



# Analysis of Melon Growth Due to Application of Silver Black Plastic Mulch and Cow Manure Compost

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**Abstract:** Melon is a short-lived dicot, that growing up on the ground or on bamboo stakes. Vegetative growth and melon production rate are influenced by internal and external factors. Research has been carried out on the analysis of melon growth due to the application of silver black plastic mulch and cow manure compost in 2023. This study aims to analyze the effect of application of silver black plastic mulch on melon growth; application of cow manure compost on melon growth; interaction of application of silver black plastic mulch and cow manure compost on melon growth. The study was designed in two factors, namely the application of silver black plastic mulch as the first factor and the dosage of cow manure compost as the second factor. The results of the study were: there was an increase in plant height, number of leaves, leaf length and width of melon leaves due to application of silver black plastic mulch; there was an increase in plant height, number of leaves, length of melon leaves due to application of cow manure compost, but the application cow manure compost did not increase the length of melon leaves; there was no increase in all growth parameters measured due to the interaction of silver black plastic mulch and cow manure compost application.

**Keywords:** Compost; Melon Growth; Silver Black Plastic Mulch.

## Introduction

Melon is a short-lived dicot, that growing up on the ground or on bamboo stakes. Melon has a watery stem with many branches, the main stem can reach several meters in length. Melon has green leaves, rounded shape with indented leaf edges. Melon root is a small taproot that grows in the soil. Melon has yellow flowers, which consist of male and female flowers which are unisexual-monoecious (Jalil, 2018).

Vegetative growth and melon production rate are influenced by internal and external factors. One of the determining external factors is the condition of the nutrients in the planting medium. To increase the nutrients it is necessary to do fertilization. One of the environmentally friendly fertilizers is compost which can be made from organic waste such as cow manure. Bachtiar and Ahmad (2019) reported that Cassia siamea leaf compost contained 1.16% nitrogen, 0.233% phosphorus, 0.879% potassium and 15.54% C-organic.

Compost made from tea leaf waste treated with activator contains 45.81% C-organic, 5.20% N-total, 8.84 C/N ratio, 0.05 ppm Co, 0.17 ppm Na, 0.02 ppm Mo and 627.77 ppm Mn (Panataria et al, 2020). Furthermore Baroroh et al (2015) reported that compost derived from bamboo leaf litter and sugar factory waste contains organic matter, C-organic, N-total, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, C/N and water content that meets the national standards of Indonesia.

Application of compost can increase the height growth of mahogany seedlings (Tamakloe et al., 2021). The application of 30 g of compost resulted in a growth percentage of 40.70% compared to the control with an average growth of 6.81 cm (Wasis and Sandrasari, 2011). Treatment of 8 kg of compost for each polybag is the best dose compared to other doses for the growth of plant height, number of leaves, leaf length and weight of kale land. However, for leaf area, a dose of 4 kg for 1 polybag is the best dose (Ansyari and Jasmi, 2022). Treatment of 5 t/ha of compost N<sup>o</sup>3 has the best agronomic parameters compared to other types of compost and to

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treatment without organic amendment. It is therefore more efficient in improving soil fertility (Tomakloe et al, 2021). It was further reported that the application of compost can increase the height of tomato stems at the age of 15, 30 and 45 days after planting with the best dose of 75 g (Jailani, 2022).

In addition to fertilization, the application of mulch can also improve the quality of the plant root environment. Mulch used on agricultural land can be in the form of plastic mulch, rice straw mulch, or plant leaves used to cover soil on agricultural land (Darmawan et al., 2014). The use of mulch serves to inhibit weed growth and has a variety of positive impacts on land and plant growth. Mulch can maintain humidity, temperature and soil friability, reduce evaporation of water and fertilizer by sunlight so that it can reduce the cost of fertilizing and watering and can prevent soil erosion during the rainy season (Tati, 2004). Likewise, Ilyas et al (2017) explained that the application of mulch can improve soil chemical properties and improve soil physical properties by improving soil structure, retaining groundwater and minimizing soil temperature fluctuation.

Based on the background above, a research was conducted on the Growth analysis of melons due to the application of silver black plastic mulch and cow manure compost. This study aims to analyze the effect of: (1) application of silver black plastic mulch on melon growth, (2) application of cow manure compost on melon growth, (3) interaction of application of silver black plastic mulch and cow manure compost on melon growth.

