plant branches by approximately 0.0102 branches.

In Table 4, it can be seen that the NPK pearl fertilizer treatment that gave the highest number of branches was the N_3 treatment (5.40 branches), followed by the N_2 treatment (5.22 branches), and the lowest value was followed by the N_1 treatment (25.55 branches). The relationship between the number of branches and the NPK pearl fertilizer treatment is shown in Figure 8.

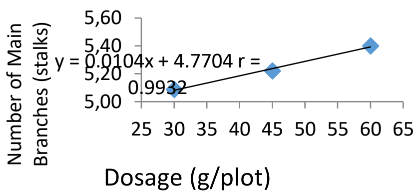


Figure 8. Influence Curve of the Effect of NPK Mutiara Fertilizer on the Number of Main Branches

The results of the regression analysis based on Figure 6 reveal that the correlation between the application of Mutiara NPK fertilizer and the number of branches forms a positive linear regression curve. The equation is $y = 0.0104x + 4.7704$, and the correlation coefficient (r) value is 0.9932. This means that every increase in the dose of Mutiara NPK fertilizer by 1 g per plot will increase the number of branches by approximately 0.0104 branches.

4. Number of Gynophores per Plant (fruit)

Observation data on the effects of dolomite and NPK Mutiara fertilizer from the variability analysis showed that dolomite and NPK Mutiara fertilizer had a significant impact on the number of plant gynophores, and the interaction between the two treatments also had a significant effect on the number of plant gynophores. Table 5 contains the average number of plant gynophores from various dolomite and NPK Mutiara fertilizer treatments.

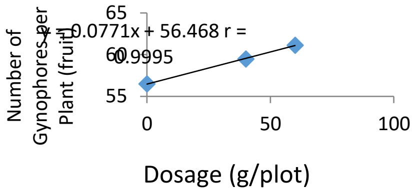
Table 5. Average Results of the Number of Gynophores per Plant Given Dolomite and Mutiara NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	54.47	55.67	59.33	56.48a
D_2	57.73	61.53	59.20	59.48b
D_3	60.13	60.13	63.13	61.13b
Average	57.44 a	59.11 b	60.55 c	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

In Table 5 it can be seen that the dolomite treatment that gave the highest number of gynophores was treatment D_3 (61.13 pieces), followed by treatment D_2 (59.48 pieces), and the lowest value was treatment D_1 (56.48 pieces). The relationship between the number of gynophores and the dolomite treatment is shown in Figure 9.

Figure 9. Curve of the Effect of Dolomite Application on the Number of Gynophores per Plant



Based on the results of the regression analysis in Figure 9, it shows that the relationship between the dolomite dose and the number of gynophores forms a positive linear regression curve, with the equation $y = 0.00771x + 56.468$; $r = 0.9995$, which means that increasing the dolomite dose by 1 g/plot increases the number of gynophores by 0.00771 pieces.

In Table 5 it can be seen that the treatment of NPK pearl fertilizer which gave the highest number of gynophores was the N_3 treatment (60.55 pieces), followed by the N_2 treatment (59.11 pieces), and followed by the lowest value in the N_1 treatment (57.44 pieces). The relationship between the number of gynophores and the treatment of pearl NPK fertilizer is shown in Figure 10.

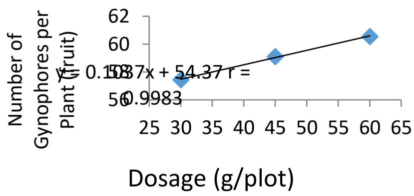


Figure 10.; Curve of the Effect of NPK Mutiara Application on the Number of Gynophores per Plant

The results of the regression analysis based on Figure 10 indicate that the relationship between the application of Mutiara NPK fertilizer and the number of gynophores forms a positive linear regression curve. The equation is $y = 0.1037x + 54.37$, and the correlation coefficient (r) value is 0.9983. This means that every increase in the dose of Mutiara NPK fertilizer by 1 g per plot will increase the number of gynophores by approximately 0.1037 pieces.

5. Total Number of Pods per Plant (pods)

Observation data on the effects of dolomite and NPK Mutiara fertilizer application results from variability analysis showed that dolomite and NPK Mutiara fertilizer application had a significant impact on the total number of pods in plants, while the interaction between the two treatments did not have a significant effect on the total number of pods in plants. Table 6 contains the average number of total pods in plants from various dolomite and NPK Mutiara fertilizer application treatments.

