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The Effect of Giving NPK Fertilizer On Growth and Results Plant Purple *(Solanum Melongena L.)*

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ABSTRACT

The research objective was to determine the effect of NPK compound fertilizer dosage on the growth and yield of purple eggplant (Solanum melongena L). The research was carried out at the Nursery, Agribusiness Sub-Terminal, Food Security and Agriculture Service of Surabaya City, on Jl. Ketintang Madya VII Surabaya, East Java with an altitude of ± 5 m above sea level. Conducted from April to June 2018. his study used a randomized block design (RBD) consisting of six dose treatments with three replications and two sample plants. The NPK compound fertilizer dosage treatment included: D0 = without NPK (Control); D1 = NPK 100 kg / Ha; D2 = NPK dose of 200 kg / ha; D3 = NPK dose of 300 kg / ha; D4 = NPK dosage 400 kg / ha; D5 = NPK dose of 500 kg / ha.The conclusion of the study, namely the NPK dose treatment had a very significant effect on plant height, number of leaves, number of fruits and wet weight per plant of purple eggplant (Solanum melongena L). Treatment with NPK dose of 500 kg / Ha showed the highest growth and yield, although statistically it was not significantly different from the NPK treatment dose of 400 kg / Ha and the NPK treatment dose of 300 kg / Ha (optimum dose).

Keywords: Dosage, NPK Compound Fertilizer, Purple Eggplant

1. INTRODUCTION

Purple eggplant (Solanum Melongena L) is an important agricultural commodity needed in Indonesia, this is because eggplant has a fairly complete nutritional content and has high economic value. Usually used as food ingredients, therapeutic ingredients, and natural cosmetic ingredients. Eggplant (eggplant) contains a lot of potassium and vitamin A which can be useful for the body. The chemical composition of eggplant per 100 grams, namely 92.70 grams of water; ash (mineral) 0.60 grams; iron 0.60 mg; carbohydrates 5.70 grams; 0.20 grams of fat; fiber 0.80 grams; calories 24.00 cal; phosphorus 27.00 mg; potassium 223.00 mg; calcium 30.00 mg; 1.10 grams of protein; sodium 4.00 mg; vitamin B3 0.60 mg; vitamin B2 0.05 mg; vitamin B1 10.00 mg; vitamin A 130.00 SI; and vitamin C 5.00 mg (Budiman, 2008).

Along with the increase in population, the demand for ongu eggplant products also continues to increase. However, the increase in demand for these commodities was not accompanied by an increase in the amount of production. One of them is caused by the low productivity of eggplant per unit plant and per unit area. Eggplant production in 2013 amounted to 509,380 tons (Directorate General of Horticulture, 2014).

Production of purple eggplant in Indonesia is quite apprehensive where the average production is only 3,264-3,411 tons per hectare, even though the potential is very high where an area of one hectare can produce 30 tons (Rukmana, 2002). The low production of eggplant is

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thought to be due to conventional farming methods (seed use, fertilizer and fertilization techniques), low soil fertility and under-paid climatic factors (Susana Neli, Noor Jannah and Abdul Rahmi, 2016).

It is not enough for plants to rely solely on nutrients from the soil. Therefore, plants need to be given additional nutrients from outside, namely in the form of fertilizers (Prihmantoro, 2001). Efforts to increase the efficiency of fertilizer use can be pursued through the principles of right dosage, right method, on time application and balanced according to plant needs (Novizan, 2002).

Furthermore, Munawar (2011) explains that fertilizers are materials and nutrients that are given or added to plants with the intention of increasing the nutrients for the soil. Lack of farmer knowledge regarding the type and amount of fertilizer dosage needed by plants is also a problem which will result in a low increase in the production of large-scale unified crops (Lingga and Marsono, 2007).

According to Sutanto (2002), inorganic fertilizers are able to increase soil productivity in a short time, but will cause damage to the soil structure (hard soil) and reduce the productivity of the resulting plants, while soil given organic fertilizers has a good soil structure and soil organic matter content. sufficient, so that the ability of the soil to bind water is greater (Hariyadi, Huda, Ali, & Wandik, 2019). Optimal nitrogen application can increase plant growth, increase protein synthesis, chlorophyll formation which causes leaf color to become greener and increases the shoot root ratio. Therefore, the optimal nitrogen application can increase the plant growth rate (Nur and Thohari, 2005).

One of the important factors in plant cultivation that supports the success of plant life is the problem of fertilization. A common problem in fertilization is the low efficiency of nutrient uptake by plants. The efficiency of N and K fertilization is low, ranging from 30-40%. The efficiency of P fertilization by plants is also low, ranging from 15-20% (Rukmana, 2002).

