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The Effect of Doses of Cow Manure and NPK Fertilizer on the Growth and Yield of Purple Eggplant (*Solanum Melongena* L) Cultivars Mustang F1

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Abstract. The aim of this study was to determine the effect of doses of cow manure and NPK fertilizer on the growth and yield of purple eggplant plants (Solanum melongena L) Mustang cultivar F1, as well as to determine the relationship between the components of growth with components of purple eggplant plants (*Solanum melongena* L). The study was conducted in the village of Cigintung, Kuningan District, Kuningan Regency from September 07, 2019 to November 24, 2019. The location was at an altitude of 400 m above sea level (asl) with clay type, rainfall type C (Slightly wet). The method used was an experimental method with a factorial Randomized block Design (RBD), the treatment consisted of two factors that were repated three times. The first factor is cow manure consisting of three levels (K_1 = 10 tons/ha, K_2 = 15 tons/ha, K_3 = 20 tons/ha). The second factor is NPK fertilizer consisting of three levels (N_1 = 100 kg/ha, N_2 = 200 kg/ha, N 3 = 300 kg/ha). The results showed that the different treatment dosages of doses of cow nanure and NPK fertilizer do not have a real effect on all ages observations on plant height, number of fruit plants, fruit length, fruit diameter, fruit weight per plant, fruit weight per plot.

Keywords: *Cow manure, NPK fertilizer, purple eggplant, growth, yield*

INTRODUCTION

Eggplant plants (*Solanum melongena L*) come from Asia, namely in India and Sri Lanka. According to Eriayandi Budiman, (2008) eggplant initially grew wild. But after knowing the taste and distinctiveness, eggplant began to be cultivated in the area. So eggplant plants are native to the tropics. Then it spread to other Asian regions such as Malaysia, to East Africa, Central Africa, West Africa, South America, Carbia and Spain. In Indonesia, eggplant cultivation is centered on the islands of Java and Sumatra. But now eggplant is cultivated in various regions in Indonesia

Eggplant plants are one type of fruit vegetable that is much preferred by various kalangan because it contains Kalsium, protein, fat, carbohydrates, vitamin A, vitamin B, vitamin C, phosphorus, and iron. Eggplant fruit is consumed by the community in the form

of various kinds of vegetables or vegetables, which also contain high enough nutrition and complete composition.

Eggplant fruit nutritional content in every 100 grams of fresh eggplant contains vitamin A 30.00 mg / SI, vitamin B 0.40 mg, vitamin C 5.00 mg, protein 1.10 grams, carbohydrates 5.50 grams, phosphorus 37.00 mg, calcium 15.00 mg, iron 0.40 mg and water 92.70 grams (Rukmana, 2002). According to (Ministry of Agriculture, 2009), as well as the area of harvest and productivity tend to experience an indefinite increase in those five years. For more details about production data, harvest area and eggplant productivity from 2009-2014 can be seen at

Table 1. Development of harvest area, average yield and eggplant production in Indonesia (2009-2014)

Tahun	Luas panen (ha)	produktivitas (ton/ha)	produksi (ton)
2009	48.126	9,38	451.564
2010	52.157	9,25	482.305
2011	52.233	9,95	519.481
2012	50.559	10,26	518.787
2013	50.718	10,76	545.646
2014	50.875	10,95	557.040

Source: Ministry of Agriculture 2015

The low productivity of eggplant in Indonesia is caused by several things including, the area of eggplant cultivation is still small, the form of cultivation culture is still side and not intensive. And among farmers in general, they still do not pay attention to fertilization to be planted, even only using seeds derived from eggplant seeds, vegetables obtained from the market (Budi Alhadi, 201: 7. Explained by (Wiskandar, 2002), manure can improve the physical properties of the soil to be loose and loose so that aeration becomes better and easily penetrated by plant roots, improving soil chemical properties through nutrient contributions to plants.

Nutrients in cow manure contain an average of 0.5% N, 0.25% P 2 O 5, 0.5% K_2O. In addition to these elements manure also contains carbon, magnesium, sulfur. While the influence of organic matter on the biological properties of the soil is to add energy needed for the life of soil microorganisms. Based on the results of research by Elisman (2001). The average amount of cow manure commonly applied in Indonesia ranges from 5-20 tons / ha.

