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Effect of Chicken Manure and NPK Fertilizer on the Growth and Yield of Purple Eggplant (Solanum melongena) Mustang F1 Variety

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Abstract

The experimental research was carried out in Dawuan Kidul Village, Dawuan District, Subang Regency with an altitude of 700 m above sea level, with a type C climate (somewhat wet) from March 2021 to June 2021. This study aimed to study the effect of the interaction of chicken manure and NPK pearl yaramila fertilizer. Environmental design using a completely randomized design (RAK) factorial pattern, treatment of chicken manure (K) consists of 4 levels, namely k0 = 0 tons ha¯¹ (control), k1 = 10 tons ha¯¹ k2 = 20 tons ha¯¹, k3 = 30 tons ha¯¹ and pearl NPK fertilizer Yaramila 16: 16: 16 (Y) consists of 4 levels, namely y0 = 0 kg ha¯¹ (control), y1 = 100 kg ha¯¹, y2 = 200 kg ha¯¹, y3 = 300 kg ha¯¹.. The results showed that the effect Chicken manure and pearl yaramila NPK fertilizer had an interaction effect on plant height and number of leaves aged 7 WAP, number of fruits per plant, fruit length, weight per fruit and fruit weight per plant, while the observation of plant height and number of leaves at 3 WAP and 5 MST showed no interaction.

Keywords: Purple Eggplant, Chicken Manure, Mutiara Yaramila NPK Fertilizer

Abstract

Penelitian dilaksanakan di Desa Dawuan Kidul Kecamatan Dawuan Kabupaten Subang dengan ketinggian 700 m di atas permukaan laut, dengan iklim tipe C (agak basah) dari bulan Maret 2021 sampai Juni 2021. Penelitian ini bertujuan untuk mempelajari pengaruh interaksi pemberian pupuk kandang ayam dan pupuk NPK mutiara yaramila. Rancangan lingkungan menggunakan rancangan acak lengkap (RAK) pola faktorial, perlakuan pupuk kandang ayam (K) terdiri dari 4 taraf, yaitu k0 = 0 ton ha¯¹ (kontrol), k1 = 10 ton ha¯¹ k2 = 20 ton ha¯¹, k3 = 30 ton ha¯¹ dan pupuk NPK mutiara yaramila 16 : 16 : 16 (Y) terdiri dari4 taraf yaitu y0 = 0 kg ha¯¹ (kontrol), y1 = 100 kg ha¯¹, y2 = 200 kg ha¯¹, y3 = 300 kg ha¯¹.. Hasil penelitian menunjukkan bahwapengaruh pupuk kandang ayam dan pupuk NPK mutiara yaramila memberikan efek interaksi pada tinggi tanaman dan jumlah daun umur 7 MST, jumlah buah per tanaman, panjang buah, bobot per buah serta bobot buah per tanaman, sedangkan pada pengamatan tinggi tanaman dan jumlah daun umur 3 MST dan 5 MST tidak menunjukkan adanya interaksi.

Key words: Terung Ungu, Pupuk Kandang Ayam, Pupuk NPK Mutiara Yaramila.

1. Introduction

Eggplant (Solanum melongena L) is a type of annual fruit vegetable plant. Eggplant is classified as an annual crop because it only produces once. Eggplant as a vegetable food is really needed by the community for their daily diet. Even more than that, eggplant is also

really needed by the community as a medicinal ingredient for several types of diseases (Cahyono, 2016). Considering the nutritional content and benefits of consuming eggplant for health and the increasing population, it is estimated that in the future demand for eggplant will continue to grow. The productivity of eggplant plants in Indonesia is still low. According to data from the Ministry of Agriculture (2015), consumption of eggplant by the Indonesian population in 2015 reached 2,764 kg per capita. Along with the increase in population, demand for eggplant also continues to increase.

This increase in demand was not accompanied by an increase in production quantities. Eggplant production in Indonesia in 2014 reached 557,053 tons. Eggplant production decreased in 2018 to 551,552 tons (Indonesian Central Statistics Agency, 2018). Although national eggplant production tends to increase every year, eggplant production in Indonesia is still low and only contributes 1% of world demand. The area of eggplant cultivation land is still small and the form of cultivation culture is still secondary and not yet intensive, causing eggplant production to remain low.