The results of research by Imam Firmansyah, Muhammad Syakir and Liferdi Lukman (2017) state that plant height, stem diameter, number of productive branches, number of leaves, leaf area index, and yields gave positive responses to the application of N, P, K fertilizers (15- 15-15) at a dose of 200 kg N / ha + 100 kg P2O5 + 75 kg K2O was significantly different from the control. The combination treatment of N, P, K (15-15-15) is the main plant nutrient needed to meet the needs of vegetative growth which includes leaves, stems and roots. The treatment dose of 200 kg N / ha + 100 kg P2O5 / ha + 75 kg K2O / ha is the dose that is able to give the highest yield or fruit weight.

Furthermore, in the research of Jumini, Nurhayati and Murzani (2011), it is shown that the combination of fertilizer doses N, P and K has a very significant effect on weight of ear weights, weight of ear without husk per plant and weight of ear without husk per hectare, and has a

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significant effect on height. plants at the age of 30 and 45 days after planting and ear length, but had no significant effect on the diameter of sweet corn cobs. The best growth and yield of sweet corn was found in the combination of Urea + TSP + KCl (500 + 350 + 300 kg / ha).

According to the research results of Bambang Wicaksono Hariyadi, Waka Kogoya and Nurlina (2017), there is a significant influence on the observation variables of plant height, number of leaves and wet weight of red spinach plants due to the treatment of using various doses of NPK compound fertilizer. The effective dose (effective) or the optimum dose of using NPK compound fertilizer during the growth and yield of red spinach plants, achieved the NPK compound fertilizer dosage treatment of 300 kg / ha (0.15 gram / plant), while the maximum dose, indicated by the NPK compound fertilizer dosage treatment 500 kg / Ha (0.25 gram / plant), because statistically the two NPK compound fertilizer dosage treatments were not significantly different.

Fertilization applications derived from NPK compound fertilizers which are given in the form of combined fertilizers (compound) are still not widely used. Moreover, to find out how, time and efficient (beneficial) and effective (appropriate) dosage of the use of these fertilizers on fruit vegetables, including eggplant plants. For this reason, it is necessary to study the use of the NPK compound fertilizer further.

2. **RESEARCH METHODS**

The research was carried out at the Agribis Sub-Terminal Nursery, Food and Agriculture Service Office of Surabaya City, on Jalan Ketintang Madya VII Surabaya, East Java with a height of ± 5 meters above sea level. This research was conducted from April to June 2018.

The research materials were: planting soil (medium), compound fertilizer NPK (15:15:15) Pearls, seeds of purple eggplant. The tools used are hoes, trowels, knives, polybags (media size 5 kg), labels, rulers, stationery, weight measuring instruments and electric scales and other laboratory equipment.

This study used a randomized block design (RBD) consisting of six dose treatments with three replications and two sample plants. The NPK compound fertilizer dosage treatment included: D0 = without NPK (Control); D1 = NPK dose 100 kg / Ha; D2 = NPK dose of 200 kg / ha; D3 = NPK dose of 300 kg / ha; D4 = NPK dosage 400 kg / ha; D5 = NPK dose of 500 kg / ha.

To determine the effect of NPK compound fertilizer application on the growth and yield of purple eggplant, the F test with a level of 5% was used, namely the Variety Scan Analysis Test (ASR). If from the results of the 5% F Test there is a significant effect, then the T test (Least Significant Difference Test) is continued with a level of 5% to find out the difference between the NPK compound fertilizer treatment doses, so it can be seen the dosage of NPK compound fertilizer

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treatment that is appropriate or the effective dose. (Adji Sastrosupardi, 1999 and Bambang Wicaksono Hariyadi, 2017).

3. RESULTS AND DISCUSSION

Plant height

The results of the analysis of variance showed that the treatment of using NPK compound fertilizer doses had a very significant effect on the observation of plant height during the growth of purple eggplant, both at the age of 20 days, 40 days and 60 days after planting or transplanting (Appendix Table 1). It can be assumed that the NPK compound fertilizer given is able to meet the nutrients needed by purple eggplant during its growth.

According to Haryanto (2006), the usual fertilization doses for mustard, kale and spinach are 100 kg per hectare of urea, 100 kg per hectare of SP-36 and 50 kg per hectare of KCL. By providing the right fertilizer dosage, it is hoped that it can meet the nutrient needs of mustard greens, spinach and kale, so that the growth of these plants can be optimal.

