Short Research Article

Performance of Cucumber (*Cucumis sativus* L.) as Applied with Vermi Tea as Organic Fertilizer

ABSTRACT

Aims: To determine the performance of Cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer
Study design: Experimental
Place and Duration of Study: Southern Philippines Agribusiness and Marine and Aquatic School of Technology (SPAMAST) Institute of Agricultural Technology and Entrepreneurial Studies (IATES) Buhangin, Malita, Davao Occidental from October 2019 to January 2020.
Methodology: Ramdomized Complete Block Design with five treatments and replicated three times as follows: Treatment 1 (Control), Treatment 2 (150 ml of vermitea/liter of water), Treatment 3 (200 ml of vermitea/liter of water), Treatment 4 (250 ml of vermitea/liter of water) and Treatment 5 (300 ml of vermitea/liter of water).
Results: Result showed that there was a significant effect of vermi tea as organic fertilizer application of cucumber (*Cucumis sativus* L.) in terms of weight of fruits harvested while number of days to germinate, number of flowers per plant, length of fruits, diameter of fruits, and number of fruits harvested was no significant effect.
Conclusion: Based on the results, the application of vermi tea as organic fertilizer gives the best result only on the weight of fruit harvested where vermi tea as a source of potassium has helped to develop cucumber (*Cucumis sativus* L.) fruits.

Keywords: Performance, cucumber, vermi tea, organic fertilizer

1. INTRODUCTION

Cucumber (*Cucumis sativus* L.) was an economically important family of botanical cucurbitaccaea, commonly called cucurbits and gourds. cucumber is a hot plant growing wine and annual crops in the season. the cucurbital order belongs botanically to the magnoliophyte group, the class magnoliopsida. the edible and economically important part were immature fruit and therefore its potential yield would be affected by its flowering characteristics, particularly its femininity (Tanurdzic & Banks, 2004).

Nowadays, cultivators have developed vermicompost (vc) aqueous extracts which are commonly called vermicompost' there are' which can improve crop tolerance to disease, plant growth and are much more easily applied to soils and plants (Ingham, 2003). vermicompost is much better than traditional thermophilic compost than microbial productivity and development (Edwards, 2004). while microbial organic matter can be biochemically deteriorated, earthworms are significant derivatives to the process, reinforce the substratum and switch biological function (Aira et al., 2002). Throughout

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vermicomposting, nutrients are generated and converted into soluble and available crops (Ndegwa &Thompson, 2001).

This study was conducted to evaluate the impact of vermi tea as organic fertilizer on the performance of cucumber (*Cucumis sativus* L.).

1.1 Statement of the Problem

This study aimed to determine the performance of Cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer. Specifically, it sought to answer the following questions.

1. Is there a significant difference on the number of days to germinate of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?
2. Is there a significant difference on the number of flowers per plant of a cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?
3. Is there a significant difference on the length of fruits of a cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?
4. Is there a significant difference on the diameter of fruits of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?
5. Is there a significant difference on the number of fruits harvested of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?
6. Is there a significant difference on the weight of fruit harvested of a cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer?

1.2 Significance of the Study

This study imparts and as supplement of some information which gathered by other researchers and references to those people who are interested in adopting new technology. It shared knowledge to the small- and large-scale farmers on the production management of cucumber (*Cucumis sativus* L.) production through low-cost fertilizer and so it produced an organic product that is healthier and no harmful effect to the body.

1.3 Scope and Limitation of the study

The study was conducted in the experimental area of SPAMAST, Buhangin, Malita, Davao Occidental from October 2019.

This was limited only the effect of different levels of vermi tea as applied organic fertilizer on the yield performance of cucumber (*Cucumis sativus* L.) with the following parameters: number of days to germinate, number of flowers per plant, length of fruits, diameter of fruits, number of fruits harvested, and weight of fruits harvested.

2. METHODOLOGY

The study was conducted at SPAMAST Buhangin, Malita, Davao Occidental from October 2019 to January 2020. Buhangin, Malita, Davao Occidental is bounded by the Municipality of Sta. Maria on the North and Barangay Tubalan on the South while on the East by Davao Gulf. It occupies an area of 8.0 hectares, comprises about 3.58% of the total land area of the municipality of Malita.

Soil type of barangay Buhangin is characterized by an alluvial sandy loam soil. However, a portion of this area is silt, clay loam that extends to the shoreline of Davao gulf. The experimental area has an elevation of more or less 53 meters above the sea level.

