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Growth and Yield of Green Eggplant Applied to Various Compositions of Growing Media

Pertumbuhan dan Hasil Terung Hijau yang Diaplikasikan Berbagai Komposisi Media Tanam

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ABSTRAK

Terung hijau merupakan sayuran yang diolah buahnya menjadi bahan masakan dan memiliki gizi yang tinggi. Untuk meningkatkan produktivitas terung hijau, diperlukan perbaikan kualitas media tanam agar unsur hara tercukupi. Penelitian ini bertujuan untuk mengetahui komposisi media tanam yang terbaik terhadap pertumbuhan dan hasil terung hijau. Penelitian ini menggunakan Rancangan Acak Kelompok (RAK) dengan 10 perlakuan komposisi media tanam. Hasil analisis keragaman menunjukkan bahwa pemberian arang sekam padi dan pupuk kandang ayam berpengaruh sangat nyata terhadap tinggi tanaman, jumlah daun, diameter batang, umur berbunga, umur panen, jumlah buah per tanaman, panjang buah, diameter buah, dan total bobot buah per tanaman. Hasil uji ortogonal kontras menunjukkan bahwa terung hijau yang ditanam pada media tanah saja berbeda sangat nyata dengan terung hijau yang ditanam pada media tanam lainnya di semua peubah. Hasil terbaik diperoleh perlakuan arang sekam padi: pupuk kandang ayam: tanah (2:1:1) pada peubah tinggi tanaman yaitu 42,26 cm, umur berbunga tercepat yaitu 22,33 hari, total bobot buah per tanaman tertinggi yaitu 538,44 g, diameter buah tertinggi yaitu 38,16 mm, dan bobot rata-rata per buah tertinggi yaitu 81,66 g. Perlakuan komposisi media tanam menggunakan kombinasi pupuk kandang ayam dan arang sekam padi lebih baik dibandingkan dengan komposisi media tanam dengan salah satu bahan organik.

Kata kunci: pupuk kandang ayam, terung hijau, arang sekam padi

ABSTRACT

Green eggplant was a vegetable which used for cooking ingredients and has rich nutrients. To increase the green eggplant productivity, it was necessary to improve the quality of growing media so the plant nutrition will be fulfilled. This study aimed to find out the best composition of growing media for the growth and yield of green eggplant. It used a Randomized Block Design (RBD) with 10 treatments for the composition of the growing media. The results of the analysis of diversity showed that the application of rice husk charcoal and chicken manure had a very significant effect on plant height, number of

leaves, stem diameter, flowering age, harvest age, number of fruits per plant, fruit length, fruit diameter, and total fruit weight per plant. The results of the orthogonal contrast test showed that the green eggplant grown on soil media was very significantly different from the green eggplant grown on other growing media in all variables. The best results were obtained from the treatment of rice husk charcoal: chicken manure: soil (2:1:1) on the variables of plant height was 42.26 cm, flowering age was 22.33 days, total fruit weight per plant was 538.44 g, fruit diameter was 38.16 mm, and average weight per fruit was 81.66 g. The treatment of growing media composition using a combination of chicken manure and rice husk charcoal was better than the growing media with just one organic matter.

Keywords: chicken manure, green eggplant, rice husk charcoal

INTRODUCTION

Eggplant (*Solanum melongena* L.) was a Eggplant (*Solanum melongena* L.) was popular vegetable among the community and grows well if the nutrients were adequate (Sahid et al., 2014; Setyadi et al., 2020). Eggplant has rich nutrients, it contains of protein, carbohydrates, minerals, and vitamins such as niacin, thiamin, pantothenic acid, and folic acid (Bidaramali et al., 2020). It was good for health because it contains antioxidants, anti allergic, anti microbial, and anti cancer (Helilusiatiningsih, 2021).

Eggplant has various varieties that vary in color, shape, and fruit size, one of which was green eggplant (Bidaramali et al., 2020). It was a native plant from the tropics and used for cooking ingredients (Raksun et al., 2021). The green eggplant has thick, soft, and juicy fruit (Nayanathara et al., 2016; Sudiarti, 2021). The market demand for the eggplant keeps increasing because people were aware of its benefits for health, so the quality of the green eggplant must be maintained (Amir et al., 2021; Putri et al., 2022). According to the Agricultural Data and Information Center (2016) the eggplant production in South Sumatra in 2017 was 16.295 tons, in 2018 it was 16.092,5 tons, and in 2019 it was 16.538 tons. Therefore, to increase the green eggplant productivity, it was necessary to improve the quality of growing media so the plant nutrition will be fulfilled (Hartoyo & Anwar, 2018; Khoirunnisa et al., 2021).

Chicken manure was one of the organic fertilizers derived from livestock waste so that was environmentally friendly, has macro and micro nutrients to suffice plant needs (Alhrout, 2017; Saepuloh et al., 2020; Yulianto et al., 2021). Application of chicken manure was the cheapest and safest way to increase nutrient availability and root uptake (Kyakuwaire et al., 2019). The study of Kurnianingsih et al. (2019) found that the application of soil: chicken manure (3:1) increased plant height, number of leaves, and number of tillers per shallot clump. Rice husk charcoal derived from the pyrolysis process so it was sterile, neutral, and porous when added to the soil (Gustia, 2013; Surdianto et al., 2015).

The rice husk charcoal could maintain soil moisture and increase soil water capacity (Koyama & Hayashi, 2017; Mishra et al., 2017). The study conducted by Gustia (2013) showed that application of husk charcoal : soil (2:2) provided the best results on the variables of plant height, leaf number, leaf length, leaf width, and wet weight (*Brassica juncea* L.). The study carried out by Dianawati (2014) showed that the composition of soil growing media: chicken manure : rice husk charcoal (1:1:1) increased the tuber weight and the number of potato tubers.