To obtain the expected potential yields of purple eggplant, this is done by improving correct cultivation techniques, environmental management and selecting quality plant materials. Apart from the above, one of the important factors in cultivation is the proper procurement of seeds which is useful for maintaining production stability. The use of quality seeds will produce plants that are healthy and capable of maximum production (Sunarjono, 2008) in Lusiana (2018).

The mega purple, valerie and mustang varieties are superior purple eggplant compared to other varieties, so research needs to be directed at increasing the yield and quality of purple eggplant by planting superior varieties. The Mustang f1 variety is a hybrid eggplant from Indonesia that is produced in Indonesia. Plants have erect, compact stems, short internodes with strong branching. Long shiny purple fruit, clean flesh, sweet taste, not soft when cooked. Fruit weight 150-200 g. Fruit can withstand long distance storage and transportation. Plant harvest age is 52-55 HST. High plant productivity with a potential yield of 50-60 tons ha-1 (Titis Indriyani, 2017). Crop production can be increased by improving cultivation techniques, one of which is by providing fertilizer, organic fertilizer and inorganic fertilizer. Organic fertilizer is a very important ingredient in efforts to improve soil needs and its use is often accompanied by inorganic fertilizer or factory-made chemical fertilizer (Musnamar, 2007) in Auliya Aisyah (2020). Animal manure is an organic fertilizer that contains nutrients that can support soil fertility and the growth of microorganisms in the soil. According to Mutmainnah and Masluki (2017) chicken manure is an organic fertilizer that can increase the availability of nutrients for plants that can be absorbed from the soil.

One type of inorganic fertilizer is NPK fertilizer. Each type of NPK fertilizer has its own advantages and disadvantages, so information is needed regarding the type of fertilizer that is most suitable to meet the needs of purple eggplant plants. Essential elements such as nitrogen (N), phosphate (P), and potassium (K) are needed by eggplant plants in quite large quantities.

2. Materials and Methods

The research method used is experimental by conducting experiments in the field. The experiment was carried out in an experimental garden located in Dawuan Kidul Village, Dawuan District, Subang Regency at an altitude of 700 m above sea level, with a type C climate (slightly wet) which was carried out from March 2021 to June 2021.

The materials used in this research were eggplant seeds of the Mustang F1 variety (description is presented in Appendix 2), chicken manure which has been aged for 2 weeks or composted (chicken manure content is presented in attachment 3), Yaramila NPK fertilizer containing 16-16-16, (Yaramila NPK fertilizer content 16: 16: 16 is presented in attachment 4) dhitane and curacron pesticides, poly bag measuring 35 x 40 cm.

The tools used in this research were hoes, rakes, machetes, hand spayers, measuring tapes, calipers, gembors, buckets, analytical scales, name pamphlets, ropes, petridis and writing tools.

This experiment was carried out using a Randomized Group Design (RAK) with a factorial pattern consisting of two factors, namely the first factor was the dose of chicken manure (K) in 4 levels and the second factor was NPK pearl yaramila fertilizer 16 : 16 : 16 (Y) in 4 levels. , repeated 2 times. There were 16 treatment combinations that were randomly assigned to each replication.

Table 1. Combination of treatments for chicken manure and NPK pearl yaramila fertilizer

chicken manure (K)	yaramila pearl NPK fertilizer 16 : 16 : 16 (Y)			
	y0	y1	y2	y3
k0	k0 y0	k0 y1	k0 y2	k0 y3
k1	k1 y0	k1 y1	k1 y2	k1 y3
k2	k2 y0	k2 y1	k2 y2	k2 y3
k3	k3 y0	k3 y1	k3 y2	k3 y3

Table 2. Operationalization of Variables

Variable Type	Sub Variable	Variable Indicator
Independent Variable	Chicken manure dosage (K)	k0 = 0 tons ha^{-1}
		k1 = 10 tons ha^{-1}
		k2 = 20 tons ha^{-1}
		k3 = 30 tons ha^{-1}
	Yaramila pearl NPK fertilizer dosage (Y)	y0 = 0 kg ha^{-1}
		y1 = 100kg ha^{-1}
		y2 = 200 kg ha^{-1}
		y3 = 300 kg ha^{-1}
Dependent Variable	Growth	Plant height
		Number of leaves
	Result components	Number of fruits per plant
		Fruit Length
		Weight per Fruit
		Fruit Weight per Plant