Based on the Agro-climatic Map developed by the Philippine Atmospheric Geo-physical and Astronomical Service Administration (PAGASA) Davao Occidental has a mean average rainfall of 87.85 mm per month with mean temperature of 34.3^{0}C.It is blessed with favorable

climate and rainfall pattern generally conforms to Types IV which is characterized by more or less evenly distributed rainfall.

2.1. Experimental Design and Treatments

This study was laid-out in Randomized Complete Block Design (RCBD) with five (5) treatments replicated three times. Each treatment was randomly selected using draw-lot technique.

The treatments were as follows:
T_1 – Control
T_2 – 150 ml of vermi tea/liter of water
T_3 – 200 ml of vermi tea/liter of water
T_4 – 250 ml of vermi tea/liter of water
T_5 – 300 ml of vermi tea/liter of water

2.1.1 Experimental Field Lay-out

This study has a total area of 120 square meters measuring 10 meters wide and 12 meters length. It consisted of 15 plots measuring 2 meters x 3 meters with a corresponding distance of 0.5-meter alley.

2.1.2 Randomization

Draw-lot technique was employed in the assignment of treatments to their respected plots and blocks.

2.1.3 Procurement of Materials

Cucumber seeds and other materials such a seed tray was purchased in Digos City, particularly in agricultural supplies. Vermicast was purchased in Basiawan, Sta. Maria, Davao Occidental.

2.1.4 Preparation of Vermi Tea

Vermi tea preparation, placed two (2) kilograms of vermicast, two (2) kilograms of molasses in a bucket of five (5) gallons, dissolved two (2) liters of water, and positioned the aerator. Covered the bucket to keep it free of insects and animals. Placed the brewing in a shaded region out of the immediate sunlight. Let it aerate, stirring occasionally, for 18 to 24 hours of fermentation.

2.2 Cultural Management and Practices

2.2.1 Land Preparation

The area was slashed to remove unwanted plants and it was followed by plowing and harrowing twice to reduce the soil into fine tilt. Thereafter, it was levelled and shallow furrows were made. Sticking was done after measuring the size of the plot and the planting distance. Digging was followed with 0.50 meter between furrows and 0.50 between hills.

2.2.2 Planting

Direct seeding method of planting was adapted with two (2) seeds per hill. The planting distance was 0.50 meter between furrows. Thinning out was done a week after the plants have germinated leaving only one plant per hill. Replanting was done after one week for missing hills.

2.2.3 Weeding and Cultivation

Manual weeding was employed periodically to eliminate weeds that cause competition of nutrients. Weeding was employed late in the afternoon to prevent the plant stress. Shallow cultivation was done once a month to loosen up the soil and control the growth of weeds.

This was done regularly to avoid competition and ensure the penetration and absorption of nutrients.

2.2.4 Fertilization
Vermi tea was sprayed three (3) days after planting and seven
(7) days interval until the study was terminate. This was done early in the morning or before sunrise using hand sprayer to ensure sufficient result.

2.2.5 Pest and Diseases Prevention and Control
Cucumber plants is prone to beetle, leaf folder, aphids and powdery mildew that was attack anytime the vegetable and reproductive stages of plants. To prevent from the occurrence of these pests and diseases, insecticides and fungicides was sprayed regularly following the recommended dosage stipulated by the manufacturers. This was done using hand spray.

2.2.6 Trellis Establishment
Cucumber was a vine crops belong to *Cucurbitaceae* family which needs trellis or any materials that the plants could climb for their survival. A fence type trellis was conducted made up of round number with a GI which was connected along the poles of every plant. This was done right after the seeds were germinated.

2.2.7 Watering
Cucumber was a characterized as high-water requirement crop. Heavy watering is desirable to ensure proper penetration to the root zones. Periodic watering was done especially during drought period and early stages of plants. This was done using water sprinkler with a fine's holes.

2.2.8 Harvesting
Harvesting was done when cucumber fruits reached its marketing or vegetable stage or when pale green color changed to dark green. This was done by cutting the fruits one inch away from the stem.

2.3 Data Gathered

2.3.1 Number of Days to Germinate
This was determined by counting the average number of days germinates per hill in every treatment per replication.

2.3.2 Number of Flower per Plant
This was determined by counting the average number of flowers per plant per hill in every treatment per replication.

2.3.2 Length of Fruits
This was determined by measuring the fruits per plant in every treatment per replication using ruler.

2.3.3 Diameter of Fruits
This was done by measuring the fruit diameter of cucumber from base, mid and tip of the ten sample plants using tape measure and caliper.

