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Effect of Urea and Cow Fecal Compost on Growth and Yield of Green Eggplant (*Solanum melongena L.*)

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Abstract: Eggplant *(Solanum melongena L.)* is a vegetable that grows well in various regions in Indonesia. Its growth is largely determined by the availability of nutrients in agricultural land. Research has been conducted on the effect of urea and cow fecal compost on the growth and yield of green fighting plants. This study aims to determine: (1) the effect of urea application on the growth and yield of green eggplant plants, (2) the effect of cow fecal compost application on the growth and yield of green eggplant plants, (3) the effect of the interaction of urea and cow fecal compost on the growth and yield of green eggplant plants. This study used a 2-factor design. The first factor is the dose of urea fertilizer and the second factor is the dose of cow fecal compost. Growth parameters were stem height, leaf length, and leaf width, while yield parameters were the wet weight of green eggplant. The research data were analyzed using analysis of variance. The results showed: (1) differences in the dose of cow fecal compost had a significant effect on stem height, leaf length, and fruit wet weight but had no significant effect on leaf width of green eggplant, (2) differences in the dose of urea had a significant effect on the stem, leaf length, and leaf length and fruit wet weight but did not significantly affect leaf width of green eggplant, (3) the interaction between urea fertilizer treatment and cow compost did not significantly affect all growth parameters and yield parameters of green eggplant.

Keywords: Compost; growth; yield of green eggplant; Urea fertilizer.

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Introduction

Eggplant (Solanum melongena L.) is one of the vegetables that can grow well in various regions in Indonesia. Eggplant fruit is a popular vegetable ingredient in Indonesians. Eggplant fruit contains quite high nutrition, namely in every 100 g of fresh eggplant there are 24-kilocalories, 1.1 g protein, 0.2 g fat, 5.5 g carbohydrates, 15.0 mg calcium, 37.0 mg phosphorus, 0.4 mg iron, 5 mg vitamin C, 0.04 mg vitamin B1; and 92.7 g of air (Sakri, 2012).

The growth and yield of eggplant are largely determined by the availability of nutrients in agricultural land. Fertilization is an effort that can be done to increase the availability of nutrients needed by plants. At present, plant fertilization is carried out by the community, especially on the island of Lombok, using synthetic chemical fertilizers, namely urea or NPK fertilizer. Zulkarnaen (2014) explains that the application of chemical inputs in the form of synthetic fertilizers with high doses not only affects the level of soil fertility but also results in decreased biodiversity, increased pest, and disease attacks, the emergence of resistant pests, and the development of parasitic organisms. In addition, the negative impact of the use of chemical inputs is not only limited to the area of use but can be expanded through components of the food

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chain such as drinking water, vegetables, fruits, and other contaminated products.

To reduce the negative impact of using synthetic chemical fertilizers, it is necessary to combine the use of chemical fertilizers with organic fertilizers. The use of organic fertilizers can improve soil physical properties. Lawenga et al (2015) concluded that the use of organic fertilizers can improve soil physical properties, especially in soil density, porosity, and permeability. One of the organic fertilizers that can be used is compost made from organic waste as the base material. Various research results indicate that the application of compost to agricultural land has a positive effect on plant growth and yield. Provision of straw compost can increase plant height, the number of tillers per clump, and the yield of rice plants (Kaya, 2013). Giving compost has a significant effect on plant height, plant age, harvest age, and weight of cayenne pepper (Maruli et al, 2012). The application of compost on agricultural land in Montong Are Village has a significant effect on the growth and yield of tomato plants (Raksun and Mertha, 2017).

Based on the description above, the researchers conducted research on the effect of urea and cow fecal compost on the growth and yield of green eggplant (Solanum melongena L.). The purpose of this study was to see: (1) the effect of urea application on the growth and yield of green eggplant plants, (2) the effect of compost application on the growth and yield of green eggplant plants, (3) the effect of the interaction of urea and cow fecal compost on growth. and the yield of green eggplant.

