

The Use of Organic and Anorganic Mulch on Zucchini (*Cucurbita pepo* L) Plant with Elephant Manure from Borobudur Temple

Pramono Hadi^{1*}, Firda Rizkian², and Tri Rahayu³

¹⁻³Department of Agrotechnology, Faculty of Agriculture, Universitas Islam Batik Surakarta,
Jl. KH. Agus Salim No. 10 Surakarta 57147, Indonesia

*Corresponding author: pramhadi999@gmail.com

Abstract

This study aims at identifying the use of organic and inorganic mulch on zucchini plants from elephant manure to obtain optimal growth and yield. The study was conducted in Boyolali Regency with an altitude of 170 m above sea level. The experiment used factorial Randomized Completed Block Design (RCBD) with 3 replicates. There were two treatments under the study which were the dose of elephant manure and types of mulch. There were three doses of elephant manure dose treatment factor (G), namely (G₁) 5 tons / ha, (G₂) 10 tons / ha, (G₃) 15 tons / ha of elephant manure; treatment factor mulch (M), consisted of 3 types, namely (M₀) without mulch, (M₁) Silver mulch and (M₂) straw mulch. The results of this study showed that treatment for the dose of elephant manure (G) showed no significant effect on all observed parameters; the mulch type treatment (M) showed significant effect on fruit's weight per plant and fruit diameter; but showed significant effect on fruit length, and biomass fresh weight per plant, while biomass dry weight per plant showed no significant effect. The interaction between elephant manure dose and mulch type (GxM) showed no significant effect on all observed parameters. The highest fruit weight yield was (478.84 g) and the lowest was (253.05 g).

Keyword : elephant manure; mulch; zucchini;

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Introduction

The word horticulture comes from the Latin word *hortus* which means garden and *colere* which means to grow. Literally, horticulture means the science that studies the cultivation of garden plants. However, in general, experts define horticulture as a science that studies the cultivation of vegetable, fruits, flowers, or ornamental plants. Horticulture is the art of cultivating old plants, many of the techniques used in it are obtained empirically. However, in today's modern world the relationship of horticulture with other sciences has become closer, where these sciences have become a driver in the improvements and refinements of horticultural techniques (1).

The function of straw mulch is to suppress the growth of weeds, maintain soil aggregates from rainwater vacuum, minimize soil surface erosion, prevent water evaporation and to

protect the soil from exposure to sunlight; it can also help to improve the physical properties of the soil, especially soil structure so as to improve the stability of soil aggregates and can control pests and diseases in plants (2). In order to increase crop yield in semi-arid and arid areas, plastic film mulching (PFM) is widely used in Northwestern China. To date, many studies have addressed the effects of PFM on soil physical and biochemical properties in rain-fed agriculture in Northwestern China, but the findings of different studies are often contradictory. Therefore, a comprehensive review of the impacts of PFM on soil water content, soil nutrients and food production is needed (3).

In Indonesia the zucchini plant is not widely known. There are only a few farmers in Cipanas planting zucchini. The cultivation technique of zucchini is quite easy and

the age of the plant is also relatively short so that it can be quickly harvested. The fruit is favored by Japanese consumers and still limited in the market. But with most Japanese restaurants in Indonesia the market place becomes open, in addition to meeting the needs in supermarkets (4).

Elephants are the largest mammals on land. Elephants are intelligent animals so quite a lot of attractions use these animals to attract visitors. The zoo and Borobudur temple have elephants that are commonly used as mounted elephants. Elephants that have large bodies are able to produce solid waste as much as 110 kg / day. This much manure needs to be processed properly; else it can cause environmental problems. Currently elephant waste at Borobudur temple is directly applied to the farm without special processing (5). This study aims at identifying the use of organic and inorganic mulch on the zucchini plants with manure to obtain optimal growth and yield.

Material and Methods

The research was conducted in Sudimoro Village, Teras Sub district, Boyolali

regency with a location on 170 m above sea level. The study was conducted from January 2020 to February 2020. The materials used in the study were *zucchini* seeds, silver mulch, hay and elephant manure. The tools used for this study are hoes, tugal, trays, ruler, meter, signage, calculators, digital scales, cameras and other necessary stationery and complements. The study used the draft factorial treatment in the RCBD with 3 repeats. There were two factors namely the dose of elephant manure and mulch. There were 3 levels of elephant manure dose (G): G1: 58 tons / ha, G2: 10 tons / ha, G3: 15 tons / ha. Mulch treatment factor (M) were consisted of 3 types: M0: without mulch, M1: Silver mulch and M2: Straw mulch.

Results and Discussion

Mulch treatment (M) showed non-significant effect for all parameters on the weight of fruit and the diameter of the fruit, length of fruit, and the weight of fresh biomass, and the weight of dry biomass.