2.3.4 Number of Fruits Harvested
This was determined by counting the fruits harvested.

3. RESULTS AND DISCUSSION

3.1 Number of Days to Germinate

Table 1 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of number of days to germinate as affected by the application of vermi tea as organic fertilizer.

Treatment 3 got the lowest number of days to germinate of cucumber (*Cucumis sativus* L.) with a mean value of 3.27 days followed by Treatment 1 with a mean of 3.43 days, Treatment 5 with a mean of 3.40 days, Treatment 2 with a mean of 3.37 days while Treatment 4 got the highest with a mean value of 3.60 days.

Analysis of Variance (ANOVA) exhibited that there was no significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of number of days to germinate as affected by the application of vermi tea as organic fertilizer.

Table 1. Number of days to germinate of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (day)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	3.43			
T_2 – 150 ml Vermi Tea/liter of water	3.37	1.350^{ns}	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	3.27			
T_4 – 250 ml Vermi Tea/liter of water	3.60			
T_5 – 300 ml Vermi Tea/liter of water	3.40			

ns = not significant
CV = 5.31%

3.2 Number of Flower per Plant

Table 2 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of number of flower per plant as affected by the application of vermi tea as organic fertilizer.

Treatment 3 got the highest number of flower per plant of cucumber (*Cucumis sativus* L.)with a mean value of 38.40 flowers followed by Treatment 4 with a mean of 38.07 flowers, Treatment 1 with a mean of 37.87 flowers, Treatment 2 with a mean of 37.73 flowers while Treatment 5 got the lowest with a mean value of 34.20 flowers.

Analysis of Variance (ANOVA) exhibited that there was no significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of number of flower per plant as affected by the application of vermi tea as organic fertilizer.

Table 2. Number of flowers per plant of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (flower)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	37.87			
T_2 – 150 ml Vermi Tea/liter of water	37.73	0.068^{ns}	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	38.40			
T_4 – 250 ml Vermi Tea/liter of water	38.07			

T_5 – 300 ml Vermi Tea/liter of water	34.20	

ns = not significant
CV = 30.84%

3.3 Length of Fruits

Table 3 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of length of fruits as affected by the application of vermi tea as organic fertilizer.
Treatment 4 got the highest length of fruits of cucumber (*Cucumis sativus* L.) with a mean value of 91.88 mm followed by Treatment 3 with a mean of 81.45 mm, Treatment 5 with a mean of 73.57 mm, Treatment 2 with a mean of 62.60 mm while Treatment 1 got the lowest with a mean value of 59.56 mm.
Analysis of Variance (ANOVA) exhibited that there was no significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of length of fruits as affected by the application of vermi tea as organic fertilizer.

Table 3. Length of fruits of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (mm)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	59.56			
T_2 – 150 ml Vermi Tea/liter of water	62.60	2.328^{ns}	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	81.45			
T_4 – 250 ml Vermi Tea/liter of water	91.88			
T_5 – 300 ml Vermi Tea/liter of water	73.57			

ns = not significant
CV = 20.55%

3.4 Diameter of Fruits

Table 4 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of diameter of fruits as affected by the application of vermi tea as organic fertilizer.
Treatment 3 got the highest diameter of fruits of cucumber (*Cucumis sativus* L.)with a mean value of 43.30 mm followed by Treatment 4 with a mean of 42.01 mm, Treatment 1 with a mean of 39.53 mm, Treatment 5 with a mean of 38.90 mm while Treatment 2 got the lowest with a mean value of 38.23 mm.
Analysis of Variance (ANOVA) exhibited that there was no significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of diameter of fruits as affected by the application of vermi tea as organic fertilizer.

Table 4. Diameter of fruits of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (mm)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	39.53			
T_2 – 150 ml Vermi Tea/liter of water	38.23	0.779^{ns}	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	43.30			
T_4 – 250 ml Vermi Tea/liter of water	42.01			
T_5 – 300 ml Vermi Tea/liter of water	38.90			

ns = not significant
CV = 10.51%

3.5 Number of Fruits Harvested

Table 5 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of number of fruits harvested as affected by the application of vermi tea as organic fertilizer.
Treatment 3 got the highest number of fruits harvested of cucumber (*Cucumis sativus* L.) with a mean value of 5.33 fruits followed by Treatment 2 with a mean of 5.17 fruits, Treatment 4 with a mean of 5.13 fruits, Treatment 5 with a mean of 4.20 fruits while Treatment 1 got the lowest with a mean value of 3.03 fruits.
Analysis of Variance (ANOVA) exhibited that there was no significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of number of fruits harvested as affected by the application of vermi tea as organic fertilizer.