Method

This research has been carried out in Bajur Village, West Lombok Regency. The materials used are green eggplant seeds, cow fecal compost, urea fertilizer, paddy soil, water, insecticides, herbicides, plastic pots, and fungicides. Furthermore, the tools used are plastic buckets, machetes, hammers, hoes, scales, artco push, writing instruments, tape measure, scissors, nylon sacks, gembor, shovels, hoes, and hand sprayers.

In this study, a 2-factor design with 3 replications was used. The first factor is the dose of urea fertilizer and the second factor is the dose of cow fecal compost. Treatment of urea fertilizer consists of 4 levels, namely: U_0 = without giving urea fertilizer (control), U_1 = giving 1.0 g of urea fertilizer per plant, U_2 = giving 1.5 g of urea fertilizer per plant, U_3 = giving 2.0 g of urea fertilizer per plant. Treatment of urea fertilizer is carried out by dissolving urea in 1 liter of water and given 2 times, namely when the plants are 25 days and 40 days old. The treatment of cow fecal compost consists of 5 levels, namely K_1 = without giving cow fecal compost (control), K_1 = giving 0.5 kg of cow fecal compost per 10 kg of soil, K_2 = giving 1.0 kg of cow fecal compost per 10 kg of soil, K_3 = offering 1.5 kg of cow fecal compost per 10 kg of soil, K_4 = offering 2.0 kg of cow fecal compost per 10 kg of soil. Cow fecal treatment compost is carried out 25 days before planting (Hanafiah, 2012).

In this study, the soil media was dried in the hot sun then cleaned of plant residues, rubbish and gravel, and sieved with a 0.5 cm sieve with sieve. Furthermore, the soil media in a plastic pot. Each plastic pot is filled with 10 kg of soil. Each experimental pot was treated with cow fecal compost according to the experimental dose. In each experimental pot were planted 12 green eggplant seeds. After the plants are 18 days old, thinning is done. In each pot, only one green eggplant plant was left with a homogeneous size for all the experimental pots.

Growth parameters measured were stem height, leaf length, and leaf width. Furthermore, the yield parameter measured was the wet weight of green eggplant fruit. The measurement data of the above parameter measurements were analyzed by fingerprint analysis (Gomez and Gomez, 1995; Teutenburg and Shalabh. 2009).

Result and Discussion

Data from the measurement of growth parameters including stem height, leaf length, leaf width, and yield in the form of green eggplant fruit wet weight showed variations according to the treatment dose. The results of measuring stem height, leaf length, leaf width, and fruit wet weight of the lowest green eggplant were found in the treatment control.

Table 1. The average Height of Green Eggplant Stems due to Differences in Doses of Urea and Cow Fecal Compost

Treatment	Stem height (cm)	Treatment	Stem height (cm)
U_0K_0	65	U_2K_0	70
U_0K_1	66	U_2K_1	71
U_0K_2	67	U_2K_2	71
U_0K_3	69	U_2K_3	73
U_0K_4	69	U_2K_4	71
U_1K_0	67	U_3K_0	70
U_1K_1	67	U_3K_1	70
U_1K_2	70	U_3K_2	72
U_1K_3	71	U_3K_3	72
U_1K_4	70	U_3K_4	71

The data in table 1 shows that the highest average height of green eggplant stems, namely 73 cm, was found in the U_2K_3 treatment. The lowest rate was

treatment 65 cm at U_0K_0/control. Furthermore, the results of the analysis of variance are shown in Table 2.

Tabele 2. Results of Sidik Analysis of the Effect of Urea Fertilizer and Cow Manure Compost on the Height of Green Eggplant Stems

Source of Diversity	DB	JK	KT	F_{count}	F_{Tab} (5%)
Urea (U)	3.0	156.85	52.28	13.90	2.85
Compost (K)	4.0	93.43	23.36	6.21	2.62
U x K	12.0	13.24	1.10	0.29	2.02
Galat	38.0	143.0	3.76		

The results of the analysis of variance in Table 2 show that the application of urea fertilizer has a significant effect on the height of green eggplant plants. Cow fecal compost application significantly affected the height of green eggplant stems. The interaction of urea fertilizer and cow fecal compost did not significantly affect the height of green eggplant stems. Furthermore, the data on the measurement of the length of green eggplant leaves are presented in Table 3.

