
Use of Mulch and Organic Fertilizer on Chrysanthemum

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Abstract

This study aims to determine the growth response and yield of chrysanthemum plants in the application of several types of mulch and organic fertilizer. This research uses the basic design of Randomized Block Design with the factorial pattern with 2 factors and 3 replications. The first factor is mulch treatment consisting of 3 levels ie without mulch, rice husk mulch, and black silver plastic mulch. The second factor is organic fertilizer consists of 3 levels namely petrogenic, cow manure and chicken manure. The research results showed that the highest weight of flower stalk was obtained in silver black mulch treatment, increase of 9.63% when compared with the weight of the lowest flower stalk. The highest economic fresh weight was obtained in mulch treatment, increase of 17.53% when compared with the lowest fresh economic weight on mulch rice husk mulch treatment weighing. The highest weight of the flower stalk was obtained in the treatment of cow manure, increased of 10.14% when compared with the lowest weight of the flower stalk obtained in the treatment of cow manure weighing. The highest economic fresh weight was obtained in the cow manure treatment, which increased by 9.91% when compared with the lowest fresh economic interest weight obtained in the treatment of petrogenic fertilizer weighing.

Keywords: type mulch, petrogenic, manure; flower

1. Introduction

Chrysanthemum is the most popular and high demand, chrysanthemum has high economic value and potential to be developed as the basic component in agribusiness because it has many uses such as a raw material of perfume industry, cosmetic perfume, tea deodorizer, traditional medicine, and flower arrangement. Cultivation of chrysanthemums has grown in various centers of production in Indonesia as a source of profitable farmers income. The cultivation of chrysanthemums originally concentrated in Java has now spread to Bali. Chrysanthemum known as seruni flowers has a relatively long and easy to assemble, another advantage is that flowering and harvest can be arranged according to market needs [1].

Chrysanthemum production, especially Bali has not been able to meet the market needs because of low productivity and the area of planting is still cultivated by certain farmers only. The farmers who work on chrysanthemum in Bali are only concentrated in two districts of Buleleng and Tabanan and two villages namely Pancasari and Kembang Merta. Potential agroclimatic Pancasari village, Sukasada district, Buleleng district has a potential location for the development of cultivation of chrysanthemum as a mainstay commodity [2]. Problems encountered in chrysanthemum cultivation include the suitability of agroclimatic so as to impact on pest and disease attacks, poor production process causing low quality of flowers, the provision of planting materials (stek) originating from

outside Bali often does not guarantee continuity and quality so that it impacts consumer confidence. While on the one hand, Bali is a prosperous world tourism destination for the development of this commodity. Based on the research of [3] that to face problems in the procurement of high-quality chrysanthemum seedlings, farmers can use cuttings from parent plants and or production plants of yellow Fiji or white Fiji varieties.

According to [4], there are 1000 varieties of chrysanthemums growing in the world. Varieties of chrysanthemums that are widely grown in Indonesia are generally introduced from abroad. Chrysanthemum flowers are very popular in the community because of the many types, shapes, and colors of flowers. Generally, consumers prefer red, white and yellow, as the basic color of chrysanthemum. Interesting cut flowers are flowers that bloom perfect, the appearance of a healthy and fresh and have a stout stem and sturdy, so cut flowers become durable and durable.

Growth and quality of chrysanthemum plants are strongly influenced by the levels of nutrients available in planting medium and can be absorbed by plants. Lack of nutrients will cause obstacles in the growth and other symptoms that can interfere with the quality of plant growth. Modification of micro environments is needed to improve the productivity of chrysanthemum plants, for example by giving mulch and organic fertilizer to increase the production and quality of chrysanthemum flowers. Results of research in various places show that the use of black silver plastic mulch is consistently effective in suppressing the growth of weeds [5].

Good organic fertilizer is derived from livestock manure because it contains macro nutrients and micro nutrients relatively complete and low C/N ratio. High N content in animal waste can improve the quality and quantity of chrysanthemum plants because N works to accelerate the growth of plants, stimulate the repletion, improve the quality especially the protein, and become a source of food for microbes around the plant [6].

Petroganik fertilizer is a combination of organic raw materials such as manure, industrial waste, municipal waste by processing it to be in fine form. With product specifications: C-organic content (12.50%), C/N ratio (10-25), pH (4-8), and moisture content (4-12%). The use of petrogenic fertilizer is entirely on basic fertilization. The recommended dose of petrogenic fertilizer for horticultural crops is 2 ton/ha [7]. Poultry manure is an organic fertilizer from the fermentation of solid waste and liquid chicken poultry. Manure can also improve the biological properties of the soil, which fertilizes the life of soil bacteria to alter the food substances in the soil [8]. In the chicken, droppings contain nitrogen (N), phosphorus (P_2O_5), potassium (K_2O), lime (CaO), magnesium (Mg) and sulfite (SO_3) as well as micro elements such as Zn, Cu, Fe, and Mo. The nutrient content of chicken manure is N-total 2.27%, P-available 50.20 ppm and K-available 394.90 ppm [9]. Meanwhile, according to [10], nutrient content of chicken manure is 1.00-3.13% N, 2.80-6.00% P_2O_5 and 0.40-2.90% K_2O .