Table 5. Number of fruits harvested of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (fruit)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	3.03			
T_2 – 150 ml Vermi Tea/liter of water	5.17	1.753^{ns}	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	5.33			
T_4 – 250 ml Vermi Tea/liter of water	5.13			
T_5 – 300 ml Vermi Tea/liter of water	4.20			

ns = not significant
CV = 27.76%

3.6 Weight of Fruits Harvested

Table 6 shows the yield performance of cucumber (*Cucumis sativus* L.) in terms of weight of fruits harvested as affected by the application of vermi tea as organic fertilizer.
Treatment 4 got the highest weight of fruits harvested of cucumber (*Cucumis sativus* L.) with a mean value of 10.73 grams followed by Treatment 3 with a mean of 10.45 grams, Treatment 1 with a mean of 9.69 grams, Treatment 2 with a mean of 8.33 grams while Treatment 5 got the lowest with a mean value of 7.74 grams.
Analysis of Variance (ANOVA) exhibited that there was significant difference among Treatment on the growth and yield performance of cucumber (*Cucumis sativus* L.) in terms of weight of fruits harvested as affected by the application of vermi tea as organic fertilizer.
Least Significant Difference (LSD) showed that Treatment 3 and Treatment 4, was significant different to Treatment 1 (Control). Whereas Treatment 2 and Treatment 5 was no significantly different to Treatment 1 (Control). It implies that there was a significant effect on the weight of fruits harvested of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.
According to Sinha *et al.,* (2008) vermicast has millions of valuable soil microbes including nitrogen, potassium and phosphorus (NPK) that significantly the growth of plant. It implies that potassium enhance dry biomasses of plant through enhancing photosynthetic pigments content and cell metabolic processes including; cell growth and elongation (Farago, 2008). Numerous studies indicate application of potassium, increases plant dry weight of plants (Botella *et al.,* 2017). As regard to the physical fruit traits, many efforts illustrated that potassium improved fruit weight and dry matter contents (Gupta and Sengar, 2000) as well as increased cucumber fruit biomasses (Akram and Ashraf, 2011).

Table 6. Weight of fruits harvested of cucumber (*Cucumis sativus* L.) as applied with vermi tea as organic fertilizer.

TREATMENT	MEAN (gram)	CF	Tabular F 5%	Tabular F 1%
T_1 – Control	9.69			
T_2 – 150 ml Vermi Tea/liter of water	8.33^{ns}	4.321*	3.84	7.01
T_3 – 200 ml Vermi Tea/liter of water	10.45*			
T_4 – 250 ml Vermi Tea/liter of water	10.73*			
T_5 – 300 ml Vermi Tea/liter of water	7.74^{ns}			

* = significant
CV = 11.62%

4. SUMMARY, CONCLUSION AND RECOMMENDATION

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This study was conducted to evaluate the performance of cucumber (Cucumis sativus L.) as applied with vermi tea as organic fertilizer at Southern Philippines Agribusiness and Marine and Aquatic School of Technology (SPAMAST) Institute of Agricultural Technology and Entrepreneurial Studies (IATES) Buhangin Malita Davao Occidental from September 2019 to January 2020.

Complete Ramdomized Design was laid out with five treatments and replicated three times as follows: Treatment 1 (Control), Treatment 2 (150 ml of vermitea/liter of water), Treatment 3 (200 ml of vermitea/liter of water), Treatment 4 (250 ml of vermitea/liter of water) and Treatment 5 (300 ml of vermitea/liter of water).

The following parameters were taken: number of days to germinate, number of flower per plant, length of fruits, diameter of fruits, number of fruits harvested, and weight of fruits harvested.

Result showed that there was a significant effect of vermi tea as organic fertilizer application on the yield of cucumber (Cucumis sativus L.) in terms of weight of fruits harvested while number of days to germinate, number of flowers per plant, length of fruits, diameter of fruits, and number of fruits harvested.

4.1 Conclusion

Based on the study results, the application of vermi tea as organic fertilizer gives the best result only on the weight of fruit harvested cucumber (*Cucumis sativus* L.) where vermi tea as a source of potassium has helped to develop cucumber (*Cucumis sativus* L.) fruits.

4.3 Recommendation

Based on the result the researcher the researcher is hereby recommend to use Treatment 4 (250 ml of vermitea/liter of water) as it gives significant result on weight of fruits harvested. It also recommends to conduct further study with additional organic fertilizer to supplement the yield of cucumber (*Cucumis sativus* L.).

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