Based on the description, each of the chicken manure and rice husk charcoal provide benefits for plant productivity and quality of sustainable land. Currently there was no research on the composition of the growing media for the growth of green eggplant. Consequently, this study aimed to find out the best composition of growing media for the growth and yield of green eggplant.

MATERIALS AND METHODS

This study was carried out in Kelurahan Bukit Lama (3°00'32.6"S 104°43'38.1"E), Kota Palembang, Sumatera Selatan, Indonesia from July 2019 to February 2020 with an average temperature of 33.1°C during the study. The tools used in this study were calliper, meter measuring tool, 40 cm x 40 cm polybag, seedling polybag, and scales. The materials used in this study were water, rice husk charcoal, eggplant seeds of Milano F1 variety, Antracol 70 WP, Furadan 3GR, chicken manure, Mutiara NPK fertilizer 16:16:16, and soil.

This study used a randomized block design (RBD) consisting of 10 treatments. Each treatment was repeated 3 times and there were 3 plants in each replication, so the total number of plants was 90 plants. Each plant treatment was as followed:

P_1 = Soil
P_2 = Rice husk charcoal: soil (1:3)
P_3 = Rice husk charcoal: soil (1:1)
P_4 = Rice husk charcoal: soil (3:1)
P_5 = Chicken manure: soil (1:3)
P_6 = Chicken manure: soil (1:1)
P_7 = Chicken manure: soil (3:1)
P_8 = Rice husk charcoal: chicken manure: soil (1:2:1)
P_9 = Rice husk charcoal: chicken manure: soil (1:1:1)
P_{10} = Rice husk charcoal: chicken manure: soil (2:1:1)

The Working Procedure

The working procedure included eggplant seeds being soaked in water for half an hour, then they were sown in polybags with a diameter of 5 cm. The seeds were put in a 1 cm planting hole (Jailani et al., 2019). The seedling media used in the form of soil: chicken manure (1:1).

Furthermore, the planting medium used in this study was top soil which was already cleaned of dirt (Bui et al., 2015). Then the soil, husk charcoal, and chicken manure were mixed according to the volume of each treatment, and then filled in the polybags measuring 40 cm x 40 cm. The selected eggplant seedlings were 4 weeks old after sowing, healthy, and had 3-5 leaves (Kumar & Chopra, 2016; Muldiana & Rosdiana, 2017; Neli et al., 2016). The planting was carried out in the afternoon. The husbandry was conducted by watering, replanting, weeding, fertilizing, weeding, pest and disease control. The watering was carried out 1-2 times, in the morning and evening (depending on the weather conditions) (Purba et al., 2019). Embroidery was carried out to replace plants that die or have poor growth (Neli et al., 2016).

The weeding was conducted to remove the weeds around the eggplant plants (Fitrianti et al., 2018). The fertilization with Mutiara NPK 16:16:16 with a dose of 1.1 g of plant/ha (fertilizer requirement was 200 kg/ha) was carried out when transplanting by putting it into the soil (Karamina et al., 2020). The pest control by sowing Furadan 3GR and the disease control with the fungicide Antracol 70 WP (Neli et al., 2016). The eggplant was harvested with the criteria that the fruit flesh was not yet hard, young, and the color of the fruit was shiny, the harvesting was by cutting the fruit stalk (Jailani et al., 2019; Neli et al., 2016). Harvesting was carried out 5 times.

Data Analysis

The data obtained were analyzed using the analysis of variance (Anova) method to see the effect of the treatment. If the F count > from the F table at the 5% test level means that the fertilizer treatment has a significant effect. Furthermore, to see the difference between treatments, further tests were carried out using Orthogonal Contrast Method (OCM).

RESULTS

The results of the analysis of diversity showed that the application of rice husk charcoal and chicken manure had a very significant effect on plant height, number of leaves, stem diameter, flowering age, harvest age, number of fruits per plant,

fruit length, fruit diameter, total fruit weight per plant, and average weight per fruit (Table 1).

Plant Height

The results of the orthogonal contrast test showed that the height of green eggplant planted on soil media alone had a very significant effect on the height of green eggplant planted on the growing media (Table 2). The highest average plant height in the treatment of rice husk charcoal: chicken manure: soil (2:1:1) was 42.26 cm and the lowest was 32 cm in the soil treatment alone (Table 6).

Number of Leaves

The results of the orthogonal contrast test showed that the number of green eggplant leaves planted on soil media alone had a very significant effect on the number of green eggplant leaves planted on a combination planting medium of rice husk charcoal: chicken manure: soil (1:2:1), (1: 1:1), and (2:1:1). The number of green eggplant leaves planted on the soil alone had a significant effect on the number of green eggplant leaves planted on chicken manure growing media: soil (1:3), (1:1), and (3:1) (Table 2). The highest average number of leaves in the treatment of rice husk charcoal: chicken manure: soil (1:2:1) was 41.78 leaves and the lowest in the treatment of rice husk charcoal: soil (3:1) was 28.11 leaves (Table 6).

Stem Diameter

The results of the orthogonal contrast test showed that the stem diameter of green eggplant planted on soil media had a very significant effect on the stem diameter grown on other growing media (Table 2). The highest average stem diameter in the treatment of rice husk charcoal: chicken manure: soil (1:2:1) was 10.85 mm and the lowest was 7.91 mm in the soil treatment alone (Table 6).

