

Effect of Different Mulching Materials on the Growth and Yield of Cucumber (*Cucumis sativus*)

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Abstract—An experiment was done to evaluate the effect of mulching materials on the growth and yield of cucumber from January 14, 2024, to March 17, 2024, at Western Mindanao State University (WMSU) Dacanay, Siay Campus, Zamboanga Sibugay Province. The experiment was done using a Randomized Complete Block Design (RCBD). Accordingly, four different mulching materials—weed organic mulch, blue plastic mulch, and yellow plastic mulch—were used as treatments. Each treatment was replicated three times. The un-mulched plot served as control. Mulching improves the growth and yield of cucumber. Plant height and number of leaves, number of fruits, and weight of fruits were observed. In height, the plants with yellow plastic mulching (T4) obtained the highest mean of 8.24 cm. This was followed by blue plastic mulching (T3) and no mulching (T1) with a mean of 8.01 cm and 7.16 cm, respectively. The lowest plant height, with a mean of 7.11 cm, was observed in the weeds/organic mulching (T2). The number of leaves with yellow plastic mulching (T4) obtained the highest number of leaves, with a mean of 7.84 leaves. This was followed by blue plastic mulching (T3) and no mulching (T1), with a mean of 7.12 and 7 leaves, respectively. The lowest number of leaves was obtained in weeds/organics (T2) with a mean of 6.6 leaves per plant. The number of fruits with weeds or organic mulching (T2) obtained the highest number of fruits, with a mean of 3.37 fruits. This was followed by yellow plastic mulching (T4) and blue plastic mulching (T3), with a mean of 2.37 and 2.33 fruits, respectively. The lowest number of fruits was obtained in No Mulching (T1), with a mean of 2.9 fruits per treatment block in the cucumber plant. Weight of fruits with weeds or organic mulching (T2) obtained the highest-weight fruits with a mean of 530.67 g. This was followed by yellow plastic mulching (T4) and no mulching (T1), with a mean of 472.33 gm and 466.33 gm, respectively. The lowest weight of fruits was obtained in blue plastic mulching (T3), with a mean of 377.33 g per treatment and blocks of cucumber plants.

I. INTRODUCTION

Cucumber (*Cucumis sativus* L.) is an economically important vegetable crop worldwide, valued for its nutritional content and culinary versatility. Optimal growth conditions, including soil moisture retention and weed suppression, are crucial for maximizing cucumber yield and quality. Mulching, a widely practiced agricultural technique, can significantly influence cucumber growth and productivity by modifying soil microclimate and suppressing weed competition. Mulching materials vary widely, including organic materials such as straw, leaves, and compost, as well as synthetic materials like plastic film and biodegradable polymers. Each type of mulch offers unique advantages and disadvantages, impacting soil temperature, moisture retention, weed control, and nutrient availability.

According to (Kader et al.2019) mulches can potentially limit weeds population through shading and act as a barrier to

evaporation of moisture from the soil and reduce water losses and soil erosion over the surface. It also prevents the rise of water containing salt in the field and causes the plant to easily absorb available water and nutrients for easy growth and development in the case of soil temperature control, plastic Mulching will provide the a higher temperature than others mulching, which means organic sources of mulching will produce ambient soil in all part of the soil and cause the smooth transfer of water and nutrients (Tara, 2000).soil temperature was slowest with the use of sorghum straw mulch as an organic mulching practice, which is best for agronomic. (Iqbal et al.2020) mulching play role not only in the weeds control but also in maintaining soil moisture by reducing the evaporation rate and changing the infiltration capacity of soil surface. (Jordan et al.2010) mulching cover the soil surface and therefore helps soil temperature that was beneficial for overall crops growth. It regulates and balances the soil temperature. It also has a positive effect on the protection of water and soil. Improve seed germination and seedling growth, development, and survival; suppress weed growth and kill the weed seeds; enhance pest and disease protection by removing the weed because it is the host plant for the most pest life cycle completion; enhance root establishment by having microclimate production among the soil; increase plant growth and harvest. In simple terms, mulch can also be defined as the materials used in the field to control the growth of unwanted plants (Chopra and Koul, 2020). This study aims to explore the, 1. To determine the yield performance of cucumber 2. Determine which of the Mulching materials most effective. And also The researcher aims to determine the impact of various mulching materials on the growth and yield, will involve comparing the growth parameters of plant height, number of leaves, number of fruits, and weight of cucumber grown under different mulching materials to find out which is most effective.