Table 1. Average Height of Purple Eggplant due to use Various Doses of NPK Compound Fertilizer at Observation Age the Different

Dose Treatment NPK Compound Fertilizer	Average Plant Height Purple Eggplant (cm)		
	20 days	40 days	60 days
D0 = without NPK compound fertilizer	11,83 a	19,83 a	38,73 a
D1 = NPK compound fertilizer 100 kg / ha	15,50 b	27,07 b	49,00 b
D2 = NPK compound fertilizer 200 kg / ha	16,07 b	30,00 b	51,67 b
D3 = NPK compound fertilizer 300 kg / ha	20,00 c	36,50 c	69,33 c
D4 = NPK compound fertilizer 400 kg / ha	21,33 c	38,50 c	71,97 c
D5 = NPK compound fertilizer 500 kg / ha	22,50 c	40,07 c	73,00 c
LSD 5%	2,83	4,35	5,33

Information: Numbers accompanied by the same letter or the same column was not significantly different in the 5% LSD Test

Table 1 shows that increasing the use of NPK compound fertilizer doses will also be followed by an increase in plant height during the growth of purple eggplant plants. The highest yield of purple eggplant tended to be achieved by using a compound fertilizer dosage of NPK 500 kg / Ha (73.00 cm), although statistically it was not significantly different from the treatment of using NPK compound fertilizer dosage of 400 kg / Ha (71.97 cm) and treatment dosage. NPK compound fertilizer 300 kg / Ha (69.33), while the shortest purple eggplant plants from 20 days to 60 days tended to be shown treatment without NPK compound fertilizer (38.73 cm) and was statistically significantly different from the treatment of using NPK compound fertilizer doses. other. It is presumed that with the increasing dosage of NPK compound fertilizer until the optimum dose the response of the purple eggplant plant is also the optimum, so that if the dose is increased

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again, the increase in growth is not significant (not real). Spinach, mustard greens and kale are quite easy to cultivate and are responsive to environmental changes and fertilizer application. Spinach, mustard greens and kale require adequate intake of N, P and K nutrients to support their growth (Mahajoeno, 2010).

This is in accordance with the results of the research of Daud Saribun (2008) which shows that the application of NPK compound fertilizer at a dose of 300 grams per plot or 300 kg per hectare (4 grams per plant) can increase the yield of mustard greens and the highest red spinach plants and the best results are weight. crop 8.22 kg per plot is equivalent to 6.85 tonnes per hectare.

Number of Leaves

The results of the analysis of variance showed that the treatment of using NPK compound fertilizer doses had a very significant effect on the observation of the number of leaves during the growth of purple eggplant, both at the age of 20 days, 40 days and 60 days after planting or transplanting.

Table 2. Average Number of Purple Eggplant Leaf Plants Due Use of Various Doses of NPK Compound Fertilizer on Different Observation Ages

Dose Treatment NPK Compound Fertilizer	Average Number of Leaves Purple Eggplant Plant (strands)		
	20 days	40 days	60 days
D0 = without NPK compound fertilizer	6,33 a	12,67 a	18,00 a
D1 = NPK compound fertilizer 100 kg / ha	9,33 b	15,00 b	23,33 b
D2 = NPK compound fertilizer 200 kg / ha	10,67 bc	17,67 c	24,33 b
D3 = NPK compound fertilizer 300 kg / ha	12,33 cd	21,67 d	28,00 c
D4 = NPK compound fertilizer 400 kg / ha	13,00 d	22,00 d	29,33 c
D5 = NPK compound fertilizer 500 kg / ha	13,67 d	23,33 d	30,67 c
LSD 5%	1,67	2,33	3,00

Information: Numbers accompanied by the same letter or the same column was not significantly different in the 5% LSD Test

Table 2 shows that the increasing use of NPK compound fertilizer doses was also followed by an increase in the number of leaves during the growth of purple eggplant plants. The smallest number of purple eggplant leaves was shown without NPK fertilizer (18.00 strands) and was statistically significantly different from the treatment of using other NPK fertilizers. The highest number of purple eggplant leaves was achieved by using NPK compound fertilizer dosage treatment of 500 kg / Ha (30.67 strands), although statistically it was not significantly different from the treatment of using NPK compound fertilizer dosage of 400 kg / Ha (29.33 strands), as well as the use of treatment. the dosage of NPK compound fertilizer is 300 kg / Ha (28.00 pieces), so it is assumed that the dosage of NPK compound fertilizer has reached the optimum or according to what is needed by purple eggplant plants, namely the dosage of NPK compound fertilizer 300 kg / ha (optimum dose) .