Flowering Age

The results of the orthogonal contrast test showed that the flowering age of green eggplant planted on chicken manure: soil (1:3) had a very significant effect on the flowering age of green eggplant planted on chicken manure: soil (1:1) and (3:1). The flowering age of green eggplant planted on soil media alone had a very significant effect on the flowering age of green eggplant planted on a combination planting medium of rice husk charcoal: chicken manure: soil (1:2:1), (1:1:1), and (2:1:1) (Table 3). The average age of the fastest flowering in the treatment of rice husk charcoal: chicken manure: soil (2:1:1) was 22.33 days and the longest in the treatment of rice husk charcoal: soil (1:1) was 29.44 days (Table 7).

Table 1. The calculated F value and Coefficient of Diversity (CD) application of growing media composition to the observed variables

Observed Variables	Calculated F	CV (%)
Plant Height	4.04 **	8.28
Number of Leaves	4.39 **	12.14
Stem Diameter	16.37 **	5.45
Flowering Age	9.37 **	5.57
Harvest Age	18.78 **	6.76
Number of Fruits per Plant	8.07 **	9.03
Fruit Length	8.27 **	4.63
Fruit Diameter	13.73 **	6.53
Total Fruit Weight per Plant	13.28 **	13.27
Average Weight per Fruit	9.23 **	10.36
F Tabel 5%	2.46	
F Tabel 1%	3.60	

Note: CV = Coefficient of Variation, ** = Very significant effect

Table 2. Test of orthogonal contrast to variables observed in the vegetative phase

Combination Treatments			F Count		
			Plant Height (cm)	Number of Leaves	Stem Diameter (mm)
P_1 vs P_2. P_3. P_4. P_5. P_6. P_7. P_8. P_9. P_{10}			8.30 **	2.92 ns	26.37 **
P_1 vs P_2. P_3. P_4			1.07 ns	0.34 ns	0.19 ns
P_2 vs P_3. P_4			0.15 ns	2.86 ns	0.90 ns
P_3 vs P_4			0.38 ns	0.03 ns	0.04 ns
P_1 vs P_5. P_6. P_7			6.04 *	4.67 *	35.91 **
P_5 vs P_6. P_7			3.78 ns	1.09 ns	1.25 ns
P_6 vs P_7			0.14 ns	3.04 ns	2.60 ns
P_1 vs P_8. P_9. P_{10}			19.31 **	9.62 **	58.25 **
P_8 vs P_9. P_{10}			0.08 ns	0.17 ns	2.19 ns
P_9 vs P_{10}			0.81 ns	0.001 ns	0.08 ns
F - Table	0.05/0.01	Treatment	2.46	3.60	
F - Table	0.05/0.01	Ratio	4.41	8.29	

Note: ns = Non Significant Effect, * = Significant Effect, ** = Very Significant Effect

Harvest Age

The results of the orthogonal contrast test showed that the harvesting age of green eggplant planted on soil-only media had a very significant effect on the harvesting age of green eggplant planted on other growing media (Table 3). The fastest average harvest age in the treatment of rice husk charcoal : chicken manure : soil (1:1:1) was 61.29 days and the longest one on soil treatment alone was 91.87 days (Table 7).

Number of Fruits per Plant

The results of the orthogonal contrast test showed that the number of fruits per green eggplant plant grown on the soil media alone had a very significant effect on the number of fruits per green eggplant plant grown on other growing media (Table 4). The highest average number of fruits per plant was in the treatment of chicken manure : soil (3:1), which was 7.56 and the lowest one was in the soil treatment alone, which was 5 (Table 8).

Fruit Length

The results of the orthogonal contrast test showed that the length of the green eggplant planted on the soil alone had a very significant effect on the length of the green eggplant planted in other growing media. The length of green eggplant fruit planted on rice husk charcoal: soil (1:3) had a very significant effect on the length of green eggplant planted on rice husk charcoal: soil (1:1) and (3:1) (Table 4). The highest average fruit length in the rice husk charcoal: soil (3:1) treatment was 17.86 cm and the lowest one was 13.91 cm in the soil treatment alone (Table 8).

Fruit Diameter

The results of the orthogonal contrast test showed that the diameter of green eggplant fruit on soil growing media alone had a very significant effect on the diameter of green eggplant fruit on other growing media (Table 4). The highest average fruit diameter in the treatment of rice husk charcoal : chicken manure : soil (1:1:1) and (2:1:1) was 38.16 mm and the lowest one was in the treatment of rice husk charcoal : soil (3:1) which was 26.23 cm (Table 8).

Total Fruit Weight per Plant

The results of the orthogonal contrast test showed that the total green eggplant fruit per plant grown on soil media alone had a very significant effect on the total weight of green eggplant fruit per plant grown on other growing media (Table 5). The highest average total fruit weight per plant in the treatment of rice husk charcoal : chicken manure : soil (2:1:1) was 538.44 g and the lowest one was 260.67 g in the soil treatment alone (Table 9).

Table 3. Test of orthogonal contrast to variables observed in the flowering age dan harvest age

Combination Treatments				F Count: Flowering Age (days)	F Count: Harvest Age (days)
P_1 vs $P_2.P_3.P_4.P_5.P_6.P_7.P_8.P_9.P_{10}$				1.91 ^{ns}	44.09 **
P_1 vs $P_2.P_3.P_4$				3.67 ^{ns}	2.67 ^{ns}
P_2 vs $P_3.P_4$				0.14 ^{ns}	1.24 ^{ns}
P_3 vs P_4				1.06 ^{ns}	0.05 ^{ns}
P_1 vs $P_5.P_6.P_7$				3.10 ^{ns}	61.55 **
P_5 vs $P_6.P_7$				8.86 **	2.47 ^{ns}
P_6 vs P_7				0.01 ^{ns}	1.51 ^{ns}
P_1 vs $P_8.P_9.P_{10}$				15.54 **	75.78 **
P_8 vs $P_9.P_{10}$				1.42 ^{ns}	0.29 ^{ns}
P_9 vs P_{10}				0.88 ^{ns}	0.24 ^{ns}
F - Table	0.05/0.01	Treatment	2.46	3.60	
F - Table	0.05/0.01	Ratio	4.41	8.29	