Table 6. Average Results of Total Number of Pods per Plant Given Dolomite and Mutiara NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	34.40	33.87	36.60	34.95a
D_2	35.07	39.13	37.87	37.35b
D_3	37.47	38.07	39.33	38.28b
Average	35.64a	37.02ab	37.93b	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

Table 6 shows that the dolomite treatment that produced the highest number of pods was treatment D_3 (38.28 pods), followed by treatment D_2 (37.35 pods), and the lowest value was treatment D_1 (34.95 pods). The relationship between the number of pods and the dolomite treatment is shown in Figure 11.

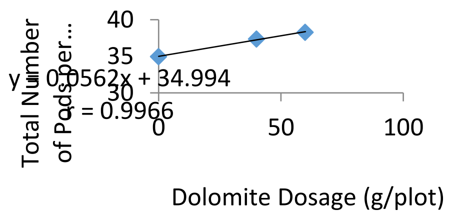


Figure 11. Curve of the Effect of Dolomite Application on the Total Number of Pods per Plant

Based on the results of the regression analysis from Figure 11, it shows that the relationship between the dolomite dose and the total number of pods per plant forms a positive linear regression curve, with the equation y = 0.0562x + 34.994; r = 0.9966, which means that increasing the dolomite dose by 1 g/plot increases the number of pods by 0.0562 pods.

In table 6, it can be seen that the treatment providing pearl NPK fertilizer which gave the highest pods was the N_3 treatment (37.93 pods), followed by the N_2 treatment (37.02 pods), and the lowest value was in the N_1 treatment (35.64 pods). The relationship between the number of pods and the NPK pearl treatment is shown in Figure 12.

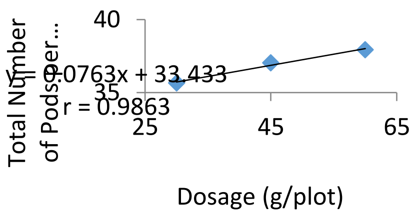


Figure 12.; Curve of the Effect of NPK Mutiara Fertilizer on the Number of Pods

The results of the regression analysis based on Figure 12 reveal that the relationship between the application of Mutiara NPK fertilizer and the number of pods forms a positive linear regression curve. The equation is y = 0.0763x + 33.433, and the correlation coefficient (r) value is 0.9863 . This means that increasing the dose of Mutiara NPK fertilizer by 1 g per plot will increase the number of pods per plant by approximately 0.0763 pods.

6. Number of Full Pods per Plant (pods)

Observation data on the effects of dolomite and NPK Mutiara fertilizer are presented in Appendix 17, while a list of variability in the observed results can be found in Appendix 18. Variability analysis shows that dolomite and NPK Mutiara fertilizer have a significant impact on the number of filled pods, while the interaction between the two treatments does not have a significant effect on the number of filled pods. Table 7 contains the average number of filled pods from various dolomite and NPK Mutiara fertilizer treatments.

Table 7. Average Results of the Number of Pods Containing Dolomite and Pearl NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	28.07	27.60	31.07	28.91a
D_2	29.33	33.73	32.67	31.91b
D_3	31.67	32.93	34.46	33.02b
Average	29.68a	31.42ab	32.73b	

Description: in the same treatment with numbers followed by the same letters, there is no significant difference at the 5% Duncan test level.

Table 7 shows that the dolomite treatment that produced the highest number of filled pods was treatment D_3 (33.02 pods), followed by treatment D_2 (31.91 pods), and the lowest value was treatment D_1 (28.91 pods). The relationship between the number of filled pods and the dolomite treatment is shown in Figure 13.

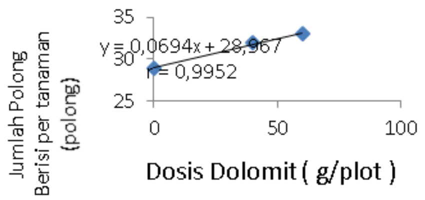


Figure 13.; Response Curve of the Effect of Dolomite Application on the Number of Filled Pods

Based on the results of the regression analysis from Figure 13, it shows that the relationship between the dolomite dose and the number of pods containing the pods forms a positive linear regression curve, with the equation y = 0.0694x + 28.967; r = 0.9952, which means that increasing the dolomite dose by 1 g/plot increases the number of pods containing 0.0694 pods.