Similarly, eggplant plants fed with cow manure of 15 tons/ha have the highest number of branches and increase yield and highest production in eggplant plants.

The use of the right dose of cow manure greatly determines the productin addition to organic fertilizer, the application of inorganic fertilizer also needs to be done so that sufficient and balanced nutrients are available in the soil. The application of inorganic fertilizers is mainly carried out to provide nutrients N, P, and K either in the form of single or compound fertilizers. One of the compound fertilizers that farmers often use is NPK 16:16:16 compound fertilizer (containing 16% N (Nitrogen), 16% P 2 O 5 (Phospate) and 16% K_2O(Potassium). This means that NPK fertilizer contains balanced macronutrients that are good for plant growth. However, plants also need micronutrients that are not widely obtained in NPK fertilizer. For this reason, the use of inorganic fertilizers needs to be combined with the use of organic fertilizers in order to increase the nutrients needed by plants and at the same time increase the source of soil organic matter. Farida and Hamdani (2001) stated that the application of organic fertilizers combined with inorganic fertilizers can increase plant productivity and can increase the efficiency of fertilizer use. Based on this background, the problem formulation is prepared, among others, as follows:

1 Is there an interaction between the dose of cow manure and the dose of NPK fertilizer on the growth and yield of purple eggplant (*Solanum melongena* L.) Mustang F1 Cultivars
2 In the application of the dose of cow manure and the dose of NPK fertilizer, what is the best effect on the growth and yield of purple eggplant (*Solanum melongena* L.*)* Mustang F1 Cultivars
3 Is there a noticeable correlation between the growth component and the yield component of purple eggplant (*Solanum melongena* L.) Mustang F1 cultivars.

LITERATURE

Eggplant is one type of fruit vegetable that is much favored by various groups because it contains calcium, protein, fat, carbohydrates, vitamin A, vitamin B, vitamin C, phosphorus, and iron. Eggplant fruit is consumed by the community in the form of various kinds of vegetables or vegetables and shares processed types, which also contain high enough nutrients and complete composition. Eggplant is a vegetable ingredient that is quite promising prospects for cultivation, but currently eggplant productivity is still very low. The demand for eggplant commodities will continue to increase along with population growth

and increasing public awareness of health. According to the Central Bureau of Statistics (2013).

The use of organic fertilizers should be combined with inorganic fertilizers to complement each other (Sudarkoco *et.al,* 2004). The application of organic fertilizers combined with inorganic fertilizers can increase plant productivity and can increase the efficiency of fertilizer use. The application of inorganic fertilizers is carried out to provide nutrients N, P, and K in the form of single or compound fertilizers. One of the compound fertilizers usually used by farmers is NPK Mutiara Yaramila 16:16:16 compound fertilizer (containing 16% N, 16% P 2 O 5, and 16% K_2O). This means that Yaramila pearl NPK fertilizer contains balanced macronutrients that are good for plant growth. Plants also need micronutrients that are not widely obtained in NPK fertilizer so that the use of inorganic fertilizers needs to be combined with the use of organic fertilizers in order to increase the nutrients needed by plants and at the same time increase the source of soil organic matter (Farida and Hamdani, 2001).

Fertilization is one of the things that can be taken in maximizing plant yields. According to Wijaya (2008), fertilization is carried out as an effort to meet the needs of plants so that production goals can be achieved. However, if the use of fertilizers is not wise or excessive can cause problems for the crops cultivated, such as poisoning, susceptible to pests and diseases, low production quality and in addition high production costs and can cause pollution.

Classification and Botany of Purple Eggplant (*Solanum mengolena* L.) Mustang F1 cultivars

According to Prahasta (2009) the classification of eggplant plants (*Solanum melongena* L.) as follows:

Divisio : Spermatopita

Sub divisio :Angiosperms

Class : Dycotyledonae

Order : Tubiflorae

Family : Solanaceae

Genus : Solanum

Species: *Solanum melongena*

Eggplant plants include dicotyledonous plants (two-piece seeds), taproot, and shrub-shaped. The stem is short, spherical and fluffy, standing upright with a height of 50-150 cm.