## Method

The materials needed include; Black silver plastic mulch, river water, melon seeds, paranet nets, nursery polybags, paddy field soil, composted cow dung, bamboo stakes, insecticide brandukurata 20 EC, fungicide brand acrobat 50 WP, herbicide brand bablass 490 SL and iron wire. The tools needed are: hoe, sickle, Akapro brand hand sprayer, machete, hammer, tape measure, measuring cup and scales. The work steps in carrying out the research included: killing weeds at the study site using the herbicide bablass 490 SL; making 20 plots on agricultural land with a length of 10 meters and a width of 82 cm; adding cow manure compost to each plot according to the treatment dose; applying silver black plastic mulch to the experimental land; conducting melon nurseries; providing water to the experimental land 1 day before planting melons; planting melon seedling; irrigating melons regularly; controlling pests and plant diseases; collecting plant growth parameter data.

This research is a quantitative research carried out by experimental method with 2 factors. The first factor consisted of 2 stages, namely  $C_0$  = planting melons without using mulch and  $C_1$  = application of silver black plastic mulch. The second factor was the application of cow manure compost which consisted of 5 types of treatment, namely:  $D_0$  = 0 kg of cow manure compost,  $D_1$  = application of 5 kg of cow manure compost for 1 plot,  $D_2$  = application of 10 kg of cow manure compost to 1 plot,  $D_3$  = application of 15 kg of cow manure compost for 1 plot,  $D_4$  = application of 20 kg of cow manure compost for 1 plot. Research data consisting of stem length, number of leaves, leaf length and width of melon leaves, were analyzed using Anova (Teutenburg & Shalabh, 2009).

## Result and Discussion

### Number of Leaves

Figure 1 shows the average number of melon leaves measured when the melon was 30 days old after planting. The number of melon leaves varies, determined by the application of silver black plastic mulch and the dose of cow dung compost. The lowest number of leaves was 11 leaves observed on plants growing on plots without silver black plastic mulch and treated with 0 kg of cow dung compost.

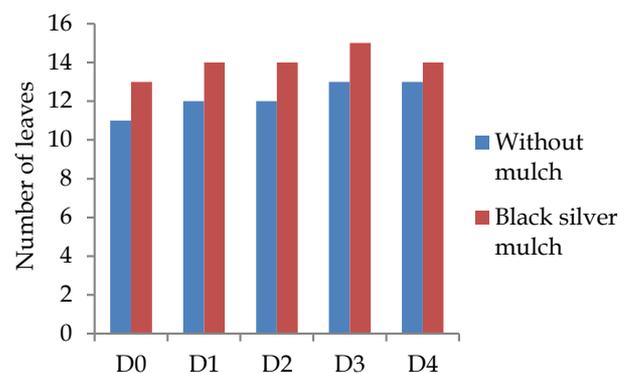


Figure 1. Average number of melon leaves

The highest number of leaves was 15 leaves found in the combination of silver black plastic mulch and 15 kg of cow dung compost for 1 plot. The results of data analysis using Anova showed that the application of silver black plastic mulch significantly increased the number of melon leaves. The different doses of cow dung compost had a significant effect on the number of melon leaves. The application of silver black plastic mulch and cow manure compost had no significant effect on the number of melon leaves. The higher the number of melon leaves due to the application of silver black plastic mulch occurs because the application of

mulch can provide good environmental conditions for plant growth. Silver black plastic mulch has 2 sides of mulch with different colors. The black color which is placed facing down plays a role in reducing the risk of weeds developing in the area around plant roots thereby reducing the possibility of competition between cultivated plants and weeds for nutrients and sunlight. The silver color on the upper surface serves to reduce the risk of too high air humidity so as to prevent the growth of fungi that can cause disease for plants (Wahyudi, 2011). Mulch had a positive impact in generating increased fruit yield. Silver over black plastic mulch produced the highest fruit yield of tomato, brinjal, capsicum, and broccoli (Islam et al, 2021)

Application of cow manure compost can also increase the number of melon leaves. Similar results were found for sataria grass, the application of compost increased the number of leaves = 20.63 leaves, the number of tillers = 94.97 stems, and the plant height = 45.07 cm (Kalo & Sio, 2020). Likewise Raksun et al. (2021) reported that the application of vermicompost could increase the number of leaves, stem height, stem diameter and length of green eggplant leaves. The best dose of vermicompost is 18 tons for 1 hectare

#### Stem Length.

The results of measurements of melon stem length at 30 days after planting are presented in figure 2. Melon stem length varies according to the dose of each treatment. The highest stem length of melon was 160 cm which was observed in melon plants grown in plots covered with silver black plastic mulch and given 15 kg of cow dung compost for 1 plot. The smallest stem length of melon was 150 cm observed in melons grown in plots without mulch treated with 0 kg of cow dung compost.