Table 3. Dosage of Chicken Manure Per Ha, Per Polybag

Chicken Manure Dosage							
Tons/ha				kg/ polybag/ plant			
k0	k1	k2	k3	y0	k1	k2	k3
0	10	20	30	0	0.04	0.08	0.12

Table 4. Mutiara Yaramila NPK fertilizer dosage per polybag

Yaramila pearl NPK fertilizer dosage 16: 16: 16							
kg/ha				kg/ polybag/ plant			
y0	y1	y2	y3	y0	y1	y2	y3
0	100	200	300	0	0.0004	0.0008	0.0012

Table 5. List of analyzes of various randomized block designs with factorial patterns

Diversity Source	Degrees of Freedom	Sum of Squares	Middle Square	F count
Deuteronomy (r)	r-1 = 1	JKr	KTr	KTr/KTg
Treatment(t)	ky -1 = 15	JKt	Summit	KTP/KTG
Manure (K)	k - 1 = 3	JK (k)	KT (k)	KT (k)/KTg
NPK Fertilizer (Y)	y - 1 = 3	JK (y)	KT (y)	KT (y)/KTg
Interaction (KY)	(k-1) (y-1) =9	JK (ky)	KT (ky)	KT (ky)/KTg
Error (g)	(ky-1)(r-1)=15	JK is wrong	KTg	
Total	kyr - 1 = 31	JKT		

Source Herdiyantoro (2013) in Yati Haryati (2018)

3. Results and Discussion

Plant Height

The effect of giving chicken manure and pearl NPK on plant height observations at 3 WAP and 5 WAP showed no interaction, whereas at 7 WAP there was interaction.

Table 6. Effect of Chicken Manure and NPK Fertilizer on Height
Plants aged 3 WAP and 5 WAP

Treatment	Average Plant Height (cm)	
	3 WAP	5 WAP
Chicken Manure (K)		
k0 (0 ton ha-1)	11.99 a	16.90 A
k1 (10 tons ha-1)	12.38 a	17.51 Ab
k2 (20 tons ha-1)	12.58 a	17.97 ab
k3 (30 tons ha-1)	12.57 a	18.22 b
Pearl Yaramila NPK Fertilizer (Y)		
y0 (0 kg ha-1)	11.53 a	14.43 a
y1 (100 kg ha-1)	12.16 b	16.88 b
y2 (200 kg ha-1)	12.80 c	19.54 c
y3 (300 kg ha-1)	13.05 c	19.75 c

Table 7. Effect of Chicken Manure and NPK Fertilizer on Plant Height at 7 WAP

Treatment	Average Plant Height at 7 WAP (cm)			
	y0 (0 kg ha-1)	y1 (100 kg ha-1)	y2 (200 kg ha-1)	y3 (300 kg ha-1)
k0 (0 ton ha-1)	18.57 A A	28.77 C a	26.07 B a	31.16 D b

k1 (10 tons ha-1)	22.60 B	A	28.12 a	B	27.35 a	B	31.84 b	C
k2 (20 tons ha-1)	23.52 B	A	29.50 a	B	31.15 b	B	34.49 c	C
k3 (30 tons ha-1)	26.25 C	A	29.52 a	B	32.59 b	C	28.95 a	B

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Observations at the age of 7 WAP of the effect of chicken manure show that the levelk0 (0 ton ha-1), k1 (10 ton ha-1) and k2 (20 ton ha-1) give the best plant height when using NPK fertilizer with level y3 (300 kg ha-1), and are significantly different from the level other NPK fertilizer treatments. The k3 chicken manure treatment level (30 tons ha-1) provided the best plant height with the use of NPK fertilizer at the y2 level (200 kg ha-1) and was significantly different from other treatments.

Number of Leaves

The effect of giving chicken manure and pearl NPK on the observation of the number of leaves at the age of 3 WAP and 5 WAP showed that there was no interaction, whereas at the age of 7 WAP there was an interaction.