Table 7 shows that the NPK pearl fertilizer treatment that produced the highest number of full pods was the N_3 treatment (32.73 pods), followed by the N_2 treatment (31.42 pods), and the lowest value was the N_1 treatment (29.68 pods). The relationship between the number of full pods and the NPK pearl fertilizer treatment is shown in Figure 14.

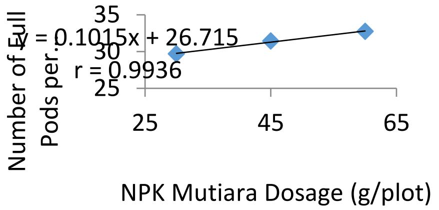


Figure 14.; Curve of the Effect of NPK Mutiara Application on the Number of Filled Pods per Plant.

The results of the regression analysis based on Figure 14 reveal that the relationship between the NPK Mutiara dose and the number of filled pods forms a positive linear regression curve. The equation is y = 0.1015x + 26.715, and the correlation coefficient (r) is 0.9936 . This means that increasing the NPK Mutiara fertilizer dose by 1 g per plot will increase the number of filled pods by approximately 0.1015 pods.

7. Number of Empty Pods per Plant (pods)

Observation data on the effects of dolomite and NPK Mutiara fertilizer from the variability analysis showed that dolomite and NPK Mutiara fertilizer had a significant impact on the number of empty pods, while the interaction between the two treatments did not have a significant effect on the number of empty pods. Table 8 contains the average number of empty pods from various dolomite and NPK Mutiara fertilizer treatments.

Table 8. Average Results of the Number of Empty Pods Given Dolomite and Mutiara NPK Fertilizer

Treatmen	N_1	N_2	N_3	Averag

t				e
D_1	6.33	6.20	5.53	6.02c
D_2	5.73	5.40	5.20	5.44ab
D_3	5.80	5.13	4.93	5.28a
Average	5.95b	5.57ab	5.22a	

Description: for the same treatment with numbers followed by the same letter, there is no significant difference at the Duncan test level of 5%.

In Table 8, it can be seen that the dolomite treatment that produced the highest number of empty pods was treatment D_1 (6.02 pods), followed by treatment D_2 (5.44 pods), and followed by the lowest value in treatment D_3 (5.28 pods). The relationship between the number of empty pods and the dolomite treatment is shown in Figure 15.

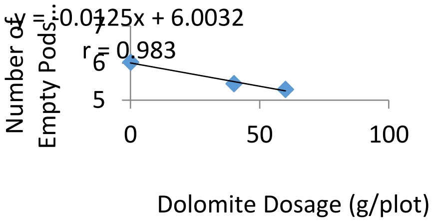


Figure 15.; Response Curve of the Effect of Dolomite Application on the Number of Empty Pods per Plant.

Based on the results of the regression analysis from Figure 15, it shows that the relationship between dolomite dosage and the number of empty pods forms a negative linear regression curve, with the equation y = -0.0125x + 6.0032 ; r = 0.983, which means that increasing the dolomite dosage by 1 g/plot reduces the number of empty pods by 0.0125 pods.

In Table 8, it can be seen that the NPK pearl fertilizer treatment that produced the highest number of empty pods was treatment N1 (5.95 pods), followed by treatment N2 (5.57 pods), and followed by the lowest value in treatment N3 (5.22 pods). The relationship between the number of empty pods and the NPK pearl fertilizer treatment is shown in Figure 16.

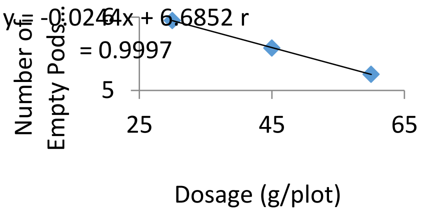


Figure 16.; Curve of the Effect of NPK Mutiara on the Number of Empty Pods per Plant.

The results of the regression analysis based on Figure 16 indicate that the relationship between the NPK Mutiara dosage and the number of empty pods forms a negative linear regression curve. The equation is y = -0.0244x + 6.852, and the correlation coefficient (r) is 0.9997 . This means that increasing the NPK Mutiara fertilizer dosage by 1 g per plot will reduce the number of empty pods by approximately 0.0244 pods.