Note: ^{ns} = Non Significant Effect, * = Significant Effect, ** = Very Significant Effect

Table 4. Test of orthogonal contrast to variables observed in the generative phase

Combination Treatments				F count: Total Fruit Weight per Plant	F count: Fruit Length (cm)	F count: Fruit Diameter (mm)
P_1 vs $P_2.$ $P_3.$ $P_4.$ $P_5.$ $P_6.$ $P_7.$ $P_8.$ $P_9.$ P_{10}				21.99 **	14.58 **	15.02 **
P_1 vs $P_2.$ $P_3.$ P_4				2.28 ^{ns}	30.46 **	0.22 ^{ns}
P_2 vs $P_3.$ P_4				2.16 ^{ns}	13.21 **	4.32 ^{ns}
P_3 vs P_4				0.05 ^{ns}	3.46 ^{ns}	0.07 ^{ns}
P_1 vs $P_5.$ $P_6.$ P_7				35.40 **	2.76 ^{ns}	22.82 **
P_5 vs $P_6.$ P_7				0.16 ^{ns}	3.61 ^{ns}	1.37 ^{ns}
P_6 vs P_7				1.34 ^{ns}	0.45 ^{ns}	0.55 ^{ns}
P_1vs $P_8.$ $P_9.$ P_{10}				28.97 **	10.73 **	39.79 **
P_8 vs $P_9.$ P_{10}				0.000002 ^{ns}	0.98 ^{ns}	0.15 ^{ns}
P_9 vs P_{10}				0.22 ^{ns}	0.26 ^{ns}	0.87 ^{ns}
F - Table	0.05/0.01	Treatment	2.46	3.60		
F - Table	0.05/0.01	Ratio	4.41	8.29		

Note: ^{ns} = Non Significant Effect, * = Significant Effect, ** = Very Significant Effect

Table 5. Test of orthogonal contrast to variables observed in the total fruit weight per plant dan average weight per fruit

Combination Treatments				F Count: Total Fruit Weight per Plant (g)	F Count: Average Weight per Fruit (g)
P_1 vs $P_2.P_3.P_4.P_5.P_6.P_7.P_8.P_9.P_{10}$				24.76 **	11.66 **
P_1 vs $P_2.P_3.P_4$				0.72 ^{ns}	0.02 ^{ns}
P_2 vs $P_3.P_4$				1.58 ^{ns}	0.25 ^{ns}
P_3 vs P_4				0.29 ^{ns}	0.74 ^{ns}
P_1 vs $P_5.P_6.P_7$				30.22 **	11.94 **
P_5 vs $P_6.P_7$				4.11 ^{ns}	4.26 ^{ns}
P_6 vs P_7				0.17 ^{ns}	0.29 ^{ns}
P_1 vs $P_8.P_9.P_{10}$				53.02 **	33.25 **
P_8 vs $P_9.P_{10}$				0.19 ^{ns}	0.98 ^{ns}
P_9 vs P_{10}				0.17 ^{ns}	0.65 ^{ns}
F - Table	0.05/0.01	Treatment	2.46	3.60	
F - Table	0.05/0.01	Ratio	4.41	8.29	

Note: ^{ns} = Non Significant Effect, * = Significant Effect, ** = Very Significant Effect

Average Weight per Fruit

The results of the orthogonal contrast test showed that the average weight per green eggplant planted on soil media alone had a very significant effect on the average weight per green eggplant planted on other growing media (Table 5). The highest average weight per fruit in the treatment of rice husk charcoal: chicken manure: soil (2:1:1) was 81.66 g and the lowest one was in the treatment of rice husk charcoal: soil (1:3), namely 49.56 g (Table 9).

Table 6. Research results on green eggplant vegetative variables

Growing Media Compositions	Plant Height (cm)	Number of Leaves	Stem Diameter (mm)
P_1 (Soil)	32.00	31.89	7.91
P_2 (Rice husk charcoal : soil (1:3)	34.67	33.67	8.28
P_3 (Rice husk charcoal: soil (1:1)	33.06	28.78	7.98
P_4 (Rice husk charcoal : soil (3:1)	34.60	28.11	7.90
P_5 (Chicken manure : soil (1:3)	39.79	40.33	10.22
P_6 (Chicken manure : soil (1:1)	35.13	40.22	10.14
P_7 (Chicken manure : soil (3:1)	36.07	34.00	9.47
P_8 (Rice husk charcoal : chicken manure : soil (1:2:1)	40.53	41.78	10.85
P_9 (Rice husk charcoal : chicken manure : soil (1:1:1)	40.01	40.56	10.38
P_{10} (Rice husk charcoal: chicken manure: soil (2:1:1)	42.26	40.44	10.26

Table 7. Research results on green eggplant flowering age and harvest age variables

Growing Media Compositions	Flowering Age (days)	Harvest Age (days)
P_1 (Soil)	27.11	91.87
P_2 (Rice husk charcoal : soil (1:3)	29.22	83.82
P_3 (Rice husk charcoal: soil (1:1)	29.44	87.29
P_4 (Rice husk charcoal : soil (3:1)	28.22	88.20
P_5 (Chicken manure : soil (1:3)	27.44	62.09
P_6 (Chicken manure : soil (1:1)	24.44	65.13
P_7 (Chicken manure : soil (3:1)	24.33	70.13
P_8 (Rice husk charcoal : chicken manure : soil (1:2:1)	24.11	64.20
P_9 (Rice husk charcoal : chicken manure : soil (1:1:1)	23.44	61.29
P_{10} (Rice husk charcoal: chicken manure: soil (2:1:1)	22.33	63.29

