



The Effect Of Mulch Type On Eggplant Plants Production (*Solanum Melongena* L.)

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Abstract. *The aim's of this research was to determine the effect of mulch type on the growth and yield of eggplant plants. This research was carried out from February to May 2018. In Fatuquero village, Railaco sub-District, Ermera Municipality, it is located at an altitude of 800 m above sea level. The design used in this research was a single factor Randomized Block Design, namely Mulch (M) which was repeated 4 times, namely M0 = No Mulch (control), M1 = Rice Straw Mulch, M2 = Black Plastic Mulch and M3 = White Plastic Mulch silver. In general, the effect of mulch type provides very significant differences in all growth parameters and yield parameters. The research results showed that the silver white plastic mulch (M3) gave the highest yield, namely 8.03 kg/plot and the lowest yield was obtained in the treatment without mulch (M0) with a value of 4.83 kg/plot.*

Keywords: *Mulch and Eggplant Plants.*

INTRODUCTION

Eggplant is a type of plant that is grown as a vegetable and used as food. Scientifically eggplant known as *Solanum melongena* L, is a tropical crop that originated in Indonesia. Sunarjono (2003). The eggplant plant originated from the Asian continent, particularly in India and Burma, where many people cultivate it, but the exact date is unknown. Other literature suggests that eggplants were widely grown in China and later spread to other nations in Europe, Africa, South America, Malaysia, and Indonesia. (Rukmana, 2003). Some research results indicate that many areas of intensive agriculture have already experienced degradation and their productivity is reduced by more than 2%, while in other areas such as Java, the nutrition in rice fields is reduced by less than that amount. In some other parts, we have organic fertilizers such as animal waste which are not yet being optimally utilized. (Sutriadi, 2005).

In Timor-Leste, almost 60% of the land area is used for agriculture, mainly for planting corn. The main problem faced by farmers is the shortage of water, which makes it difficult to raise livestock or plant trees. Therefore, people do not raise horses or plant fruit trees because of the lack of water. This shortage of water may also affect the production of horticulture products in Timor-Leste, compared to neighbouring countries like Indonesia. According to data from the Timor-Leste Agriculture Ministry, eggplant farming covers an area of 35 hectares with a total annual production of 326.20 tonnes and an average production

of 9.32 tons per hectare. (Anonymous, 2018). In comparison, Indonesia's eggplant production has reached up to 25.79 tons per hectare. (Rukmana, 2003).

Eggplant falls under the vegetable category that many people enjoy because it contains significant nutrition from calcium, protein, oil, carbohydrates, Vitamin A, B, C, and phosphorus (Soetajad '2000). According to Soedijanto et. al. (2002), the material used to cover the garden bed (mulch) is mainly made from dry or leftover parts of the fruit trees that have died or been cut, thick grass, or rice stalks that have been chopped into pieces and left on the top surface of the soil.

According to Hille (1971) cited by Wasito (2005), the definition of the material used to cover the raised garden beds (mulch) is made up of the leftover stems of maize, rice plants, rice stalks, and the remains of industrial materials such as letters, fabrics, and plastics. Hakim et.al (2001) stated that the most effective materials for making mulch are the remains of healthy plants such as rice plants, maize, legumes, gift stems, with the objective of reducing the evaporation process and minimizing the life of the weeds. The benefits of mulch include providing a suitable environment for the growth of the planted trees, reducing evaporation, reducing weed growth, securing the topsoil from rain, ensuring the moisture of the soil, promoting the presence of water inside the soil, and increasing microorganism activity in the soil. Gustanti, Y. Chaerul and Syam Z., 2014. According to (Lana, 1990), the use of rice plant and dry grass mulch that is 5 cm thick for eggplant planting can result in a yield of 8.46 tons/ha, while the use of white plastic mulch can result in a yield of 15.27 tons/ha.

Many people in Timor-Leste do not yet know about the function and benefits of mulch, so some people want to conduct a scientific research with the title "Influence of Mulch Types (rice plant, black plastic, and grey fuzzy plastic) on the growth and yield of eggplant".

METHODS

This research used a single factor randomized block design with 4 treatments repeated 3 times in 3 blocks. Types of mulch with code (M) are: M0 = Control (no mulch); M1 = Rice Straw Mulch; M2 = black plastic mulch; and M3 = Silver White plastic mulch

Thus, obtaining 16 experimental plots

The linear/mathematical model of a single factor randomized block design is as follows:

$$Y_{ij} = \mu + \tau_i + \beta_j + \epsilon_{ij} \quad (\text{Hanafiah, K.A. 2012}).$$

Justification:

$i = 1, 2, \dots, t$ and $j = 1, 2, \dots, r$

Y_{ij} = Effect of Treatment i and j group

μ = General average

τ_i = Effect of treatment i

β_j = Influence of the j Group

ϵ_{ij} = Random effect on the i treatment and j group

RESULTS AND DISCUSSION

Tabel 1. Effect of mulch type on number of fruit/plants, fruit length and fruit diameter.