Cow manure is a waste fertilizer from cattle farms that play a role in improve soil physical properties and enrich the nutrients in the soil. Chemical analysis, cow manure contains 0.65% N and 1.25% K_2O , in addition to fertilizer Cattle pens, have high fiber content such as cellulose, providing macro and micro nutrients for plants [11]. The dosage of manure in Indonesia is generally 20 ton/ha [12]. According to [13], that the dosage of chicken manure 45 ton/ha gave the highest total fresh weight of chrysanthemum plant or increased 47.93% compared to without treatment of chicken manure. This study aims to determine the effect of various types of mulch and organic fertilizer and its interaction on the growth and yield of chrysanthemum plants. The hypothesis proposed is by giving of silver plastic mulch and cow manure and its interaction can increase the growth and yield of chrysanthemum plants.

2. Material and Methods

The study was conducted in Pancasari Village, Sukasada District, Buleleng District, Bali Province, with the altitude of 1,247 meters above sea level and an average temperature of 17°C to 20°C. This study starts from May to August 2015. The materials used in this research are chrysanthemum seed, chicken manure, cow manure, the organic mulch of rice husk, and black silver plastic mulch.

This research uses the basic design of Randomized Block Design (RBD) with the factorial pattern with 2 factors. The first factor is mulch type treatment consisting of 3 levels ie without mulch, black silver plastic mulch, and rice husk mulch. The second factor is the type of organic fertilizer consists of 3 levels namely cow manure, chicken manure, and petrogenic fertilizer. Thus there were 9 treatment combinations each repeated 3 times to obtain 27 plots, the distance between the treatment plot 30 cm while the distance between the 50 cm repeat, the area of a plot of experiment 1m x 1m with the population of 64 plants. For petrogenic fertilizer, chicken manure and cow manure each with a dose of 10 tons per hectare or equivalent to 1 kg per plot. The variables observed were plant height, a number of leaves, the length of the flower stalk, weight of flower stalk, and fresh weight of economic interest. The data of this research is analyzed statistically by using variance analysis. The treatment that has a significant effect until very real then followed by LSD test of 5% level.

3. Result and Discussion

Based on the result of an analysis, the significance of mulch type (M) and organic fertilizer (P) and its interaction (MP) effect on all observed variables can be seen in Table 1. Based on Table 1 it can be explained that the interaction (MP) has no significant effect ($P \geq 0.05$) on all observed variables. Mulch treatment (M) had a significant effect ($P < 0.05$) to very real ($P < 0.01$) to most observed variables except for plant height and a number of leaves. The treatment of organic fertilizer (P) had a significant effect ($P < 0.05$) on the variable length of flower stalk and weight of flower stalk.

Table 1.
The significant influence of mulch type (M) and organic fertilizer (P) and interaction (MP) type treatment on all observed variables.

Variable	Treatment		
	Type of Mulch (M)	Type of Organic Fertilizer (P)	Interaction MP
Plant height	ns	ns	ns
Number of leaves	ns	ns	ns
The length of the flower stalk	*	*	ns
Weight of flower stalk	**	*	ns
Fresh economic flower weight	**	ns	ns

**= highly significant effect ($P < 0.01$); * = significantly effect ($P < 0.05$); ns = not significant effect ($P \geq 0.05$)

3.1 Effect of mulch on chrysanthemum plants

The results showed that the highest weight was obtained in silver black mulch treatment which was 103.87 g or increased by 9.63% when compared with the lowest weight of the flower stalk obtained on without mulch weighing 94.74 g (Table 2 and Figure 1). In contrast, the highest fresh economic flower weight was obtained on without mulch of 85.28 g or an increase of 17.53% when compared with the lowest fresh economic flower weight on mulch rice husk mulch treatment 72.56 g (Table 2 and Figure 2).