Table 8. Research results on green eggplant number of fruits per plant, fruit length, and fruit diameter variables

Growing Media Compositions	Number of Fruits per Plant	Fruit Length (cm)	Fruit Diameter (mm)
P_1 (Soil)	5.00	13.91	28.17
P_2 (Rice husk charcoal : soil (1:3)	6.00	15.38	29.59
P_3 (Rice husk charcoal: soil (1:1)	5.44	16.73	26.67
P_4 (Rice husk charcoal : soil (3:1)	5.33	17.86	26.23
P_5 (Chicken manure : soil (1:3)	7.44	15.40	36.15
P_6 (Chicken manure : soil (1:1)	7.00	14.20	35.03
P_7 (Chicken manure : soil (3:1)	7.56	14.61	33.74
P_8 (Rice husk charcoal : chicken manure : soil (1:2:1)	7.11	15.19	36.76
P_9 (Rice husk charcoal : chicken manure : soil (1:1:1)	7.22	15.87	36.54
P_{10} (Rice husk charcoal: chicken manure: soil (2:1:1)	7.00	15.56	38.16

Table 9. Research results on green eggplant total fruit weight plant and average weight per fruit variables

Growing Media Compositions	Total Fruit Weight per Plant (g)	Average Weight per Fruit (g)
P_1 (Soil)	260.67	52.13
P_2 (Rice husk charcoal : soil (1:3)	323.44	54.29
P_3 (Rice husk charcoal: soil (1:1)	263.33	49.56
P_4 (Rice husk charcoal : soil (3:1)	287.11	54.27
P_5 (Chicken manure : soil (1:3)	511.11	74.08
P_6 (Chicken manure : soil (1:1)	442.44	65.77
P_7 (Chicken manure : soil (3:1)	424.33	62.84
P_8 (Rice husk charcoal : chicken manure : soil (1:2:1)	512.67	74.75
P_9 (Rice husk charcoal : chicken manure : soil (1:1:1)	520.22	77.24
P_{10} (Rice husk charcoal: chicken manure: soil (2:1:1)	538.44	81.66

DISCUSSION

Based on the results of the contrast test, the green eggplant planted on the soil was very significantly different from the green eggplant grown on growing media with the addition of organic matter on the variables of plant height, stem diameter, harvest age, number of fruit, fruit length, fruit diameter, total fruit weight. per plant, and the average weight per fruit (Table 2, Table 3, Table 4, & Table 5). The green eggplant grown on the soil produced the lowest yield compared to other treatments on the variables of plant height, stem diameter, harvest age, number of fruits per plant, fruit length, and total fruit weight per plant (Table 6, Table 7, Table 8, Table 9). It is suspected that the soil growing media without the addition of organic matter caused the green eggplant does not grow optimally compared to the growing media added with organic matter. According to Azizah et al. (2016) the treatment without the organic fertilizer makes the plant nutrient needs were not fulfilled. The composition of the growing media with rice husk charcoal and chicken manure provides macronutrients for plants and can increase nutrient uptake so that it will increase the productivity of infertile suboptimal land.

Based on the results of the contrast test, the difference in the volume of chicken manure application had a very significant effect on the flowering age variable (Table 3). It is suspected that the higher volume of chicken manure had a higher P element so that it affected the time of flowering. Therefore, the flowering time of the green eggplant grown on the treatment added with chicken manure was different. This is in line with Nainggolan et al. (2016) the P element from manure affects the flower formation process on corn.

Based on the results of the contrast test, the difference in the volume of rice husk charcoal had a very significant effect on the fruit length variables (Table 4). The rice husk charcoal is good for soil porosity. The excessive amounts of rice husk charcoal cause water not to be retained in the soil (run off) and it gets more easily evaporated. Therefore, it is suspected that the water requirement for the green eggplant on the rice husk charcoal: soil (1:1) and (3:1) was less available so that the fruit got longer with a smaller weight compared to the green eggplant on the rice husk charcoal growing media: soil (1:3). This is in line with the study conducted by Rinasari et al. (2016) that on the generative phase, sufficient water is needed for fruit formation of tomato.

The best results were obtained from the treatment of rice husk charcoal: chicken manure: soil (2:1:1) on the variables of plant height, flowering age, total fruit weight per plant, fruit diameter, and average weight per fruit (Table 6, Table 7, Table 8, Table 9). It is suspected that this growing media improved the physical, biological, and chemical properties of the soil so it can facilitate the absorption of nutrients by the roots, then it indirectly

affected the vegetative and generative growth of green eggplant. According to Agustin et al. (2014) and Lawenga et al. (2015), the rice husk charcoal can increase pH of the soil and improve the soil structure to become crumblier, and the chicken manure can increase nutrient availability, improve soil density, porosity, and permeability of the soil so that can increase plant absorption.

The results of the contrast test showed that the difference in the volume of the combination of rice husk charcoal, chicken manure, and soil had no significant effect on the yield of green eggplant in all variables (Table 2, Table 3, Table 4, & Table 5). It is suspected that despite the difference in volume, the growing media contained almost the same nutrient content and properties of the growing media so that the growing media provided the same results.

Based on the results of the study, the highest number of leaves and the widest stem diameter were found in the treatment of rice husk charcoal: chicken manure: soil (1:2:1), namely 41.78 leaves and 10.85 mm of stem diameter (Table 5). It is suspected that the application of chicken manure could suffice the needs of N, P, and K elements for the vegetative growth of green eggplant. Lukman and Kusrianty (2021) and Sidemen et al. (2017) stated that N is needed by plants for the formation of leaf buds. The study conducted by Ludihargi et al. (2019) and Mutaqin et al. (2018) showed that K derived from the chicken manure and rice husk charcoal that is good for stem and increases the diameter of corn stalks.