Table 8. Effect of Chicken Manure and NPK Fertilizer on the Number of Leaves at 3 WAP and 5 WAP

Treatment	Average Number of Leaves (pieces)			
	3 WAP		5 WAP	
Chicken Manure (K)				
k0 (0 ton ha-1)	6.46	a	10.07	a
k1 (10 tons ha-1)	6.35	a	10.86	a
k2 (20 tons ha-1)	6.57	a	10.67	a
k3 (30 tons ha-1)	6.75	a	10.47	a
Pearl Yaramila NPK Fertilizer (Y)				
y0 (0 kg ha-1)	4.44	a	7.87	a
y1 (100 kg ha-1)	6.61	b	10.13	b
y2 (200 kg ha-1)	7.46	c	12.00	c
y3 (300 kg ha-1)	7.62	c	12.07	c

Note: the average number followed by the same letter in different column directions is not significant based on the Duncan's multiple range test at the 5% significance level

Table 9. Effect of Chicken Manure and NPK Fertilizer on the Number of Leaves at 7 WAP

Treatment	Average Number of Leaves Aged 7 WAP (pieces)							
	y0 (0 kg ha-1)		y1 (100 kg ha-1)		y2 (200 kg ha-1)		y3 (300 kg ha-1)	
k0 (0 ton ha-1)	13.00 A	A	16,17 a	B	18,17 b	C	18.83 b	D
k1 (10 tons ha-1)	12.67 A	A	16.50 ab	B	16.83 a	B	19.33 b	C
k2 (20 tons ha-1)	13.83 B	A	16.50 ab	B	19.83 d	C	19.33 b	C
k3 (30 tons ha-1)	15,17 C	A	17.00 b	C	19,17 c	D	16.33 a	B

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Use of graded chicken manurek0 (0 ton ha-1) and k1 (10 ton ha-1) show the best number of leaves when using NPK fertilizer level y3 (300 kg ha-1) and are significantly different from other treatments, whereas at level k2 (20 ton ha-1) 1) The number of leaves was better shown when using NPK fertilizer y2 (200 kg ha-1) and y3 (300 kg ha-1) and was significantly different from other levels. Chicken manure level k3 (30 tons ha-1), the best number of leaves was obtained when using NPK level y2 fertilizer (200 kg ha-1) and was significantly different from other treatments.

Number of Fruits per Plant

The effect of giving chicken manure and pearl NPK on observing the number of fruit per plant shows an interaction.

Table 10. Effect of Chicken Manure and NPK Fertilizer on the Number of Fruits per Plant

Treatment	Average Number of Fruits per Plant (fruit)			
	y0 (0 kg ha-1)	y1 (100 kg ha-1)	y2 (200 kg ha-1)	y3 (300 kg ha-1)
k0 (0 ton ha-1)	12.33 A A	13.50 B a	18.67 C a	20.50 D a
k1 (10 tons ha-1)	14,17 A C	14.50 A b	22.17 B c	25.00 C b
k2 (20 tons ha-1)	13,17 A B	17,17 B c	24.83 C d	24.50 C b
k3 (30 tons ha-1)	13,17 A B	20.00 B d	23.67 C c	20.50 B a

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Use of graded chicken manurek0 (0 tons ha-1) and k1 (10 tons ha-1) show the best number of fruit per plant when using NPK fertilizer level y3 (300 kg ha-1) and are significantly different from other treatments, while at level k2 (20 tons ha-1) the number of fruits per plant was better demonstrated by the use of NPK fertilizer y2 (200 kg ha-1) and y3 (300 kg ha-1) and was significantly different from other levels. Chicken manure level k3 (30 tons ha-1), the best number of fruit per plant was obtained when using NPK fertilizer level y2 (200 kg ha-1) and was significantly different from other treatments.

Fruit Length

The effect of giving chicken manure and pearl NPK on fruit length observations showed an interaction.

Table 11. Effect of Chicken Manure and NPK Fertilizer on Fruit Length

Treatment	Average Fruit Length (cm)			
	y0 (0 kg ha-1)	y1 (100 kg ha-1)	y2 (200 kg ha-1)	y3 (300 kg ha-1)
k0 (0 ton ha-1)	11.63 A	13.38 B	15.40 C	15.95 C

	A	a	a	A
k1 (10 tons ha-1)	13.55 A C	13.40 A a	18.30 B b	18.25 B C
k2 (20 tons ha-1)	12.75 A B	14.70 B b	19.65 D b	17.95 C C
k3 (30 tons ha-1)	13.43 A C	14.90 B b	20,20 D b	16.88 C B

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Use of graded chicken manurek0 (0 ton ha-1) and k1 (10 ton ha-1) indicate better fruit length when using NPK fertilizer levels y2 (200 kg ha-1) and y3 (300 kg ha-1) and are significantly different from other treatments . Chicken manure levels k2 (20 tons ha-1) and k3 (30 tons ha-1) showed the best fruit length when using NPK level y2 fertilizer (200 kg ha-1) and were significantly different from other treatments.