The results of data analysis using Anova showed that the application of silver black plastic mulch significantly increased the length of melon stems. Likewise, cow manure compost treatment increased melon stem length, but the interaction of silver black plastic mulch and cow manure compost application had no significant effect on melon stem length. The increase in the length of melon stems growing on land covered with silver black plastic mulch is possible because the application of silver black plastic mulch has a positive impact on plant growth. Silver black plastic mulch can regulate soil friability, temperature and humidity so that it can stimulate root development, reduce the risk of soil erosion during the rainy season so as to prevent nutrient loss in agricultural land

Silver black plastic mulch can regulate soil friability, temperature and humidity so that it can stimulate root development, reduce the risk of soil erosion during the rainy season so as to prevent nutrient loss in agricultural land. Silver black plastic mulch can

also increase the efficiency of absorbing sunlight in the photosynthesis process due to the reflection of sunlight produced by the silver black plastic mulch surface (Subahar, 2004). On shallots it was also found that the application of silver black plastic mulch could increase plant growth, namely producing the highest growth in plant height and the highest number of leaves at the age of 50 days after planting (Wisudawati et al., 2016).

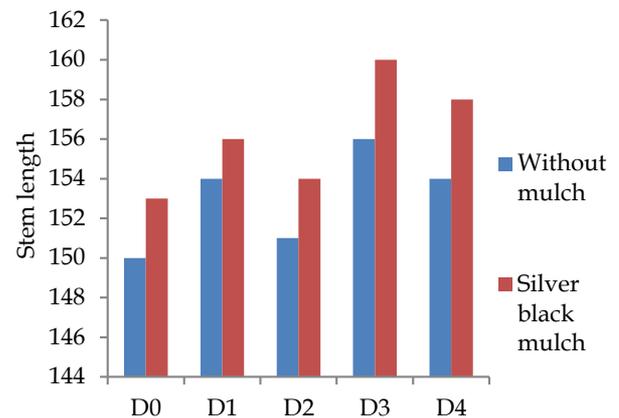


Figure 2. Average stem length 30 days after planting

Compost treatment can also increase the length of melon stems. The increase in the length of melon stems due to the application of cow dung compost occurs because the compost contains nutrients needed by plants. The nutrient content of compost depends on the raw materials it is made of. Compost contains 0.1 – 0.6% nitrogen, 0.1 – 0.4 phosphorus, 0.8 – 1.5 potassium and 0.8 – 1.5 calcium (Novizan, 2005). Furthermore, Tajoedin and Iswanto (2002) explained that the nutrients contained in compost can improve soil structure. The nutrients contained in compost are nitrogen, phosphorus, potassium and calcium. In oil palm plants. Andri and Wawan (2017) reported similar results where greenbotane compost treatment increased plant height, head diameter, fresh weight and dry weight of oil palm seedlings. The vermicompost treatment significantly affected the increase in plant height and total long bean leaves (Raksun et al, 2023).

#### Leaf Length

Melon leaf length, measured 31 days after planting, showed variations that were influenced by the application of silver black plastic mulch and cow dung compost. Figure 3. Presents data on melon leaf length where the smallest leaf length is 10 cm, observed on plants growing on plots without mulch and with the application of 0 kg of cow dung compost. The highest leaf length was 13 cm, observed in plants grown in plots covered with plastic mulch treated with 10 kg and 15 kg of cow dung compost for 1 plot.

