

Study of the Use of Organic Polybags based on Water Hyacinth and Coconut Fiber on Growth and Results of Big Red Chili (*Capsicum Annum L.*)

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Abstract. Polybags, including plastic materials that are difficult to be decomposed by soil microbes, can affect plant growth. The increasing demand of red chili pepper every time causes the chili to be relied upon as a non-oil and gas export commodity. This study aims to examine the use of organic polybag based on water hyacinth and coconut fiber with the addition of goat manure to the growth and yield of red chili pepper (*Capsicum annum L.*). The study was conducted from August to December 2018. This study used a simple Randomized Block Design (RBD) repeated 3 times. The treatment is as follows: P0: control ie plastic polybag, PO1: EG: SK (40g: 60g) + goat manure 1 g, PO2: EG: SK (50g: 50g) + goat manure 1 g, PO3: EG: SK (60g: 40g) + goat manure 1 g, PO4: EG: SK (70g: 30g) + goat manure 1 g, and PO5: EG: SK (80g: 20g) + goat manure 1 g. The results of the study using organic planting pots made from water hyacinth 40 g: 60 g coconut fiber (PO1) showed the best results on vegetative observation variables namely plant height and number of leaves. The treatment of the use of organic planting pots in the comparison of water hyacinth 70g: 30g coconut fiber (PO4) showed the best results on generative observation variables, namely the number of flowers, number of fruits, and wet weight of fruit

Keywords: organic planting pot, hyacinth, coconut fiber and goat manure

INTRODUCTION

Red chili pepper (*Capsicum annum L.*) is one of chili types which is widely cultivated by Indonesian farmers [1]. This is evident from the commodity of fresh vegetables to export, including onions, tomatoes, potatoes, cabbage, carrots, and chili [2]. Based on data, the most consumed commodities are red chili pepper [3]; [4]. Plant nurseries usually use polybags, but the use of polybags in the nursery process has several disadvantages including the necessity to tear polybags when transplanting is done, making it less practical [5]. Polybags include plastic materials which are very difficult to be decomposed by soil microbes, which can affect

plant growth [6]. One way to overcome the disadvantages of polybags is to use eco-friendly (organic pot) seedling containers that are environmentally friendly [7]. Some types of organic materials that have been tried to be developed for organic pots include a mixture of clay, newsprint, cow dung, fur fibers, litter, and organic pot compost [8].

Researches on organic polybags or organic-based pots have been carried out by several researchers called organic planting bags [9]; [10]; [11]. For this reason, further research is needed on organic polybags with the addition of organic fertilizer. This study was conducted to study the use of organic polybag based on water hyacinth and coconut fiber with the addition of goat manure to the growth and yield of red chili pepper (*Capsicum annum L.*).

METHOD

This study was conducted in Pendem Village, Junrejo Subdistrict, Batu starting from August 2018 to December 2018. This study used a simple Randomized Block Design (RBD) repeated 3 times. The treatment is as follows: P0: control ie plastic polybag, PO1: EG: SK (40g: 60g) + goat manure 1 g, PO2: EG: SK (50g: 50g) + goat manure 1 g, PO3: EG: SK (60g: 40g) + goat manure 1 g, PO4: EG: SK (70g: 30g) + goat manure 1 g, and PO5: EG: SK (80g: 20g) + goat manure 1 g.

The implementation of this study includes making organic planting bags, seeding seedlings, processing land, planting seeds, maintaining, controlling pests and diseases, and harvesting. The observation variable consisted of vegetative and destructive observations.

The data obtained were analyzed using a simple randomized block design (RBD) method with the ANOVA test and using the BNJ test with a level of 5%. Analysis of the surface response method is to analyze plant variable data using the surface response method using Minitab application.

RESULTS

Plant Height

The results of variance analysis showed that the treatment of the use of organic planting pots made from

water hyacinth and coconut fiber showed a very significant influence on the height of the red chili pepper plant.

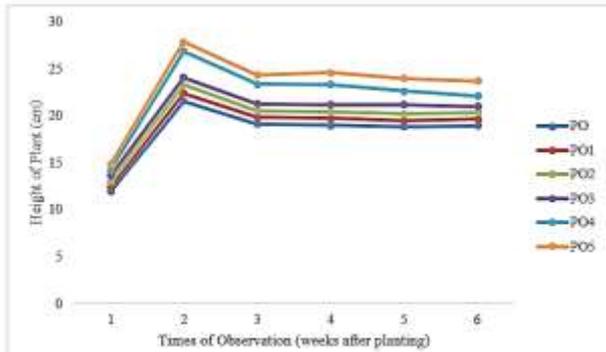


Figure 1. The height of chili plants at each age of observation (weeks after planting)
Description: PO: plastic polybags, PO1: 40 EG: 60 SK, PO2: 50 EG: 50 SK, PO3: 60 EG: 40 SK, PO4: 70 EG: 30 SK, PO5: 80 EG: 20 SK

In figure 1, it shows that the treatment of using organic planting pots of water hyacinth 40 g and coconut fiber 60 g (PO1) showed the highest plant height compared to other treatments, while the lowest was polybag treatment (P0).