Weight per Fruit

The effect of giving chicken manure and pearl NPK on the weight per fruit observation showed an interaction.

Table 12. Effect of Chicken Manure and NPK Fertilizer on Weight per Fruit

Treatment	Average Weight per Fruit (g)			
	y0 (0 kg ha-1)	y1 (100 kg ha-1)	y2 (200 kg ha-1)	y3 (300 kg ha-1)
k0 (0 ton ha-1)	97.62 A A	106.27 B a	116.33 C a	124.27 D B
k1 (10 tons ha-1)	100.91 A B	111.43 B b	118.95 C b	130.93 D C
k2 (20 tons ha-1)	100.02 A B	117.23 B c	126.02 C c	139.27 D d
k3 (30 tons ha-1)	101.55 A B	115.32 C c	135.05 D d	104.62 B a

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Use of graded chicken manurek0 (0 ton ha-1) k1 (10 ton ha-1) and k2 (20 ton ha-1) provide the best weight per fruit when using Y3 level NPK fertilizer (300 kg ha-1) and are significantly different from other treatments. Meanwhile, the best k3 level (30 tons ha-1) weight per fruit was obtained when using Y2 level NPK fertilizer (200 kg ha-1).

Fruit Weight per Plant

The effect of giving chicken manure and pearl NPK on the observation of fruit weight per plant showed an interaction.

Table 13. Effect of Chicken Manure and NPK Fertilizer on Fruit Weight per Plant

Treatment	Average Fruit Weight per Plant (kg)			
	y0 (0 kg ha-1)	y1 (100 kg ha-1)	y2 (200 kg ha-1)	y3 (300 kg ha-1)
k0 (0 ton ha-1)	2.65 A A	3.45 B a	3.40 B a	5.05 C b
k1 (10 tons ha-1)	3.20 A	4.13 B	5.00 C	5.13 C

	B b b b			
k2 (20 tons ha-1)	3.25 A	4.15 B	5.90 D	5.38 C
	B b c b			
k3 (30 tons ha-1)	3.73 A	4.10 B	5.88 C	3.58 A
	C b c a			

Note: the average numbers followed by the same lower case letters in the column direction and capital letters in the row direction are not significantly different based on the Duncan multiple distance test at a 5% significance level.

Use of graded chicken manurek0 (0 ton ha-1) shows the best fruit weight per plant when using NPK fertilizer level y3 (300 kg ha-1). Meanwhile, the k1 level (10 tons ha-1) of fruit weight per plant was better shown in the NPK y2 (200 kg ha-1) and y3 (300 kg ha-1) NPK fertilizer treatments and was significantly different from the other levels. Chicken manure level k2 (20 tons ha-1) and k3 (30 tons ha-1) the best weight of fruit per plant is shown by using NPK level y2 fertilizer (200 kg ha-1).

4. Conclusion

Based on the results of the data analysis and discussion that has been presented, it can be concluded that the influence of chicken manure and Yaramila pearl NPK fertilizer has an interaction effect on the use of 20 ton ha-1 and 30 ton ha-1 chicken manure with the use of 100 kg Yaramila pearl NPK fertilizer. ha-1 and 200 kg ha-1 on plant height (68.97 cm) and number of leaves aged 7 WAP (39.67 pieces), number of fruit per plant (50.00 pieces), fruit length (40.40 cm) , weight per fruit (278.54 grams) and fruit weight per plant (11.80kg), while observations of plant height and number of leaves aged 3 WAP and 5 WAP did not show any interaction.

Use a dose of chicken manure between 20 tons ha-1 to 30 tons ha-1 with the use of NPK pearl yaramila fertilizer between 100 kg ha-1 to 200 kg ha-1. Shows a good interaction effect with the conditions of the research site, so it needs to be studied further in different environmental and climatic conditions to determine the interaction effect

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