Table 3. The Average of green Eggplant Leaf Length due to Urea Fertilizer Treatment and Cow Fecal Compost

Treatment	Leaf Length (cm)	Treatment	Leaf Length (cm)
U_0K_0	19	U_2K_0	21
U_0K_1	19	U_2K_1	23
U_0K_2	21	U_2K_2	23
U_0K_3	22	U_2K_3	25
U_0K_4	21	U_2K_4	23
U_1K_0	20	U_3K_0	20
U_1K_1	21	U_3K_1	20
U_1K_2	21	U_3K_2	21
U_1K_3	23	U_3K_3	23
U_1K_4	22	U_3K_4	22

In Table 3 it can be seen that the lowest average length of the green eggplant leaf blade is 19 cm found in the U0K0 and U0K1 treatments (treatment of 0 g of urea fertilizer combined with 0 kg and 0.5 kg of cow fecal compost). The highest average length of leaf blades was found in the U2K3 treatment (treatment of 1.5 g of urea fertilizer and 1.5 kg of cow fecal compost). The results of the analysis of variance on the effect of differences in doses of urea and cow fecal compost are presented in Table 4.

Tabel 4. Results of Sidik Analysis of Variety of Effects of Urea Fertilizer and Cow Fecal Compost on Leaf Length of Green Eggplant

Source of Diversity	DB	JK	KT	F_{count}	F_{Tab} (5%)
Urea (U)	3.0	56.18	18.73	6.98	2.85
Compost (K)	4.0	76.09	19.02	7.07	2.62
U x K	12.0	7.24	0.6	0.22	2.02
Galat	38.0	122.2	2.69		

The results of the analysis of variance in Table 4 show that the application of urea has a significant effect on the length of the leaves of the green eggplant plant. The application of cow dung compost significantly affected the leaf length of the green eggplant plant. The interaction of urea and cow fecal compost did not significantly affect the leaf length of the green eggplant plant. Furthermore, data on the width of green eggplant leaves can be seen in table 5.

Table 5. The Average Green Eggplant Leaf Width due to Urea Fertilizer Treatment and Cow Fecal Compost

Treatment	Eggplant Leaf (cm)	Treatment	Eggplant Leaf (cm)
U_0K_0	15.0	U_2K_0	15.0
U_0K_1	14.0	U_2K_1	16.0
U_0K_2	17.0	U_2K_2	16.0
U_0K_3	15.0	U_2K_3	17.0
U_0K_4	15.0	U_2K_4	15.0
U_1K_0	15.0	U_3K_0	16.0
U_1K_1	15.0	U_3K_1	15.0
U_1K_2	16.0	U_3K_2	16.0
U_1K_3	15.0	U_3K_3	15.0
U_1K_4	16.0	U_3K_4	15.0

Based on the data in Table 5, it is known that the lowest green eggplant leaf width is 14 cm in the U0K1 treatment, namely in the treatment combination of 0 g urea fertilizer and 0.6 kg of cow fecal compost. The highest green eggplant leaf width was 17 cm, found in the treatment combination of 1.5 g of urea fertilizer and 1.5 kg of cow fecal compost. Furthermore, the results of analysis of the various effects of urea fertilizer dosage and cow fecal compost are presented in Table 6.

Table 6. Results of Sidik Analysis of Variety of Influence of Urea Fertilizer and Cow Fecal Compost on Leaf Width of Green Eggplant

Source of Diversity	DB	JK	KT	F_{count}	F_{Tab} (5%)
Urea (U)	3	2,23	0,56	0,23	2,85
Compost (K)	4	3,25	1,08	0,45	2,62
U x K	12	16,84	1,40	0,58	2,02
Galat	38	91,43	2,41		

The results of data analysis in table 4 show that the difference in the dose of urea fertilizer and cow manure compost has no significant effect on the leaf width of green eggplant. Likewise, the interaction between urea fertilizer and cow dung compost did not significantly affect the leaf length of green eggplant plants. Furthermore, the data on the results of measuring the wet weight of green eggplant fruit are presented in Table 7.