The trunk is branched and woody but not so sturdy that during fruiting it is needed to support the plant. Young stems are green and hairless, in young stems it is easy to grow shoots so sometimes pruning is needed (Haryoto 2009). In Indonesia, eggplant plants have a fairly wide adaptability. Therefore, this plant can generally be cultivated in almost all parts of Indonesia. Both in the lowlands and highlands up to an altitude of 1000 meters above sea level. The suitable temperature for eggplant plant growth is 22-30 C (Ministry of Agriculture 2009)

Purple eggplant plants have taproots and root branches that can penetrate into the soil about 80-100 cm. Eggplant stems are low (short), woody and branched. The height of the stem of the plant varies between 78-90 cm depending on the type of variety. The shape of the fruit is diverse, namely cylindrical, oval, oval or round. Skin color is purple to shiny purple. Terms for Growing Purple Eggplant (*Solanum mengolena* L.), This plant can grow in the lowlands and high altitudes with an altitude of about 1,200 meters above sea level with an air temperature of 22-30^0 C. The best type of plant for eggplant cultivation is a type of sandy clay, fertile, rich in organic matter, and a good water system. Eggplant does not require its special requirements In order to grow optimally the soil must be loose, fertile and rich in humus.

DISCUSSION

From the description of the frame of mind, a hypothesis can be drawn, namely thatthere is an interaction between the dose of cow manure and the dose of NPK fertilizer on the growth and yield of purple eggplant plants (*Solanum melongena*L.) and dosis cow manure 15 tons / ha and NPK fertilizer 200 kg / ha gives the best effect on the growth and yield of eggplant plants **(***Solanum melongena* L.)

Supporting Observations

Supporting observations are observations that aim to determine general environmental conditions before and after the experiment. Supporting observation data are used to support the main observation.

Plant Height (cm)

The results of statistical analysis showed that the dose treatment of cow manure and NPK Mutiara Yaramila fertilizer did not provide a real interaction (no interaction and independent influence) on plant height at the age of 21 HST, 28 HST and 35 HST (Appendix

10, Appendix 11, Appendix 12) The results of statistical analysis canbe seen in detail on Tabel

Table 2. The Effect of Cow Manure and NPK Fertilizer Dosage on Plant Height

Average Plant	Eggplant Age 21, 28 and 35 HST (cm) Height Treatment (cm)		
	21 HST	28 HST	35 HST
Manure (K)			
K1 (10 tons/ha)	6.23 a	10.48 a	20.84 a
K2 (15 tons/ha)	6.04 a	10.00 a	18.76 a
K3 (20 tons/ha)	5.75 a	10.25 a	22.08 a
NPK Fertilizer (N)			
N1 (100 kg/ha)	6.37 a	10.88 a	21.38 a
N2 (200 kg/ha)	6.12 a	10.54 a	21.65 a
N3 (300 kg/ha)	5.54 a	9.32 a	18.65 a

Description: The average number followed by the same lowercase letter in the same column

Number of Leaves (Strands) The results of statistical tests showed that the treatment of cow manure doses and NPK pupun doses did not provide a real interaction and independent effect at the age of 21 HST, 28 HST and 35 HST

Table 3. The Effect of Cow Manure and NPK Fertilizer Dosage on the Number of

Treatment	Eggplant Leaves Age 21, 28 and 35 HST (strands) of Average Number of Leaves (Strands)		
	21 HST	28 HST	35 HST
Manure (K)			
K1 (10 tons/ha)	4.07 a	5.76 a	7.42 a
K2 (15 tons/ha)	3.82 a	5.49 a	7.51 a
K3 (20 tons/ha)	4.31 a	5.89 a	7.91 a
NPK Fertilizer (N)			
N1 (100 kg/ha)	4.11 a	5.91 a	7.73 a
N2 (200 kg/ha)	4.13 a	5.71 a	7.69 a
N3 (300 kg/ha)	4.96 a	5.51 a	7.42 a