Treatment	Number of sample fruit/plants	Fruit length (cm)	Diameter of fruit (mm)
M0	5.39 a	25.93 a	74.84 a
M1	5.59 a	28.43 b	75.42 b
M2	6.37b	31.39 c	78.93 c
M3	7.42c	33.33 d	84.75 d
LSD 5%	1.19	1.58	1.47

Note: The numbers in the column followed by the same lower case letter do not have a significant difference in the Least Smallest Different (LSD) test at the 5% level.

Table 1 above indicates that all treatments had significant differences on the length of fruit for each sampled fruit tree. The treatment with white mulch plastic (M3) provided eggplants with longer fruit length measuring 33.33 cm, compared to the treatment without mulch (M0) which resulted in shorter fruit length with a value of 25.93 cm. This occurred because during the generative phase, all nutrient absorption by the plant went towards developing the fruit, causing it to grow longer and bigger. In relation to this, Ruhanto et.al. (2008) stated that environmental factors influence the growth of trees in the generative phase, especially the top surface, water, and nutrients in the soil because the result of the photosynthesis process that produces food, water, and nutrients that are picked up/absorbed from the soil are all transported to the buds. Fitter and Fisher (1996) also mentioned that light from the top surface influences the growth of trees in the generative phase. According to Rukmana (2003), the use of a white plastic cap which covers the topsoil can hinder the growth and result in low yields for trees that are grown during the day because the white plastic cap can reflect the light which closes the lid that can ensure the temperature of the soil, water in the soil, humidity of the soil, and prevent soil-borne diseases.

Table 1 also shows that the type of mulch treatment affects the fruit diameter of eggplant. The plastic mulch treatment (M3) resulted in larger fruit diameter with a value of 84.75 mm, while the treatment without mulch (M0) resulted in smaller fruit diameter with a value of 74.84 mm. The smaller fruit diameter in the treatment without mulch (M0) occurred due to high evaporation from the topsoil, low humidity and water content in the soil, and competition between the plants and microorganisms for nutrients and oxygen, which affected the growth and yield. Wasito T. (2005) mentioned that the plants in the soil can lose more water due to high evaporation, especially in the agricultural area, which has high potential for evaporation during cultivation, especially in horticultural raised beds. He also pointed out that not using materials to cover the soil can negatively impact the growth and development of plants, from the vegetative phase to the generative phase.

Table 2. Effect of mulch type on fruit weight/plant and fruit weight/plot.

Treatment	Weight/plant sample (gr)	Fruit weight / plot (Kg)
M0	540.00 a	4.89 a
M1	653.00 b	5.69 b
M2	793.33 c	6.23 c
M3	1040.00 d	8.03 d
LSD 5%	3.64	0.29

Note: Numbers that are in the column followed by the same small letter, did not show significant difference in the Least Smallest Different (LSD) test at 5% level.

Table 2 above shows that different types of mulch have a significant effect on the weight of eggplant fruit and plant growth, with significant differences in certain treatments. Treatment with grey plastic mulch (M3) for eggplant fruit/plant samples resulted in much heavier yields weighing 1040 grams, while samples from plants that were not covered with mulch (M0) weighed only 450 grams. This is because the grey plastic mulch (M3) treatment can reflect sunlight back to the soil, maintaining the temperature and humidity levels of the soil, thereby allowing plants to absorb nutrients and undergo photosynthesis more easily. This facilitates the transport of all nutrients to the generative phase of plant growth, leading to an increase in the production of flowers and fruits. Regarding this fact, Jumin (2001), stated that the growth of the plant is determined by photosynthesis activity during the dry material revision from respiration, as well as the determination of nutrient translocation to the fruit part. According to Ruhanto et. al., (2008), environmental factors influence the growth of plant especially during the generative phase, especially sunlight, water, and nutrients in the soil, because the results of the photosynthesis process produced by the leaf, water and nutrients picked up/sucked up from the soil are all.

Table 2 also shows that the type of mulch has a significant influence on the weight of eggplant fruits in each raised garden bed, with significant differences observed among the different treatments. The use of white plastic mulch (M3) for eggplant fruit in each garden bed resulted in a heavier weight of 8.03 kg, while in the treatment where the garden bed top was not covered with any material (M0), the weight was only 4.89 kg. The difference in weight between the two treatments occurred because of high evaporation from the top soil due to high temperatures, low humidity, less water content in the soil, and competition from weeds for water, nutrients, and oxygen in the soil affecting the growth and yield of the plants. an located to the fruit. Regarding this, Wasito T. (2001) says that water in the soil can be lost through high evaporation, especially in agriculture areas; a condition which has the potential to be worsened by evaporation during cultivation, especially in horticulture raised garden beds. He also suggests that raised garden beds that do not use mulch can cause decreased growth and development during both vegetative and generative phases. According to Darwin (2000), raised garden beds that do not use mulch can cause high evaporation rates which can lead to loss of water in the soil, reducing soil temperature and negatively impacting the vegetative growth and production of crops.

CONCLUSION

From the results and discussions above, the following conclusions can be pointed out:

1. Generally, the type of mulch used has a significant difference in the observed parameters.
2. Research results show that the white plastic mulch treatment (M3) resulted in a lower production value of 8.03 kg/bed or 26.76 ton/ha, whereas not using mulch resulted in a higher production value of 4.83 kg/bed or 14.96 ton/ha.

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