The high weight of flower stalks on silver black mulch treatment because the use of silver black plastic mulch can increase the soil temperature and spur the growth of plants and speed up the harvest. Closed soil with plastic mulch water loss due to evaporation will be reduced, in addition to the use of drip irrigation on the land with a silver black plastic mulch will keep the soil moisture and increase water demand for plants. Water

use is more efficient because it can reduce water use by 45% Irrigation spraying, surface water flow will be retained by plastic mulch so that nutrients will not be lost by washing. The use of plastic mulch will keep the nutrients for plants, so the use of nutrients for plants is in the root zone, so the use of nutrients is more efficient. Mulch color will determine the energy of solar radiation received and impact on the temperature of the soil layer, in addition to light reflected mulch surface effect on environmental conditions around the plant. The silver black plastic mulch can maintain the stability of the microclimate in the soil, where the silver color on its upper surface can reflect back the coming solar radiation so as to increase photosynthesis while the black color will cause the radiation of the sun passed into the ground to be small and possibly zero, will cause the ground temperature to remain low resulting in good results [14]. According to [15] that the advantages of black silver plastic mulch such as black from mulch cause the dark impression to suppress weed growth, while silver color from mulch can reduce Aphids, Thrips and Mite pests and indirectly to keep the soil able to increase quality and yield.

Table 2
The average maximum plant height on the effect of mulch type (M) and organic fertilizer (P)

Treatment	Plant height (cm)	Number of leaves (strand)	The length of the flower stalk (cm)	Weight of flower stalk (g)	Fresh economic flower weight (g)
Type of Mulch					
Without mulch	69.68 a	28.01 a	115.32 b	94.74 b	85.28 a
Black silver plastic	75.69 a	27.90 a	122.86 a	103.87 a	79.10 ab
Rice husk	72.56 a	31.56 a	115.54 b	94.88 b	72.56 b
LSD 5%	-	-	6.63	6.19	6.72
Type of Organic Fertilizer					
Cow manure	73.44 a	29.50 a	122.76 a	103.10 a	82.41 a
Chicken manure	72.59 a	30.35 a	117.49 ab	96.78 b	79.55 a
Petrogenic	71.89 a	27.62 a	113.47 b	93.60 b	74.98 a

Average values followed by the same letter in the same treatment were not significantly different in the 5% LSD test.

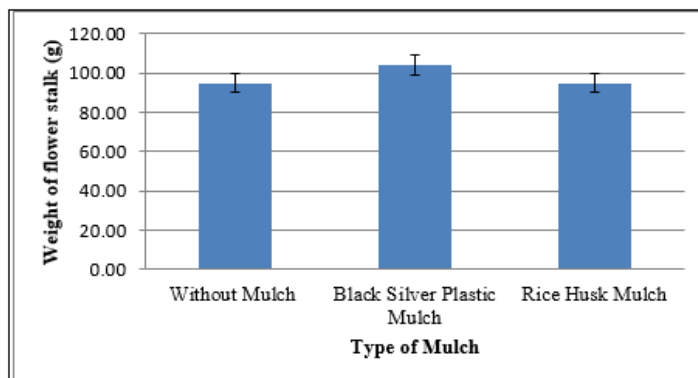


Figure 1
Histogram weight of flower stalk on mulch type treatment

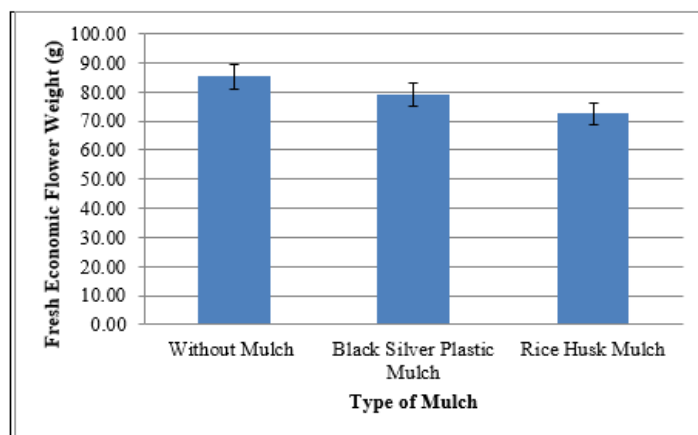


Figure 2
Histogram of fresh weight of economic interest on mulch type treatment

3.2 Effect of organic fertilizer on chrysanthemum plants

The highest yield of the flower stem obtained in the treatment of cow manure that is 103.10 g increased by 10.14% when compared with the lowest weight of the stalk obtained in the treatment of chicken manure and petrogenic fertilizer (Figure 2 and 3).

The high weight of the flower stalk and the weight of the fresh flower of the economy on the treatment of cow manure is caused because cow manure is a manure of waste from cattle farms that have high levels of fiber or cellulose in this livestock manure. Cow manure is a compound fertilizer containing macro and micro nutrients needed by plants. Manure has an influence for the long period of time and is a storehouse of food for plants such as, adding substances or nutrients in the soil and enhance humus content in the soil because the more humus found in the soil is relatively more fertile soil [16].