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Compound fertilizers are mixed fertilizers which generally contain more than one kind of plant nutrients (macro and micro), especially N, P and K nutrients (Roesmarkan and Yuwono, 2002). The advantages of NPK compound fertilizers, namely one application of fertilizer, can cover several elements needed by plants, so that it is more efficient in its use when compared to a single fertilizer (Hardjowigeno, 2003).

Number of Fruits and Wet Weight per Purple Eggplant Plant

The results of the analysis of variance showed that the treatment of using NPK compound fertilizer doses had a very significant effect on the observation of the number of fruit and the wet weight per plant of purple eggplant at harvest 60 days after planting (Appendix Table 3). It can be assumed that the NPK compound fertilizer given is able to meet the nutrient needs needed by purple eggplant during its growth and its use is more practical and profitable.

Table 3 shows that the increasing use of NPK compound fertilizer doses tends to be followed by an increase in the number of fruit and wet weight per plant of purple eggplant. The smallest number of fruit and wet weight per plant tended to be shown in the treatment without NPK compound fertilizer (5.33 fruits and 189.33 grams) and were statistically significantly different from other NPK compound fertilizer dosage treatments. The highest number of fruit and wet weight per plant of purple eggplant was achieved by using the NPK compound fertilizer dosage of 500 kg / Ha (8.33 fruit and 340.67 gram), although statistically it was not significantly different from the treatment using the NPK compound fertilizer dosage 400 kg / Ha (8.17 fruit and 331.33 gram) and the treatment of using NPK compound fertilizer dosage of 300 kg / ha (7.83 fruit and 328.00 gram). It is assumed that the dosage of using NPK compound fertilizer has reached the optimum requirement or according to that required by purple eggplant plants, namely the NPK compound fertilizer dosage of 300 kg / ha (optimum dose).

The function of nitrogen (N) for vegetable plants is as a building block for protein for shoot growth and fostering vegetative growth, making it suitable for leafy vegetable crops, such as mustard greens, spinach, kale and so on. The function of phosphorus (P) as one of the constituent elements of protein, is needed for the formation of flowers, fruits and seeds, stimulates root growth to become elongated and grows strong, so that plants will be resistant drought. Lack of phosphorus (P) will cause stunted plants, inhibited flowering and seed formation, and plants become weak so they easily collapse. The element potassium (K) plays a role in metabolic processes such as photosynthesis and respiration which are important in plant growth (Sutejo, 2002).

The element of phosphorus (P) is one of the main constraints on acidic soils such as inceptisols. Phosphorus (P) is a nutrient that is not mobile and has an efficiency of approximately 20%, so that phosphorus that is not absorbed by plants will remain in the soil as a residue to become reserve phosphorus or bound by organic matter (Sri Adiningsih et al, 1995). Organic

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phosphorus in the soil is about 5-50% of the total soil phosphorus which varies from about 15-80% in most soils (Sarapatka, 2003).

Furthermore, Sutejo (2002) argues that the application of compound inorganic fertilizers to the soil can increase the availability of nutrients that are fast and available for plants, in addition to other advantages of using compound fertilizers, namely saving time, labor and transportation costs.

Table 3. Average Number of Fruits and Wet Weight per Plant Purple Eggplant Due to Using Various Doses of Fertilizer NPK compound

Dose Treatment NPK Compound Fertilizer	Number of Fruits/Plant (fruit)	Average Wet Weight/Plant (gram)
D0 = without NPK compound fertilizer	5,33 a	189,33 a
D1 = NPK compound fertilizer 100 kg / ha	6,83 b	268,00 b
D2 = NPK compound fertilizer 200 kg / ha	7,13 b	280,67 b
D3 = NPK compound fertilizer 300 kg / ha	7,83 c	328,00 c
D4 = NPK compound fertilizer 400 kg / ha	8,17 c	331,33 c
D5 = NPK compound fertilizer 500 kg / ha	8,33 c	340,67 c
LSD 5%	0,75	15,31

Information: Numbers accompanied by the same letter or the same column was not significantly different in the 5% LSD Test

4. CONCLUSIONS

NPK dose treatment had a very significant effect on plant height, number of leaves, number of fruits and wet weight per plant of purple eggplant (Solanum melongena L). Treatment with NPK dose of 500 kg / Ha showed the highest growth and yield, although statistically it was not significantly different from the NPK treatment dose of 400 kg / Ha and the NPK treatment dose of 300 kg / Ha (optimum dose). It is recommended that the cultivation of purple eggplant in Surabaya and its surroundings use a compound fertilizer dosage of 300 kg NPK per hectare (optimum dose).

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