High temperatures affected the results of green eggplant study. The results of the study showed that the highest plant height was found in the treatment of rice husk charcoal: chicken manure: soil (2:1:1) which was 42.26 cm (Table 6). The normal height of eggplant was 50 – 140 cm (Ludihargi et al., 2019; Nggolitu et al., 2018). The low height of green eggplant was thought to be due to the effect of high temperature in the field because of the lack of available water. The ideal temperature for eggplant growth during the day is 25 – 32° C (Putra, 2018). As a result of the high temperature, the growing media became less optimum on retaining water in the soil. Plants that lack water will disrupt the process of plant height growth (Wibowo & Sitawati, 2017). In the study conducted by Nugraha et al. (2014), the results showed that the soybeans treated with the sufficient water in accordance with the plant needs had higher plant height than those treated with the water below the normal requirements.

The results of the study showed that the fastest flowering age was found in the treatment of rice husk charcoal: chicken manure: soil (2:1:1), which was 22.33 days. In the harvest age variable, the fastest average harvesting age was found in the treatment of rice husk charcoal: chicken manure: soil (1:1:1), which was 61.29 days (Table 7). In the study conducted by Neli et al. (2016) that flowering age of eggplant grown on environment with normal temperatures was 46.42 days. The fast flowering period is thought to be caused by the high temperatures which stimulated the plants to enter the flowering phase. The distance between the flowering and harvesting age was quite far, presumably due to the large number of fallen flowers. According to Riskiyah (2014), the daily temperatures that exceed the optimum limit have an impact on plants to form flowers more quickly. Oktarina et al. (2017) stated that high temperatures cause the flowers to fall off resulting in the delay of the harvest time.

Based on the results of the study, the highest average fruit length was found in the treatment of rice husk charcoal: soil (3:1) which was 17.86 cm, but the lowest fruit diameter variable was found in that treatment which was 26.23 mm (Table 8). In the study conducted by Sahid et al. (2014) that the length of Malang lokal green eggplant grown on environment with normal temperatures was 21 cm. It is suspected that the high daily temperature

affected the shape of the fruit to become smaller and wrinkled. This is in line with Angio (2016) that under the conditions of high temperature (35.2°C), the eggplant fruit size becomes smaller and the fruit skin shrinks.

Based on the results of the study, the highest total fruit weight per plant for 5 harvests was found in the treatment of rice husk charcoal: chicken manure: soil (2:1:1) which was 538.44 g (Table 9). However, the study conducted by Raksun (2018) showed that the average weight of eggplant fruit grown on the soil for 5 harvests was 1.826 g. The low total fruit weight per green eggplant plant was thought to be influenced by the high temperatures in the field and water loss due to evapotranspiration. The high temperatures affect the occurrence of evapotranspiration so that the water in plants and soil will decrease (Solankey et al., 2014). Lack of water in the generative phase of plants causes a decrease in photosynthesis when it is channeled into fruit formation which results in not optimal fruit formation (Nasrulloh et al., 2016; Sobir et al., 2018). Improvement of growing media for green eggplant needs to be supported by availability of water and temperature conditions on the field. The difficulty on providing sufficient water for plant growth is a challenge in suboptimal land management (Lakitan & Gofar, 2013). During high temperatures, it is recommended to cultivate green eggplant using mulch or shade to avoid excessive evapotranspiration.

CONCLUSION

The best results were obtained from the treatment of rice husk charcoal: chicken manure: soil (2:1:1) on the variables of plant height, flowering age, total fruit weight per plant, fruit diameter, and average weight per fruit. The treatment of growing media composition using a combination of chicken manure and rice husk charcoal was better than the growing media with just one organic matter.

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REFERENCES

Agustin AD, Riniarti M, Duryat. 2014. Use of saw dust and rice husk as a growth media of Yellow Cempaka (*Michelia champaca*). *Jurnal Sylva Lestari*. 2 (3): 49–58. DOI: 10.13057/psnmbi/m010423.

Alhrout HH. 2017. Response of growth and yield components of sweet pepper to tow different kinds of fertilizers under green house conditions in Jordan. *Journal of Agricultural Science*. 9 (10): 265–272. DOI: 10.5539/jas.v9n10p265.

Angio M. 2016. Physiological and morphological responses of eggplant (*Solanum melongena*) to high temperature stress. [Thesis]. Institut Pertanian Bogor.

Azizah N, Haryono G, Tujiyanta. 2016. The response of types of organic fertilizers and types of mulch to the yield of caisim (*Brassica juncea*, L.) var. Tosakan. *Jurnal Ilmu Pertanian Tropika dan Subtropika*. 1 (1): 44–51. DOI: 10.31002/vigor.v1i1.316.g250.

Bidaramali V, Akhtar S, Das A. 2020. Proximate composition and bioactive compounds in diverse eggplant genotypes. *Current Journal of Applied Science and Technology*. 39 (4): 113–121. DOI: 10.9734/ cjast/2020/v39i430537.

Bui F, Lelang MA, Taolin RICO. 2015. Effect of growing media composition and polybag size on growth and yield of tomatoes (*Licopercicum escelentum*, Mill). *Jurnal Pertanian Konservasi*

Lahan Kering. 1 (1): 1–7. DOI: 10.32938/sc.v1i01.

Dianawati M. 2014. Use manure and organic waste as growing media of seed potatoes production. *Jurnal Agros*. 16 (2): 292–300.

Fitrianti, Masdar, Astianti. 2018. Growth response and production of eggplant (*Solanum melongena*) on various types of soil and the addition of Phonska NPK fertilizer. *Agrovital: Jurnal Ilmu Pertanian Pertanian Universitas Al Asyariah*. 3 (2): 60–64. DOI: 10.35329/agrovital.v3i2.207.