8. Pod Weight per Plant (g)

Data on pod weight per peanut plant due to the effects of dolomite and NPK Mutiara fertilizer application indicate that dolomite and NPK Mutiara fertilizer application had a significant impact on pod weight, while the interaction between the two treatments did not have a significant effect on pod weight. Table 9 contains the average pod weight of various dolomite and NPK Mutiara fertilizer application treatments.

Table 9. Average Results of Pod Weight per Plant Given Dolomite and Mutiara NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	54.93	54.87	63.20	57.66a
D_2	64.80	68.67	67.07	66.84b
D_3	66.47	69.87	71.66	69.33b
Average	62.06a	64.46ab	67.31b	

Description: for the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

Table 9 shows that the dolomite treatment that produced the highest pod weight per plant was treatment D_3 (69.33 g), followed by treatment D_2 (66.84 g), and the lowest value was treatment D_1

(57.66 g). The relationship between pod weight per plant and dolomite treatment is shown in Figure 17.

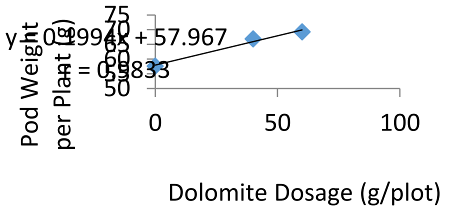


Figure 17. Curve of the effect of dolomite application on pod weight per plant.

Based on the results of the regression analysis from Figure 17, it shows that the relationship between dolomite dosage and pod weight per plant forms a positive linear regression curve, with the equation y = 0.1994x + 57.967; r = 0.9833, which means that increasing dolomite dosage by 1 g/plot increases pod weight per plant by 0.1994 grams.

Table 9 shows that the dolomite treatment for peanuts that produced the heaviest pod weight per plant was the N_3 treatment (67.31 g), followed by the N_2 treatment (64.46 g), and the lowest value was the N_1 treatment (62.06 g). The relationship between the number of full pods and the dolomite treatment is shown in Figure 18.

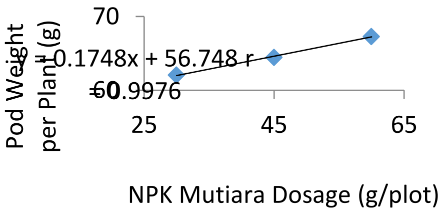


Figure 18. Curve of the influence of NPK Mutiara application on pod weight per plant

The results of the regression analysis based on Figure 18 indicate that the relationship between the NPK Mutiara dosage and pod weight per plant forms a positive linear regression curve. The equation is y = 0.1748x + 56.748, and the correlation coefficient (r) value is 0.9976 . This means that increasing the NPK Mutiara dosage by 1 g per plot will increase pod weight by approximately 0.1748 grams.

9. **Pod Weight per Plot (g)**

Observational data on pod weight per plot due to dolomite and NPK Mutiara fertilizer application results from variability analysis indicate that dolomite and NPK Mutiara fertilizer application significantly affect pod weight per plot, while the interaction between the two treatments does not have a significant impact on pod weight. Table 5 contains the average number of gynophores in plants from various dolomite and NPK Mutiara fertilizer application treatments.

Table 10. Average Pod Weight Results per Plot Given Dolomite and Mutiara NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	275.00	274.33	316.00	288.44 a
D_2	324.67	343.00	335.33	334.33 b
D_3	332.33	349.67	358.00	346.67 b
Average	310.66a	322.33 ab	336.44b	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

Table 10 shows that the treatment with the highest dolomite dose that gave the highest pod weight was D_3 (346.67 g), followed by treatment D_2 (334.33 g), and followed by the lowest weight value in treatment D_1 (288.44 g). The relationship between pod weight and dolomite treatment is shown in Figure 19.

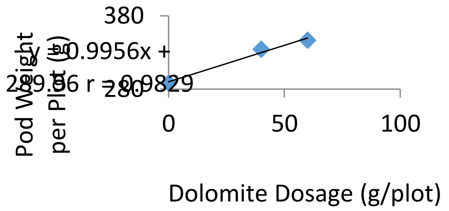


Figure 19. Curve of the effect of dolomite application on pod weight per plot

The results of the regression analysis based on Figure 19 reveal that the relationship between dolomite dosage and pod weight per peanut plot forms a positive linear regression curve. The equation is y = 0.9956x + 289.96 , and the correlation coefficient (r) is 0.9829. This means that increasing dolomite dosage by 1 g per plot will increase pod weight by approximately 0.9956 grams.