Description: The average number followed by the same lowercase letter in the same column shows no real difference (Duncan's Multiple Distance Test with a level of 5%

In Table 3, it can be seen that the treatment of cow manure dose and NPK fertilizer dose has no significant interaction effect on the number of leaves at the age of 21 HST, 28 HST and 35 HST. The dose treatment of cow manure and NPK fertilizer does not provide a real interaction, it is suspected that the nutrients in the soil are sufficient for the needs of the

number of leaves for the plant so that it has no real effect when treated with manure and fertilizer

NPK. According to Harjadi (2002) that the more the number of leaves results in the average leaf area is higher. The average height of leaf area is closely related to the magnitude of the rate of photosynthesis, where with a wider leaf area surface will further increase nutrient absorption and sunlight interception in the process of overhauling organic and inorganic matter by plants in leaf organs. This is inseparable from the influence of the dose of cow shrimp fertilizer and the dose of NPK fertilizer which is able to provide a lot of nutrients to plants, so that it can support the rate of photosynthesis, but the elements in the soil are sufficient for the needs of these plants so that they do not have a real effect when given a dose of cow manure and a dose of NPK fertilizer. According to (Lingga, 2009)

Fruit Weight Per Plot (kg)

The results of statistical tests showed that the treatment of cow manure doses and NPK pupun doses did not provide real interaction and independent influence. More detailed results can be seen inthe table below

Table 4. The Effect of Cow Manure and NPK Fertilizer Dosage on Fruit Weight Per Plot (Kg)

Average Treatment of Fruit Weight Per Plot (kg)
Manure (K)
K1 (10 ton/ha) 13.87 a
K2 (15 ton/ha) 13.84 a
K3 (20 tons / ha) 14.08 a
NPK Fertilizer (N)
N1 (100 kg/ha) 12.44 a N2 (200 kg/ha) 15.33 a N3 (300 kg/ha) 14.02 a

Description: The average number followed by the same lowercase letter in the same column the same shows no real difference (Duncan's Multiple Distance Test At a rate of 5%)

The results of the duncan multiple distance test analysis with a level of 5%, fruit weight per plot showed that there was no significant interaction in the treatment of cow manure and NPK fertilizer on fruit weight per plot. It is suspected that the nutrients in the soil are sufficient for plant needs, and the content in the soil K is very high so that there is no real effect when treated with cow manure and NPK fertilizer on fruit weight per plot, besides that uneven watering due to limited water on plant growth is not uniform, so that the formation of flowers or fruiting age is not uniform besides that the factor on weight Fruits per plant give results that do not differ markedly due to the lack of photosynthesis due to too

frequent rains. The rate of photosynthesis in plants can take place at the maximum rate if the supporting elements are met, including light, carbon dioxide concentration, temperature, water content, the amount of photosynthete or photosynthesis results and then the growth stage of the plant itself (Anonim, 2013).

CONCLUSION

Based on the results of research on the effect of doses of cow manure and NPK fertilizer on the growth and yield of purple eggplant cultivars mustang F1 (Solanum melongena L.) it can be concluded that the dose treatment of cow manure and NPK fertilizer on the growth and yield of purple eggplant cultivars mustang F1 (*Solanum melongena* L.) did not have a noticeable effect on all observation ages on plant height, number of leaves, stem diameter, number of fruits per plant, fruit length, fruit diameter, fruit weight per plant, fruit weight per plot. Different treatments of cow manure doses and NPK fertilizer doses on the growth and yield of purple eggplant plants did not provide significant differences in all observations There was an intangible correlation at all observation ages of plant height, number of leaves, stem diameter, and fruit weight per plot.

Dosing treatment of cow manure when applied to clay texture and limited water, has no effect on plants. The soil in the field actually causes hard because of the lack of water availability so that cow manure is given the soil does not cause crumbs or looseness, so it would be nice so that it can be balanced there must be sufficient water availability. The dosage treatment of NPK fertilizer when applied to clay soil and lack of water, does not have a noticeable effect on eggplant plants, because NPK fertilizer is an inorganic fertilizer, and will cause the soil to become hard and the decomposition of the fertilizer is not optimal.

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