Tabel 7. The Aveage of Green Eggplant Fruit Wet Weight due to Urea Fertilizer Treatment and Cow Fecal Compost

Treatment	Fruit Wet Weight (g)	Treatment	Fruit Wet Weight (g)
U_0K_0	745.0	U_2K_0	832.0
U_0K_1	793.0	U_2K_1	855.0
U_0K_2	822.0	U_2K_2	887.0
U_0K_3	835.0	U_2K_3	947.0
U_0K_4	831.0	U_2K_4	855.0
U_1K_0	787.0	U_3K_0	813.0
U_1K_1	820.0	U_3K_1	828.0
U_1K_2	832.0	U_3K_2	831.0
U_1K_3	837.0	U_3K_3	836.0
U_1K_4	831.0	U_3K_4	835.0

In Table 7 it can be seen that the lowest average wet weight of green eggplant fruit is 745.0 g, found in the U_0K_0 treatment, 0 g urea fertilizer, and 0 kg cow dung compost. The highest average wet weight of green eggplant fruit was 947.0 g in the U_2K_3 treatment (a combination of treatment of 1.5 g of urea fertilizer with 1.5 kg of cow dung compost. Furthermore, the results of the various analysis are shown in Table 8.

Table 8. Results of Sidik Analysis of Variety of Effects of Urea Fertilizer and Cow Fecal Compost on Green Eggplant Fruit Wet Weight

Source of Diversity	DB	JK	KT	F_{count}	F_{Tab} (5%)
Urea (U)	3	40582,3	13527,4	7,92	2,85
Compost (K)	4	32136,5	8034,1	4,7	2,62
U x K	12	14738,3	1228,2	0,72	2,02
Galat	38	64929,7	1708,7		

The results of the analysis of variance in Table 8 show that the urea dose has a significant effect on the wet weight of green eggplant fruit. The dose of cow fecal compost had a significant effect on the wet weight of green eggplant, while the interaction between urea and cow fecal compost did not significantly affect the wet weight of green eggplant fruit.

The average of lowest stem height, leaf length, and wet weight of green eggplant fruit were found in the treatment control (0 g of urea fertilizer and 0 kg of cow fecal compost), then the mean stem height, leaf length and wet weight of green eggplant fruit experienced an increase in line with the increase in the dose of compost treatment. cow feces up to K3 treatment. The highest mean stem height, leaf length, and wet weight of green eggplant were found in the treatment with a cow fecal compost dose of 1.5 kg per 10 kg of soil. The increase in stem height, leaf length, and wet weight of green eggplant due to cow fecal compost treatment is possible because cow fecal compost is an organic fertilizer that can improve soil physical and chemical properties.

Zulkarnain et al (2013) concluded that compost application can increase the content of C-organic and N-total, increase aggregate stability, soil porosity, and soil water content. Application of organic fertilizers on soil poor in C-organic and N-total can increase yields of sugarcane. Giving compost of cow dung, chicken manure, and Gamal leaves can improve the physical properties of the soil which include soil moisture and soil porosity. In addition, the compost can improve soil chemical properties including soil pH and soil organic C (Hasibuan, 2015). Giving several doses of compost can increase aggregate stability, reduce soil weight, and increase soil pores at harvest. The administration of the highest dose (P5, namely 25.5 kg plot-1) gave the results of aggregate stability and soil pores higher than the control treatment and gave a lower yield of soil content than the control treatment. Changes in soil physical properties (aggregate stability, bulk density, and soil pores) affect the growth of maize. The correlation results of soil physical properties (aggregate stability, bulk density, and soil pores) on plant growth showed a positive relationship. The addition of compost can cause the soil structure to become loose and increase soil pores which in turn will cause plant roots to develop easily (Widodo, and Kusuma, 2018).