II. METHODOLOGY

The following are the materials used in conducting the study. plastic cellophanes (thickness 003), Notebook, 1 roll straw less, Ballpen, 200 m nylon rope Digital weighing scale, 10 sacks of soil, Herbicide, 24 poles, Pesticide (Lannate), 2pck seeds mega CF1 (east west), Sprinkler, Plywood,

Methods

Research design and treatment: the study was carried out using a Randomized Complete Block Design (RCBD) with

four (4) treatments replicated three (3) times, with eight (8) sample per replication for a total of 96 samples.

The treatments are as follows: T1- No Mulch, T2- Organic mulch, T3- Blue plastic mulch, T4- Yellow plastic mulch

Land preparation

The area was cleared, and all weeds were removed by using a bolo. After cleaning, dig the soil using Pick Mattock to reduce soil compaction.

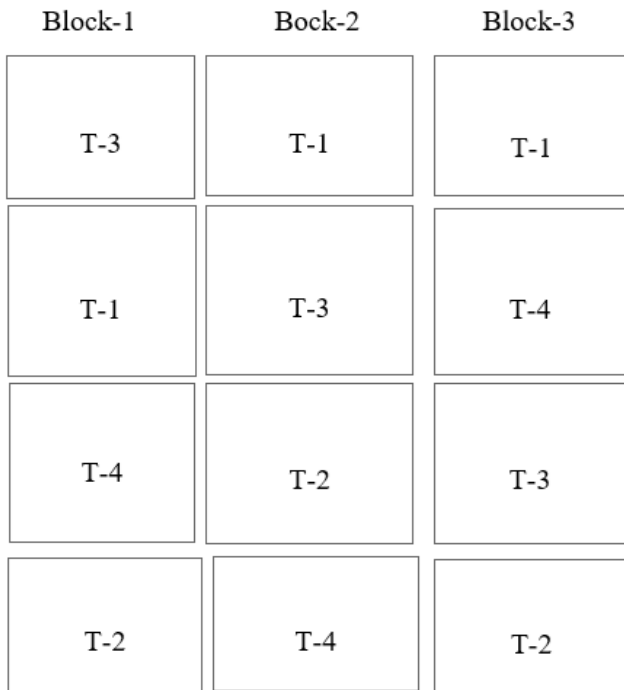


Figure 1: Field Layout

Total Experimental Area = 148m²
 Dimension per Plot = L-86cm/W-45cm
 Distance between Blocks = 2ft
 Distance between Treatment = 2ft
 Number of Plots =12

Legend:

- T1– No Mulching
- T2– Organic mulch
- T3- Blue plastic mulch
- T4 – Yellow plastic mulch

Planting

Cucumber seeds were planted about ½ to 1 inch deep in the soil, placing 2-3 seeds per pot. Water the soil thoroughly after planting.

Mulching

Different mulching materials, which are plastic, yellow, and blue mulch, and dried weeds, were spread before planting. Plastic mulch and dried weeds were distributed on the bed as a cover of soil. Planting holes were formed based on the 100 cm by 50 cm planting distance.

Fertilization

After the seeds have developed, a few sets of true leaves are applied application of fertilizer was done after 10 days

from planting. 14-14 -14 was used in fertilization. Applied late in the afternoon.

Watering

Water cucumber plants early in the morning to minimize evaporation and reduce the risk of fungal disease, and late in the afternoon to minimize water loss in the growth of cucumber plants.

Pest management

Spraying pesticide using lannate and foliar organic pesticides so that the pest cannot harm the plant and damage more.

Harvesting

Cucumber fruits were harvested every 2-3 days to ensure their peak freshness to prevent them from becoming overripe.

Data gathered.

Height of stem:

The height of eight (8) sample plants was measured on a cm scale from the based of the stem up to the tip of the plants with the help of a tape measure.

Number of leaves:

The number of leaves of eight (8) sample plants was counted individually per treatment and block.