Number of Leaves

The treatment of using organic planting pots made from water hyacinth and coconut fiber showed a very significant influence on the leaves number of the red chili pepper plants.

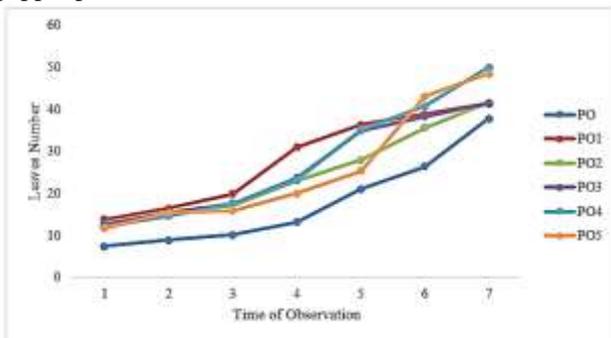


Figure 2. The number of chili leaves at each age of observation (weeks after planting)
Description: PO: plastic polybags, PO1: 40 EG: 60 SK, PO2: 50 EG: 50 SK, PO3: 60 EG: 40 SK, PO4: 70 EG: 30 SK, PO5: 80 EG: 20 SK

In figure 2, it shows that the treatment of using organic planting pots of water hyacinth 70 g and coconut fiber 30 g (PO4), and 80 g hyacinth and coconut fiber 20 g (PO5) showed the highest leaves number compared to other treatments, while the lowest was polybag treatment (P0).

Stem Diameter

The treatment of using organic planting pots made from water hyacinth and coconut fiber showed a very significant influence on the stem diameter of the red chili pepper plants.

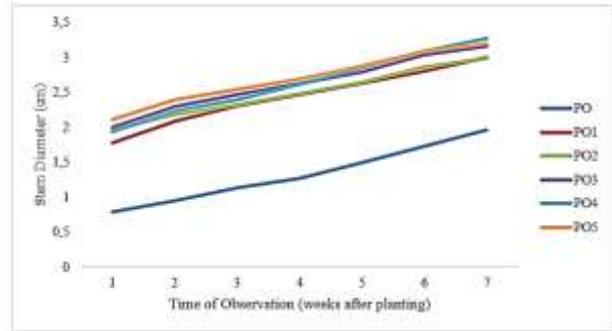


Figure 3. The stem diameter of chili pepper plants at each age of observation (weeks after planting)
Description: PO: plastic polybags, PO1: 40 EG: 60 SK, PO2: 50 EG: 50 SK, PO3: 60 EG: 40 SK, PO4: 70 EG: 30 SK, PO5: 80 EG: 20 SK

In figure 3, it shows that the treatment of using organic planting pots of water hyacinth 70 g and coconut fiber 30 g (PO4) showed the highest plant height compared to other treatments, while the lowest was polybag treatment (P0).

Amount of Interest

The treatment of using organic planting pots made from water hyacinth and coconut fiber showed a very significant influence on the interest amount of the red chili pepper plants.

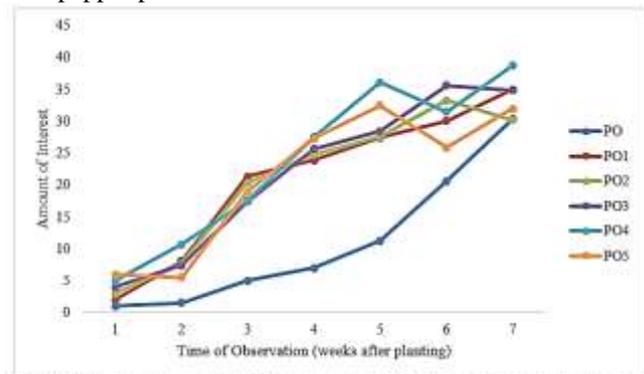


Figure 4. The interest amount of red chili pepper plants at each age of observation (weeks after planting)
Description: PO: plastic polybags, PO1: 40 EG: 60 SK, PO2: 50 EG: 50 SK, PO3: 60 EG: 40 SK, PO4: 70 EG: 30 SK, PO5: 80 EG: 20 SK

In figure 4, it shows that the treatment of using organic planting pots of water hyacinth 70 g hyacinth and coconut fiber 30 g (PO4), and 60 g hyacinth, and coconut fiber 40 g (PO3) showed the highest plant height compared to other treatments, while the lowest was polybag treatment (P0).

Quality of Crop Yields

The quality of the crop showed a significant difference in the number, length, and dry weight of the fruit. However, it did not show a significant difference in the diameter and the fresh weight of the fruit.