In other plants, it was also found that compost treatment could increase plant growth. Compost dose significantly affected the height of mustard plants at the age of 16 and 40 days after planting (Habibi et al, 2017). Alpinia malaccencis plants which received 75% of the input of nutrients in the form of bioposka compost had faster vegetative growth in the parameters of plant height, stem diameter, leaf length, leaf width, and number of leaves compared to other treatments. Furthermore, bilotong compost can increase flowering time, the number of fruit planted, and fruit weight per hectare of tomato plants (Nisaa et al, 2017). The use of compost on agricultural land in Sukarare Village had a significant effect on stem length and the number of young bean leaves. The optimum dose of compost that needs to be given to agricultural land in Sukarara Village so that long beans can grow optimally is 2.0 kg of compost for 1 m2 of agricultural land (Raksun et al, 2018). Differences in compost dose have a significant effect on stem height, leaf blade length, and leaf blade width of ground spinach (Raksun, et al, 2020)..

In line with the results of the research above, Andri and Wawan (2017) found that giving greenbotane compost to oil palm seedlings had a significant effect on the parameters of plant height, weevil diameter, wet weight, seed dry weight and root shoot ratio. The increase in the treatment dose was

accompanied by an increase in seed growth in each parameter of the observation. Giving greenbotane compost at a dose of 200 g / polybag is the best treatment dose for all observation parameters. Likewise, Imas et al (2017) concluded that applying compost to red chili plants had a significant effect on each growth parameter, both vegetative growth, and productivity. The treatment of 20% of compost has a very good effect on each parameter of growth and product yield. The 20% compost treatment had more fruit than other treatments.

The application of urea fertilizer also significantly affected the increase in stem height, leaf length, and wet weight of green eggplant fruit. The significant effect of urea treatment on the increase in stem height, leaf length, and wet weight of green eggplant fruit was thought to be caused by the high content of nitrogen in urea fertilizer. Winarso (2005) explains that nitrogen is needed by plants in large quantities. Nitrogen plays a role in the process of photosynthesis, the formation of amino acids and proteins. Nitrogen is an essential nutrient and is needed in large quantities, so it is called a macronutrient. Furthermore, Lingga and Marsono (2001) explained that the role of nitrogen is to accelerate overall plant growth, especially stems and leaves. The N content contained in the soil will be used by plants in cell division. Division and enlargement of young cells will form leaf primordia (Lakit.1996).

An increase in plant growth due to urea fertilizer treatment was also found in other plants. Giving various doses of nitrogen (urea fertilizer) increased the growth and yield of sweet corn plants, the higher the nitrogen dose the better the growth and yield of sweet corn plants. The application of 250 kg ha^{-1} of urea fertilizer resulted in better production length (31.44 cm) and ear weight (10.048 tons ha^{-1}) and more fertilizer doses, and was relatively the same as the urea dosage of 300 kg ha^{-1} et al, 2018). Urea fertilizer up to 100% recommendation has a significant effect on the number of leaves, stem circumference, number of branches, root length, shoot wet weight, root wet weight, total wet weight, shoot dry weight, root dry weight, and total dry weight of alfalfa plants (Yuliawati et al. al, 2014)

Conclusion

Based on the results of data analysis and discussion in this study, it can be concluded that: (1) differences in the dose of cow fecal compost have a significant effect on stem height, leaf length, and fruit wet weight but have no significant effect on leaf width of green eggplant, (2) differences in the dose of urea have an effect significant on stem height, leaf length, and fruit wet weight but not significant effect on leaf width of green eggplant, (3) the interaction between urea fertilizer treatment and cow fecal compost had no significant effect on stem height, leaf length, leaf width and wet weight of eggplant fruit green, (4) treatment of urea fertilizer 0.5 g and compost of cow feces of 1.5 kg gave better results than other treatments.

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