This has been proven by the results of the calculation of various fingerprint analysis.

Table 1. Mulch treatment for all parameters

Parameters	Mulch treatment	Highest	Lowest
Weight of fruit (g)	ns	478.84 G3M1	253.05 G1M0
Fruit Length (cm)	ns	23.11 G3M1	18.52 G2M0
Fruit diameter (cm)	ns	6.60 G2M1	4.76 G1M0
Fresh biomass weight (g)	ns	733.95 G3M1	387.37 G2M2
Dry biomass weight (g)	ns	80.01 G3M1	50.86 G2M2

The use of mulch can affect the availability of groundwater, the availability of groundwater will facilitate the process of photosynthesis so that photosynthesis can be used in the formation of leaf area (6). Application of mulch on compacted soil is a common engineering measure to suppress runoff and soil loss during ground-based mechanized forest operations. Despite the expanded use, efficacy of these rehabilitation treatments on soil quality as well as seedling survival and growth rate are crucial issues that require further attention (7).

PFM can significantly increase crop yield and economic return (especially for

spring maize) in rain-fed agriculture areas of Northwestern China. Crop zoning is recommended for PFM to achieve the largest economic benefit. However, full account needs to be taken of the environmental impacts relating to N loss, SOC depletion and film pollution to evaluate the sustainability of PFM systems and further research is required to quantify and mitigate these impacts (3).

The treatment of the dose of elephant manure (G) showed very significant effect on all observation parameters, except dry biomass weight. Plants in their growth require quite a lot of essential nutrients, if the nutrients are lacking in the soil; it can inhibit and interfere

with plant growth both vegetative and generative (8).

Fertilizer from animal feces contained macro or micro nutrients with low levels.

Organic fertilizers are available after the substance is decayed by micro-organisms (8). Elephant waste if not handled properly can cause environmental problems for visitors

Table 2. treatment of doses of elephant manure for all parameters

Parameters	doses of elephant manure	Highest	Lowest
Weight of fruit (g)	**	478.84 G3M1	253.05 G1M0
Fruit Length (cm)	*	23.11 G3M1	18.52 G2M0
Fruit diameter (cm)	**	6.60 G2M1	4.76 G1M0
Fresh biomast weight (g)	*	733.95 G3M1	387.37 G2M2
Dry biomast weight (g)	ns	80.01 G3M1	50.86 G2M2

and residents around the tourist attraction. Currently, elephant waste at Borobudur temple is directly applied to the farm without special processing (5).

The plots corresponded to seven doses of organic compost and additional treatments (mineral fertilizer); the subplots were corresponded to four growth cycles.

The variables analyzed were total herbage biomass (THB), canopy height (CH), tiller population density (TPD) and water efficiency for green leaf biomass production (WUEGLB) and green stem biomass (WUEGSB). In the

first cycle, TPD decreased linearly with increasing doses of the compost, with 47 tillers per m² at the dose of 79.8 Mg ha⁻¹, while THB and WUEGLB variables behaved quadratically, with a maximum point of 23.53 Mg DM ha⁻¹ cycle⁻¹, and 16.33 kg DM mm⁻¹ for the doses of 66.52 and 62.94 Mg ha⁻¹ of the organic compost. We concluded plant structural characteristics and water use efficiency were responsive to applications of the organic compost, and we recommend the dose of 67.7 Mg ha⁻¹ (9). non-significant effect on all observation parameters.

Table 3. Treatment of mulch interaction with a doses of elephant manure for all parameters

parameters	mulch interaction with a dose of elephant manure	Highest	Lowest
Weight of fruit (g)	ns	478.84 G3M1	253.05 G1M0
Fruit Length (cm)	ns	23.11 G3M1	18.52 G2M0
Fruit diameter (cm)	ns	6.60 G2M1	4.76 G1M0
Fresh biomast weight (g)	ns	733.95 G3M1	387.37 G2M2
Dry biomast weight (g)	ns	80.01 G3M1	50.86 G2M2

The influence of one factor is the same for all other levels of factors and equal to its main influence.

Conclusion

From the results of research on the type of mulch and the dose of elephant manure against the growth and yield of zucchini plants (*Cucurbita pepo* L.), it can be concluded as follows: 1) Treatment of the dose of elephant

manure (G) showed non-significant effect on all observation parameters. 2) Mulch treatment (M) showed very significant effect on the weight of fruit per plant and the diameter of the fruit, a real effect on the length of the fruit per plant, and the weight of fresh bio mast, while the weight of dry biomass showed a non-significant effect. 3). The interaction between elephant manure and mulch (GxM) has non-significant on all observation parameters.

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All the author contributed the experiment and prepared the paper

Conflict of Interest

All the author declared "no conflicts of interest" in this section.

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