Number of fruits:

The number of fruits in all plant samples was counted per treatment, and blocks.

Weight of fruits:

The weight of fruits in all plants per treatment and blocks was taken with the use of a digital weighing scale in grams.

III. RESULT AND DISCUSSION

TABLE 1: Height of Plants

Treatment	Block 1	Block 2	Block 3	Total	Mean
T1 no mulch	7.77	6.85	6.87	21.49	7.16
T2 Organic mulch	5.45	8.08	7.8	21.33	7.11
T3 blue plastic mulch	6.84	8.97	8.22	24.03	8.01
T4 yellow plastic mulch	9.08	7.43	8.2	24.71	8.24
Block total	29.14	31.33	31.09		
Grand total				91.56	
Grand mean					7.63

The plant height of cucumber measured in centimeters as influenced by different mulching materials is shown in Table 1. As noted in the data, plants with yellow plastic mulching (T4) obtained the highest mean of 8.24 cm. This was followed by blue plastic mulching (T3) and no mulching (T1), with a mean of 8.01cm and 7.16 cm, respectively. The lowest plant height, with a mean of 7.11 cm, was observed in the weeds/organic mulching (T2).

Table 2 shows the number of leaves per plant of cucumber as influenced by the different mulching materials. As shown in the table, cucumber plants with yellow plastic mulching (T4) obtained the highest number of leaves, with a mean of 7.84 leaves. This was followed by blue plastic mulching (T3) and no mulching (T1), with a mean of 7.12 and 7 leaves, respectively. The lowest number of leaves was obtained in weeds/organiacs (T2) with a mean of 6.6 leaves per plant.

TABLE 2: No. of Leaves

Treatment	Block 1	Block 2	Block 3	Total	Mean
T1 no mulch	6.7	7.17	7.13	21	7
T2-Organic mulch	6.8	7.3	5.7	19.8	6.6
T3-blue plastic mulch	6.96	7.7	6.71	21.37	7.12
T4-yellow plastic mulch	7.92	8.4	7.21	23.53	6.84
Block total	28.38	30.57	26.75		
Grand total				85.7	
Grand mean					7.14

TABLE 3: No. of Fruits

Treatment	Block 1	Block 2	Block 3	Total	Mean
T1 no mulch	4	2	2.7	8.7	2.9
T2 organic mulch	2.7	2.7	4.7	10.1	3.37
T3 blue plastic mulch	1.3	2	3.7	7	2.33
T4 yellow plastic mulch	3.7	1.7	1.7	7.1	2.37
Block total	11.7	12.8	12.8		
Grand total				32.9	
Grand mean					2.74

Shows the number of fruits per plant in every treatment and block of cucumber as influenced by the different mulching materials. As shown in the table, cucumber plants with weeds or organic mulching (T2) obtained the highest number of fruits, with a mean of 3.37 fruits. This was followed by yellow plastic mulching (T4) and blue plastic mulching (T3), with a mean of 2.37 and 2.33 fruits, respectively. The lowest number of fruits was obtained in No Mulching (T1), with a mean of 2.9 fruits per treatment block in the cucumber plant.

TABLE 4: Weight of Fruits

Treatment	Block 1	Block 2	Block 3	Total	Mean
T1 no mulch	705	420	274	1399	466.33
T2 organic Mulch	820	538	234	1592	530.67
T3 blue plastic mulch	215	330	587	1132	377.33
T4 yellow plastic mulch	605	346	463	1414	471.33
Block total	2345	1634	1558		
Grand total				5537	
Grand mean					461.42

Shows the weight of fruits per treatment and blocks in the cucumber plant as influenced by different mulching materials. As shown in the table, cucumber plants with weeds or organic mulching (T2) obtained the highest-weight fruits with a mean of 530.67 g. This was followed by yellow plastic mulching (T4) and no mulching (T1), with a mean of 472.33 gm and 466.33 gm, respectively. The lowest weight of fruits was obtained in blue plastic mulching (T3), with a mean of 377.33 g per treatment and blocks of cucumber plants.