Gustia H. 2013. The effect of adding husk charcoal to the growing media on the growth and production of mustard plants (*Brassica juncea* L.). *Journal WIDYA Kesehatan dan Lingkungan*. 1 (1): 12–17.

Hartoyo R, Anwar D. 2018. Effect of single row, double row soil system, and doses of NPK Mutiara on growth and production of eggplant (*Solanum melongena* L.) varietas Antaboga-1. *Jurnal Ilmiah Hijau Cendekia*. 3 (1): 64–72.

Helilusiatiningsih N. 2021. Test of chemical compounds on fruit eggplant (*Solanum torvum*) room temperature storage LCMS and FTIR methods. In: *International Conference of Interdisciplinary Sciences* (*ICIS*) *2021*. Lampung, Indonesia. 20–27.

Jailani S, Ratnawaty, Nasruddin, Faisal, Ismadi. 2019. Response of eggplant (*Solanum melongena* L.) on various plant media and doses of NPK fertilizer. *Jurnal Agrium*. 16 (2): 151–159. DOI: 10.29103/agrium.v16i2.5867.

Karamina H, Indawan E, Murti AT, Mujoko T. 2020. Growth and yield responses of cucumber plants to the application of NPK fertilizer and phosphate-liquid organic fertilizer. *Jurnal Kultivasi*. 19 (2): 1150–1155. DOI: 10.24198/kultivasi.v19i2.26316.

Khoirunnisa F, Sugiarto, Murwani I. 2021. The efforts of increase the yield of eggplant (*Solanum melongena* L.) by giving Terra soil improver and NPK fertilizer. *Jurnal Agronisma*. 9 (2): 457–466.

Koyama S, Hayashi H. 2017. Rice yield and soil carbon dynamics over three years of applying rice husk charcoal to an Andosol paddy field. *Plant Production Science*. *20* (2): 176–182. DOI: 10.1080/1343943X.2017.1290506.

Kumar V, Chopra AK. 2016. Agronomical performance of high yielding cultivar of eggplant (*Solanum melongena* L.) grown in Sewage Sludge Amended Soil. *Research in Agriculture*. 1 (1): 1–25. DOI: 10.22158/ra.v1n1p1.

Kurnianingsih A, Susilawati, Sefrila M. 2019. Characteristics of onion plant growth on various compositions of growing media. *Jurnal Hortikultura Indonesia*. 9 (3): 167–173. DOI: 10.29244/jhi.9.3.167-173.

Kyakuwaire M, Olupot G, Amoding A, Nkedi-Kizza P, Basamba TA. 2019. How safe is chicken litter for land application as an organic fertilizer? A review. *International Journal of Environmental Research and Public Health*. 16 (19): 1–23. DOI: 10.3390/ijerph16193521.

Lakitan B, Gofar N. 2013. Technological innovation policies for sustainable suboptimal land management. *In*: *Proceedings Seminar Nasional Lahan Suboptimal*. Palembang, Indonesia p.1-11.

Lawenga FF, Hasanah U, Widjajanto D. 2015. Effect of organic fertilizer application on soil physical and yield of tomato (*Lycopersicum esculentum* Mill.) in Bulupountu Village, Sigi Biromaru District, Sigi Regency. *Jurnal Agrotekbis*. 3 (5): 564–570.

Ludihargi RJ, Murdiono WE, Maghfoer MD. 2019. Growth and yield of eggplant (*Solanum melongena* L.) in an intercropping system with lettuce (*Lactuca sativa* L.) due to the application of goat manure and PGPR. *Jurnal Produksi Tanaman*. 7 (2): 189–197.

Lukman, Kusrianty N. 2021 The combination of water hyacinth (*Eichhornia crassipes*) compost withchickenmanure on the growth rate of robusta coffee (*Coffea canephora*) seedlings. *Jurnal Sains dan Teknologi*. 10 (2): 200–210. DOI: 10.23887/jst-undiksha.v10i2.37615.

Amir M, Mariana A, Jamal A, Karim HA. 2021. Growth and yield responses of eggplant (*Solanum melongena* L.). on the application of stale rice moles and papaya fruit waste moles with different doses. *Agrovital : Jurnal Ilmu Pertanian*. 6 (2): 94–98.

Mishra A, Taing K, Hall MW, Shinogi Y. 2017. Effects of rice husk and rice husk charcoal on soil physicochemical properties, rice growth and yield. *Agricultural Sciences*. 8 (9): 1014–1032. DOI: 10.4236/as.2017.89074.

Muldiana S, Rosdiana. 2017. The response of eggplant (*Solanum melongena* L.) on the application of liquid organic fertilizer with different time intervals. In: *Prosiding Seminar Nasional 2017 Fakultas Pertanian UMJ*. Yogyakarta, Indonesia. 155–162.

Mutaqin Z, Saputra H, Ahyuni D. 2018. Growth response of corn growth on potassium fertilizer and husk charcoal. *In*: *Proceedings Seminar Nasional Pengembangan Teknologi Petanian Politeknik Negeri Lampung*. Lampung, Indonesia p. 224–229.

Nainggolan N, Sjofjan J, Anom E. 2016. Effect of rice husk charcoal and several types of manure on growth and production of maize (*Zea mays saccharata* Sturt.) on peatlands. *Jurnal Online Mahasiswa Fakultas Pertanian*. 3 (1): 1–12.

Nasrulloh A, Mutiarawati T, Sutari W. 2016. Effect of addition of husk charcoal and number of production branches on plant growth, yield and fruit quality of tomato cultivar doufu stem grafting on Inceptisol Jatinangor. *Jurnal Kultivasi*. 15 (1): 26–36. DOI: 10.24198/ kultivasi.v15i1.12010.