Table 10 shows that the NPK pearl fertilizer treatment that gave the highest pod weight per plot was N_3 (336.44 g), followed by $N_{2\ \text{treatment}}$ (322.33 g), and the lowest weight was in $N_{1\ \text{treatment}}$ (310.66 g). The relationship between pod weight and NPK pearl fertilizer treatment is shown in Figure 20.

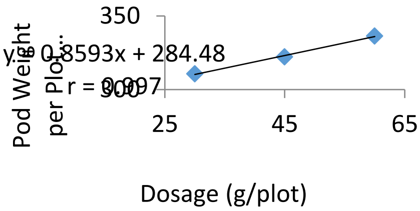


Figure 20. Curve of the effect of giving pearl NPK on pod weight per plot

The results of the regression analysis based on Figure 20 indicate that the relationship between the dose of NPK Mutiara fertilizer and pod weight per peanut plot forms a positive linear regression curve. The equation is y = 0.8593x + 284.48 , and the correlation coefficient (r) value is 0.997. This means that increasing the dose of NPK Mutiara fertilizer by 1 g per plot will increase pod weight by approximately 0.8593 grams.

10. Weight of 100 Dry Seeds (g)

Observational data on the weight of 100 dry seeds due to the influence of dolomite and NPK Mutiara fertilizer application showed that dolomite and NPK Mutiara fertilizer application significantly affected the weight of 100 dry seeds, while the interaction between the two treatments did not have a significant impact. Table 11 contains the average weight of 100 dry seeds from various dolomite and NPK Mutiara fertilizer application treatments.

Table 11. Average Weight Results of 100 Dry Seeds Given Dolomite and Mutiara NPK Fertilizer

Treatment	N_1	N_2	N_3	Average
D_1	49.00	49.33	52.00	50.11a
D_2	55.67	57.67	58.33	57.22b
D_3	57.00	59.00	60.67	58.89b
Average	53.89a	55.33ab	57.00 b	

Description: In the same treatment with numbers followed by the same letter, it means there is no significant difference at the Duncan test level of 5%.

In Table 11 it can be seen that the dolomite treatment that gave the highest weight of 100 dry seeds was treatment D_3 (58.89 g), followed by treatment D_2 (57.22 g), and followed by the lowest weight in treatment D_1 (50.11 g). The relationship between the weight of 100 dry seeds and the dolomite treatment is shown in Figure 21.

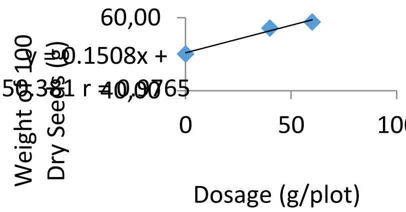


Figure 21. Curve of the effect of dolomite administration on the weight of 100 dry seeds

The results of the regression analysis based on Figure 21 reveal that the relationship between dolomite dosage and the weight of 100 dry seeds forms a positive linear regression curve. The equation is y = 0.1508x + 50.381, and the correlation coefficient (r) value is 0.9765 . This means that increasing the dolomite dosage by 1 g per plot will increase the weight of 100 dry seeds by approximately 0.1508 grams.

In Table 11, the treatment of NPK pearl fertilizer that gave the highest weight of 100 dry seeds was N_3 (57.00 g), followed by treatment N_2 (55.33 g), and followed by the lowest weight value in treatment N 1 (53.89 g). The relationship between the weight of 100 dry seeds and the dolomite treatment is shown in Figure 22.

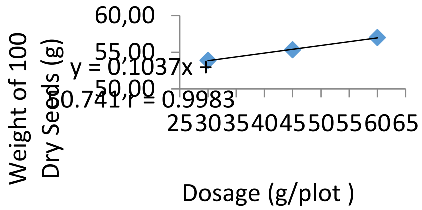


Figure 22. Curve of the effect of giving pearl NPK on the weight of 100 dry seeds

The results of the regression analysis based on Figure 22 indicate that the relationship between the dose of NPK Mutiara fertilizer and the weight of 100 dry seeds forms a positive linear regression curve. The equation is $y = 0.1037x + 50.741$, and the correlation coefficient (r) value is 0.9983 . This means that increasing the dose of NPK Mutiara fertilizer by 1 g per plot will increase the weight of 100 dry seeds by approximately 0.1037 grams.