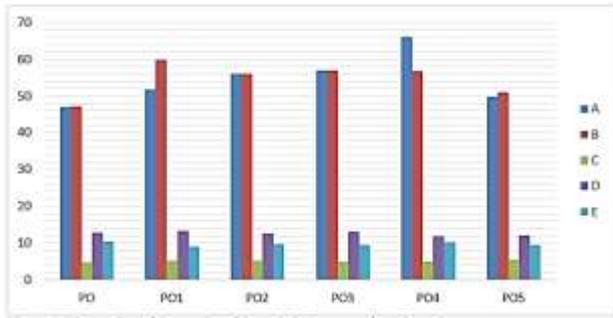


Figure 5. The quality of the results of the red chili pepper plants in each treatment. A: amount of fruit, B: dry fruit weight (g), C: fresh weight per fruit (g), D: fruit diameter (mm), E: fruit length (cm). Description: PO: plastic polybags, PO1: 40 EG: 60 SK, PO2: 50 EG: 50 SK, PO3: 60 EG: 40 SK, PO4: 70 EG: 30 SK, PO5: 80 EG: 20 SK.

Figure 5 above shows the average number of total fruits and fresh weight of fruit treated with 70 g of water hyacinth and coconut fiber 30 g (PO4) has the highest average value compared to other treatments. The highest average fruit weight per red chili pepper plant was treated with water hyacinth 40 g and coconut fiber 60 g (PO1), and 80 g water hyacinth and coconut fiber 20 g (PO5).

Analysis of Surface Response Methods

To visualize the shape of the contour response of chili pepper plants in polybags can be drawn in three-dimensional graphic images. The plot contours produced, consist of various color variations, each of which shows the range of the magnitude of the response produced. Maximum conditions are in dark green, which the range gives a clue to the location of the optimum variable point.

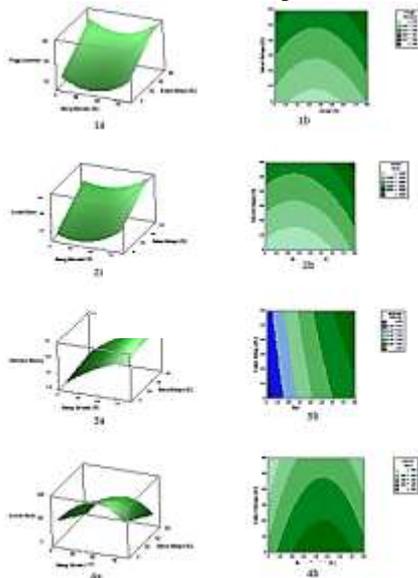


Figure 6. Characteristics of the response surface, c) surface plot and b) plot contours. Y is coconut leaf scale, X is water hyacinth in scale X, ZV is a comparison of water hyacinth and coconut fiber.

In Figure 6 above, there is a high response of red chili pepper plants to the provision of water hyacinth, namely at the optimum point of 79 g and the use of coconut fiber at an optimum point of 60 grams (Figure 1a). The response of the number of leaf and stem diameter to the provision of water hyacinth at an optimum point of 80 g, while the coconut husk was the optimum point at 60 g (Figures 2a and 3a). The response of the number of fruits showed that the optimum point of water hyacinth was 45,

while the coconut husk was the optimum point at 10 g (Figure 4a).

DISCUSSION

Overall, it can conclude that the treatment using organic planting pots made from water hyacinth 70 g and coconut fiber 30 g (PO4) shows the best treatment, which is indicated by parameters of plant height, number of leaves, number of flowers, and number of fruits. The nutrient content in organic materials used as the basic material for making organic pots causes a real plant growth response. This is in accordance with the results of previous studies that show that water hyacinth organic matter contains nutrients that are sufficient to enhance plant growth [5]; [7]; [9]; [10] especially its role in increasing the number of leaves [8].

The study of organic planting pots made from water hyacinth and coconut fiber produced a compact and strong structure [6]; [9]; [13]. The use of water hyacinth and coconut fiber as organic planting pots is beneficial for plants because they contain nutrients, such as Ca, Mg, K, Na, and P, which are needed by plants during growth [15]. Coconut coir as an organic planting pot is able to bind and store water with strong, good aeration, and drainage, in accordance with hot areas, containing essential nutrients and easily decomposed by soil microbes [8]. This is in accordance with the statement [4]; [12], that nitrogen is a constituent of many compounds such as Asamamino, which is needed in the formation or growth.

The results of the variance analysis of the fruits number, length, diameter, and fresh weight showed a real response. This is presumably because the plants get a nutrient supply to support their growth, and in the test organic water hyacinth and coconut fiber have nutrients P and K that play a role in fruit and flower formation [14]; [16].

CONCLUSION

The use of organic planting pots made from water hyacinth 40 g and coconut fiber 60g is good for vegetative growth of red chili pepper. The use of organic planting pots in the comparison of water hyacinth 70g and coconut fiber 30g is good for generative growth of red chili pepper plants.

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