Nayanathara AR, Mathews A, Aalolam KP, Reshma JK. 2016. Evaluation of total Phenol, Flavonoid and Anthocyanin content in different varieties of eggplant. *Eemer Life Sci Res*. 2 (2): 63–65.

Neli S, Jannah N, Rahmi A. 2016. Effect of NASA liquid organic fertilizer and Ratu Biogen growth regulator on growth and yield of eggplant (*Solanum melongena* L.) Antaboga-1 variety. *Jurnal Agrifor*. 15 (2): 297–308. DOI: 10.31293/af.v15i2.2085.

Nggolitu K, Zakaria F, Pembengo W. 2018. Effect of water hyacinth mulch and phosphorus fertilizer on growth and production of eggplant (*Solanum melongena* L.). *Jurnal Agroteknotropika*. 7 (2): 176–183.

Nugraha YS, Sumarni T, Sulistyono R. 2014. Effect of time interval and water application on growth and yield of soybean (*Glicine max* (L.) Merril.). *Jurnal Produksi Tanaman*. 2 (7): 552–559.

Oktarina DO, Armaini, Ardian. 2017. Growth and production of strawberries (*Fragaria* sp.) with the application of various concentrations of liquid organic fertilizer (POC) in hydroponic substrate. *Jurnal Online Mahasiswa Fakultas Pertanian*. 4 (1): 1–12.

Purba D, Widjajanto DW, Purbajanti ED. 2019. Effect of various doses of nitrogen and time of application of liquid organic fertilizer on the growth and production of green eggplant (*Solanum melongena* L.). *Journal of Agro Complex*. 3 (3): 159-165. DOI: 10.14710/joac.3.3.159-165.

Agricultural Data and Information Center. 2016. Agricultural Statistics. Jakarta: Center for Agricultural Data and Information Ministry of the Republic of Indonesia. https: //pusdatin. setjen.pertanian.go.id.

Putra E. 2018. *Vegetable Germination Techniques*. Jambi Agricultural Technology Research Center (BPTP). Jambi.

Putri YS, Utami SD, Fitriani H. 2022. Effect of fertilizer variation on green eggplant (*Solanum melongena* L.) seed growth. *Biocaster: Jurnal Kajian Biologi*. 2 (1): 33–40.

Raksun A, Mahrus M, Mertha IG. 2020. Effect of urea and cow fecal compost on growth and yield of green eggplant (*Solanum melongena* L.). *Jurnal Penelitian Pendidikan IPA*. 7 (1): 57-62. DOI: 10.29303/jppipa.v7i1.455.

Rinasari SPO, Kadir Z, Oktafri. 2016. Effect of concentration of organonitrosphorous fertilizer on growth and production of organic tomatoes (*Lycopersicon escelentum* Mill) with sub-surface irrigation. *Jurnal Teknik Pertanian Lampung*. 4 (4): 325–334.

Riskiyah J. 2014. Test volume of water in different varieties of Tomato plants (*Lycopersicum esculentum* Mill). *Jurnal Online Mahasiswa Fakultas Pertanian*. 1 (1): 1–9.

Saepuloh SS, Firmansyah E. 2020. Effect of combination dose of chicken manure and goat manure on growth and yield of pagoda (*Brassicae narinosa* L.). *Jurnal Agroscript*. 2 (1): 34–48. DOI: 10.36423/agroscript.v2i1.500.

Sahid OT, Murti RH, Trisnowati S. 2014. Yield and quality of six eggplant (*Solanum melongena* L.) lines. *Jurnal Vegetalika*. 3 (2): 45–58. DOI: 10.22146/veg.5151.

Setyadi DB, Rahmi SS, Taryono. 2020. Drought tolerance of some eggplant accessions (*Solanum* spp.). *Agrinova: Journal of Agriculture Innovation*. 3 (1): 1–5. DOI: 10.22146/a.58348.

Sidemen IN, Raka IDN, Udiyana PB. 2017. The effect of the type of organic fertilizer on the growth of spinach (*Amaranthus* sp.) on dry land from the Kubu Region, Karangasem. *Jurnal AGRIMETA*. 7 (13): 31–40.

Sobir, Miftahudin, Helmi S. 2018. Morphological and physiological responses of eggplant (*Solanum melongena* L.) genotypes to salinity stress. *Jurnal Hortikultura Indonesia*. 9 (2): 131–138. DOI: 10.29244/jhi.9.2.131-138.

Solankey SS, Singh RK, Baranwal DK, Singh DK. 2014. Genetic expression of tomato for heat and drought stress tolerance: An overview. *International Journal of Vegetable Science*. 21 (5): 496–515. DOI: 10.1080/19315260.2014.902414.

Sudiarti D. 2021. The effectiveness of organic fertilizer and micoriza arbuscula on growth and productivity green eggplant (*Solanum Melongena* L.). *International Journal of Applied Biology*. 5 (1): 106–111.

Surdianto Y, Sutrisna N, Basuno, Solihin. 2015. *Technical Guide for Making Rice Husk Charcoal*. Center for the Study of Agricultural Technology (BPTP). West Java.

Wibowo HY, Sitawati. 2017. Respons of kangkong (*Ipomoea reptans Poir*) watering interval on vertical pipe. *PLANTROPICA Journal of Agricultural Science.* 2 (2): 148–154.

Yulianto S, Bolly Y, Jeksen J. 2021. Effect of chicken manure application on growth and yield of cucumber (*Cucumis sativus* L.) in Sikka Regency. *Jurnal Inovasi Penelitian*. 1 (10): 2165–2170. DOI: 10.47492/jip.v1i10.393.