DISCUSSION

1. The Effect of Dolomite Application on the Growth and Production of Peanut Plants

The results of the study showed that providing dolomite with a dose of 60 g per plot had an impact on increasing plant height, stimulating the multiplication of plant branches, plant gionophores, accelerating inflorescence, increasing the number of pods and the number of pods filled per plant and increasing the weight of the pods themselves. This may be due to the ability of dolomite to improve the physical and chemical properties of the soil. By providing dolomite, there is an increase in the availability of nutrients that can be absorbed by plants, which in turn affects the growth of peanuts by increasing the supply of calcium (Ca) and magnesium (Mg), balancing the level of soil acidity, reducing the risk of aluminum toxicity, increasing the availability of phosphorus (P) in the soil by releasing P from aluminum (Al-P) and iron (Fe-P) bonds Kuswandi (2012), and increasing soil cation exchange (CEC). In addition, the provision of dolomite can also affect nitrogen (N) mineralization and increase N fixation, as well as facilitate the decomposition of organic matter and microbial activity in the soil. In line with this, Widodo and his colleagues (2017) indicated that the provision of dolomite can result in improvements in the physical and chemical properties of the soil, ensuring the availability of soil nutrients for plants.

2. The Effect of Pearl NPK Fertilizer on the Growth and Production of Peanut Plants

The application of NPK Mutiara fertilizer has a significant impact on plant height, number of main branches, flowering age, number of gynophores per plant, number of pods per plant, number of filled pods per plant, number of empty pods per plant, pod weight per plant, pod weight per plot, and weight of 100 dry seeds with a dose of 60 grams.

The presence of nitrogen in NPK fertilizer plays a crucial role in stimulating plant growth. Nitrogen plays a key role in promoting early vegetative growth and overall plant growth. Healthy peanuts require good vegetative growth to absorb sunlight and CO2, which are essential for photosynthesis. Therefore, applying Mutiara NPK fertilizer supports the growth of tall peanut plants.

This increase may also be due to the presence of primary macronutrients, such as nitrogen (N), phosphorus (P), and potassium (K) in Mutiara NPK fertilizer, which can affect plant growth and development. Lakitan (2011) stated that nitrogen is the main component in many amino acid compounds needed in the formation or vegetative growth of plants such as stems and leaves.

Furthermore, the phosphorus content in NPK fertilizer can produce more plant branches, including productive and non-productive gynophores. Throughout the plant growth cycle. The provision of

Mutiara NPK which contains balanced nutrients, especially phosphorus (P) and potassium (K), plays an important role in pod formation. In the view of Permadi and Hariyanti (2015), pod formation is highly dependent on factors such as soil moisture levels and the availability of essential nutrients such as nitrogen (N), phosphorus (P), and potassium (K) which are needed in the fertilization and seed ripening process.

3. **Interaction Between Dolomite and NPK Fertilizer Application on the Growth and Production of Peanut Plants.**

The analysis of variance (ANOVA) results showed a significant interaction between dolomite and NPK pearl fertilizer application on the number of gynophores per peanut plant. This interaction is likely due to two main factors. First, dolomite application helps balance soil pH, changing it from an acidic to a neutral condition. This can create a more conducive environment for peanut plant growth, including improved gynophore formation.

Second, NPK Mutiara fertilizer provides the nutrients required by peanut plants during the growth and development phase, which positively influences gynophore production. Combined, these two treatments appear to support each other in increasing the amount of gynophore produced by peanut plants.

CONCLUSION AND SUGGESTIONS

Conclusion

Dolomite application, 60 g/plot, resulted in optimal yield and growth of peanut plants, namely the weight of 100 dry seeds, plant height, pod weight per plot, flowering age, pod weight per plant, number of branches, number of filled pods per plant, number of gynophores per plant, number of empty pods per plant, and total number of pods per plant were significantly affected by dolomite application. Meanwhile, application of NPK pearl fertilizer with a dose of 60 g/plot showed the same thing .

The combination of dolomite and NPK Mutiara fertilizer only had a significant effect on the number of gynophores per plant.

Suggestion

To enhance peanut growth and yield, the use of dolomite, Mutiara NPK fertilizer, or a combination of the two can be a cultivation practice that can help increase peanut growth and yield. However, it's important to adjust the dolomite dosage to suit the plant's needs and soil conditions to achieve optimal results.

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