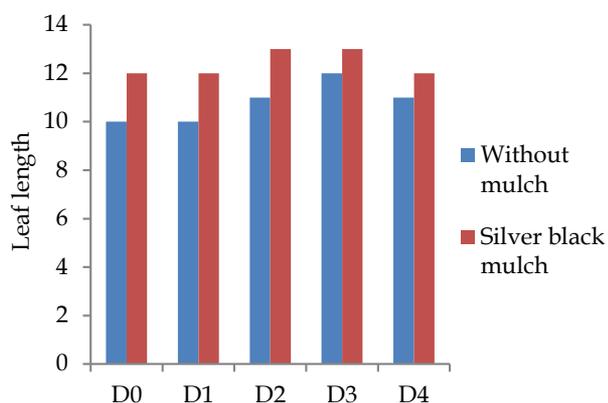


Figure 3. Leaf length at 31 days after planting

Data analysis using Anova showed that the application of silver black plastic mulch significantly increased the length of melon leaves. The different doses of cow manure compost significantly affected the length of the melon leaves. The interaction of silver black plastic mulch and cow manure compost had no significant effect on the length of melon leaves. The application of mulch on agricultural land can reduce soil compaction due to rainfall so that the soil is always loose and ideal for root growth. In addition, mulch is able to stabilize soil pH making it ideal for plant growth (Wahyudi and Astiningsih, 2011). Mulch can improve soil physical properties by minimizing soil temperature fluctuations, reducing erosion, maintaining soil water systems, improving soil structure, aeration and consistency, improving soil chemical properties. (Ilyas et al (2017). The results of a study conducted by Raksun et al (2022) showed that the use of mulch can increase leaf length, stem height, number of leaves and width of bean leaves. Silver black plastic mulch gives better results than straw mulch. Furthermore, the results of research by Etica and Husaini (2019) on shallots show that the application of silver black plastic mulch can increase the number of leaves, plant height, plant weight, sample plant production.

Compost contains nutrients needed by plants. Arianti (2022) reports that compost made from goroho banana peels through optimization of BAL culture contains nitrogen elements greater than 0.4%, so that it meets the minimum standards for compost recommended by the Indonesian National Standard. Compost derived from bamboo leaf litter and sugar factory waste contains organic matter, C-organic, N-total, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, C/N and water content that meets standards set by Indonesian national standards (Baroroh at al., 2015; Arisani, 2022). The presence of nutrient content in compost causes its application to increase plant growth, including the elongated growth of melon leaves.

### Leaf Width

Figure 4 presents the results of measuring the width of melon leaves. In the figure it can be observed that the application of silver black plastic mulch and cow dung compost causes variations in the width of melon leaves. Minimum melon leaf width was 6 mm, observed in the control. The maximum width of melon leaves was 10 mm, observed in the combination of black silver mulch and 10 kg of cow dung compost for 1 plot.

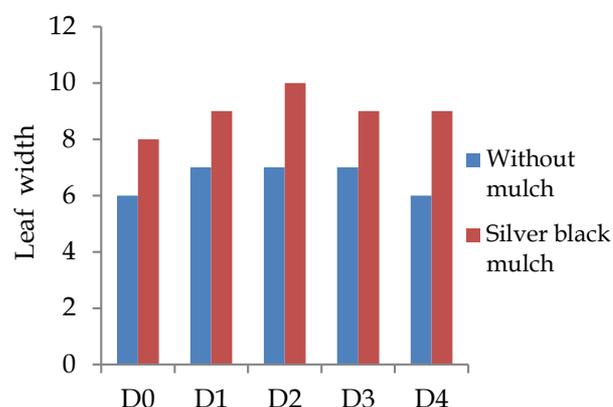


Figure 4. Average leaf width at 31 days after planting

The Anova results showed that there was no difference in the width of the melon leaves due to the application of cow dung compost. There was a significant difference between the length of melon leaves growing on plots covered with silver black plastic mulch and melon plants on plots without silver black plastic mulch. There was no significant interaction between the application of silver black plastic mulch and cow dung compost. The real effect of mulch application on plant growth was also found in other plants. The application of mulch has a significant effect on the growth of cucumbers. The best results were obtained for the application of silver plastic mulch, namely, 18.07 nodes, 8.78 pieces and 15.82 kp cucumber fruit weight for 1 plot (Purwaningrum, 2011). The use of mulch has a significant effect on stem diameter and dry weight of sweet corn (Wulandari et al, 2014).

### Conclusion

In this study it was concluded that: there was an increase in plant height, number of leaves, leaf length and width of melon leaves due to application of silver black plastic mulch; there was an increase in plant height, number of leaves, length of melon leaves due to application of cow dung compost, but the application of cow dung compost could not increase the length of melon leaves; there was no increase in all growth parameters measured due to the interaction of the

application of silver black plastic mulch and cow dung compost.

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#### Authors Contributions

In this research, Ahmad Raksun, Liwa Ilhamdi, Wayan Merta, Gde Mertha and Gde Cahyadi Wirajagat together conducted field experiments, collected data, analyzed data and wrote articles. Finally, Ahmad Raksun reviewed the entire contents of the article.

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#### Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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