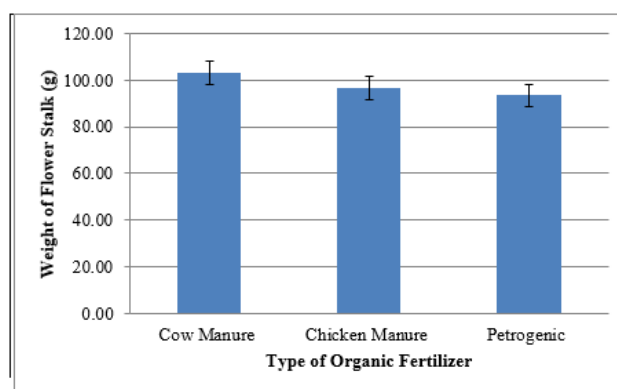


Figure 3

Histogram of the weight of the flower stalk on the type of organic fertilizer treatment

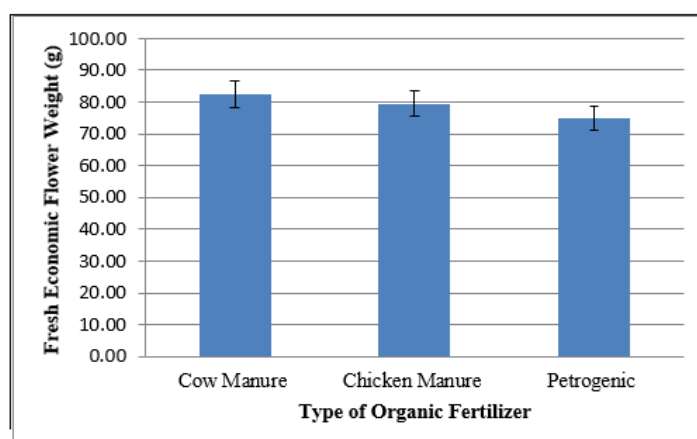


Figure 4

Histogram weight of fresh flower economy on the type of organic fertilizer treatment

The highest economic fresh weight was obtained in the cow manure treatment which was 82.41 g or an increase of 9.91% when compared with the lowest weight of the lowest economic interest obtained on the treatment of petrogenic fertilizer weighing 74.98 g (Table 2 and Figure 4). This is because cow manure contains macro nutrients and micro elements that can supply nutrient needs for plants. With the application of cow manure can add substances or nutrients in the soil, increase the content of humus in the soil, thereby improving the soil physical properties and improve soil nutrient status, soil growth becomes better so as to support growth on the ground for the better, it is shown With the increasing weight of fresh economic interest. The value of manure is not only determined by the content of nitrogen, phosphoric acid, and potassium, but because it contains almost all the macro

and micro nutrients that plants need and play a role in maintaining nutrient balance in the soil, in chrysanthemum cattle manure can increase the level of organic material. Thereby improving infiltration capacity so that the resistance to absorbing water and water holding increases. Cow manure is an organic fertilizer that can act as a soil enhancer, manure can prevent erosion, soil movement and cracking of soil and able to bind moisture, and soil cleansing. Fertilizer sometimes spur the growth and development of bacteria and other soil microorganisms, cow manure has a low content of N, P, K, but many contain micro elements, the nitrogen content in the manure will be released slowly.

4. Conclusion

The interaction between mulch treatment and organic fertilizer had no significant effect on all observed variables. Mulch treatment significantly affected the length of the flower stalk and had a very significant effect on the weight of the flower stalk and the fresh weight of the economic interest. The treatment of organic fertilizer has a significant effect on the length of the flower stalk and the weight of the flower stalk.

The highest yield of the flower stalk was obtained in silver black mulch treatment which was 103.87 g or increased by 9.63% when compared with the lowest weight of the flower stalk obtained in a 94.74 g much less treatment. While the highest fresh economic flower weight was obtained on mulch treatment which was 85.28 g or increased 17.53% when compared with the lowest weight of fresh economic interest obtained on rice husk mulch treatment weighing 72.56 g.

The highest yield of the flower stalk was obtained in the treatment of cow manure which was 103.10 g or increased by 10.14% when compared with the lowest weight of the flower stalk obtained in the treatment of chicken manure weighing 93.60 g. While the highest fresh weight of economic interest was obtained in the treatment of cow manure which was 82.41 g or an increase of 9.91% when compared with the lowest weight of the lowest economic interest obtained in the treatment of petrogenic fertilizer weighing 74.98 g. Cow manure and black silver mulch can be used to obtain the highest yield weight of flower stalk and fresh economic flower weight.

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