APPENDIX 1: ANOVA. Plant height

SV	DF	SS	MS	F value	5%. 1%
Block	2	0.72	0.36	0.28	
Treatment	3	3.00	1.00	0.78	4.76 9.78
Error	6	7.70	1.28		
Total	11	11.42			

CV = 15%

Ns= non-significant

The result shows no significant difference between the treatments. This means that the different mulching materials, namely weeds or organic mulching, blue plastic mulching, and yellow plastic mulching, influence the height of the cucumber. Their performance was similar when compared to the control. This could also mean that the experiment failed to detect differences among treatments.

The non-significant result of the plant height of cucumber may be due to the variety of cucumber used, which was Mega C F1" is a specific hybrid variety of cucumber. The term "F1" indicates that it is a first-generation cross between two genetically distinct parent lines. Mega C cucumbers are likely known for certain desirable traits such as high yield, disease resistance, uniformity in size and shape, and possibly specific flavor profiles.

APPENDIX 2: ANOVA. No of leaves

Source of variance	DF	SS	MS	F value	5% 1%
Block	2	1.84	0.92	5.22	
Treatment	3	2.42	0.81	5.46	4.76 9.78
Error	6	0.89	0.15		
Total	11	5.14			

CV= 5.3%

*= significant

The result shows the significant difference among the treatments, as shown by the analysis of variance. The result indicates that the different mulching materials had no variation to influence the number of leaves in cucumber

APPENDIX 3: ANOVA. No fruits

Source of variance	DF	SS	MS	F value	5% 1%
Block	2	2.62	1.31	1.01	4.76 9.78
Treatment	3	2.17	0.72	0.55	
Error	6	7.82	1.30		
Total	11	12.61			

CV=42%

Ns=non-significant

The result shows no significant difference among the treatments, as shown by the analysis of variance. The result indicates that the different mulching materials had no variation to influence the number of fruits in cucumber.

TABLE 5. Transformed data on the average number of fruits of cucumber as influenced by the different mulching materials.

APPENDIX 4: ANOVA. Weight of fruits

SV	DF	SS	MS	F value	5% 1%
Block	2	94222.17	47111.08	1.01	
Treatment	3	35964.25	11988.08	0.36	
Error	6	279854.5	46642.42		
Total	11	410040.92			

CV=46%

Ns= non-significant

The result shows no significant difference among the treatments, as shown by the analysis of variance. The result indicates that the different mulching materials had no variation to influence the weight of fruits in cucumber.

IV. SUMMARY AND CONCLUSION

The effect of different mulching materials on the growth and yield of cucumber (*Cucumis sativus L.*) was conducted at Western Mindanao State University (WMSU) Dacanay, Siay Campus, Zamboanga Sibugay Province from January 14, 2024 to March 17, 2024.

- 1.) To determine the yield performance of cucumber,
- 2.) To determine the effect of different mulching materials on the cucumber
- 3.) To determine which of the Mulching materials is most effective.

The study was carried out in a Randomized Complete Block Design (RCBD) with four treatments and replicated three times. Treatments were as follows: T1: No mulch; T2: Organic mulching; T3: Blue plastic mulching; T4: Yellow plastic mulching. The parameters used to determine the effect of the different treatments were plant height, average number of leaves, average number of fruits, and average weight of fruits per plot.

The result can be summarized as follows:

The plant height, average number of leaves, average number of fruits, and average weight of fruits per treatment and block of cucumber show a significant and no significant difference, suggesting that the different mulching materials influence the growth of cucumber. The performance of the different mulches was not like that of the control. Based on the findings of the study, it can be concluded that the different mulching materials improved crop production and increased nutrient availability for the plants, which cannot be determined in a short span of time. Organic mulch is economically and environmentally sound, while plastic mulch will be less labor-intensive. Although all the mulching materials have shown promises, farmers should consider the suitable time of applying each type of mulch for great success.

V. RECOMMENDATIONS

In line with the result, the researchers recommend that farmers should use mulching as one of their farming practices; however, the use of mulching materials will depend on the purpose of the farmer. For the researcher, it is also suggested that further research should be carried out to the following line: Find an area where the production of crops will be longer benefited and do research on how different mulching materials can be used to determine their influence on the growth and development of the crop. Finding a good variety of crops that are suitable for specific mulching materials can also be helpful for the crop to grow further and healthier.

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