GROWTH AND YIELD PERFORMANCE OF BELL PEPPER (*CAPSICUM ANNUUM L.*) AS APPLIED WITH VERMITEA AS ORGANIC FERTILIZER

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ABSTRACT

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The study was conducted to determine the growth and yield performance of bell peppers (Capsicum annuum L.) as applied with vermicompost as an organic fertilizer. The experiment was conducted from November 2019 to February 2020. It was laid out in Randomized Complete Block Design (RCBD) 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 parameters measured were initial plant height (15, 30, and 45 DAP), number of marketable fruits, number of non-marketable fruits, number of fruits harvested, weight of marketable fruits, weight of non-marketable fruits, weight of fruits harvested,

yield in tons per hectare, and return on investment. Statistical analysis revealed a highly significant difference in the initial plant height at 15, 30, and 45 days after planting (DAP), as well as the number and weight of marketable fruits. Moreover, there was also a significant difference in the number of fruits harvested. However, there was no significant difference in the number of non-marketable fruits, weight of non-marketable fruits, weight of fruits harvested, and yield in tons/hectare. Treatment 2 achieved the highest return on investment of 68.22%.

INTRODUCTION

Bell pepper (*Capsicum annuum L.*) is widely recognized as a seasoning in culinary. Its pigment and pungent substances are widely used in processing. The most popular and widely used condiment in the world (Lutz & Freitas, 2008). It is a horticultural crop of agronomic value, regarded as the world's fourth most important vegetable. It is a vital source of nourishment and medicine, and its production provides jobs in the tropics. The genetic variability in this species is extensive and holds considerable potential, which has been leveraged to create remarkable variations. Breeding programs are seeking new methods to accelerate the development of improved varieties with desired agronomic traits (Sánchez et al., 2020; Singh et al., 2018). Moreover, its export market is very high (Chopde, 2019) due to its nutritional value (Ashok et al., 2020).

Bell peppers are classified as a culinary product in their dried form, alongside chili peppers and paprika (Basu & De, 2003). Fruit is used in salads, stuffed or fried, added to soups and stews, dried and used as a culinary seasoning, or pickled, while the leaves make a good spinach dish (FAO EcoCrop, 2014). Bell peppers are currently gaining popularity in the country due to farmers' economic and adequate profit margins (GOP, 2013).

In 2020, the Philippines shipped 392 metric tons of capsicum (bell pepper). In 2019, the country exported 309 tons of capsicum. Capsicum (bell pepper) exports increased by 26.12% from 2017 to 2019, bringing in US$1.65 million for the year (Philippines Capsicum Market Insights, N.D.). Despite these reports, Capsicum is only produced in small areas in the Philippines. The Cordillera Administrative Region, which produces 45 percent of the country's bell pepper, is followed by Northern Mindanao, which produces 17 percent, and the Ilocos region, which produces 13 percent (Negosyong Pinoy, 2018). No reports of Capsicum production have been received from the Southern Philippines. Hence, it would be interesting to explore whether this high-value vegetable can thrive in the region's climatic conditions.

In terms of nutrient management for Capsicum, farmers typically apply commercial fertilizers, such as urea, to supplement growth and muriate of potash for stem development. In this study, traditional production systems were employed, utilizing organic fertilizers such as vermitea to support and enhance the growth and yield of bell peppers. Vermitea is a liquid produced

by earthworm manure after the flow of air. Vermitea is rich in nutrients that encourage the growth of rhizobacteria, including nitrogen, phosphorus, potassium, and calcium. Gupta et al. (2014) mentioned that vermicompost plays an important role in plant growth and development, contributing to rooting initiation, root formation, soil organic matter enhancement, and environmental quality conservation. Thus, this study was conducted within the context of this concept to evaluate the effect of vermitea on the growth and yield performance of bell peppers.

Objectives of the Study

This study was conducted to evaluate the growth and yield performance of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer. Specially, it sought to answer the following questions:

1. Is there a significant difference in the plant height (initial, 15, 30, and 45 DAP) of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
2. Is there a significant difference in the number of marketable fruits of the bell Pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
3. Is there a significant difference in the number of non-marketable fruits of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
4. Is there a significant difference in the number of fruits harvested of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
5. Is there a significant difference in the weight of marketable fruits of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
6. Is there a significant difference in the weight of non-marketable fruits of pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
7. Is there a significant difference in the weight of fruits harvested from bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?
8. Is there a significant difference in the yield in tons per hectare of bell pepper
(*Capsicum annuum L.*) As applied with vermitea as organic fertilizer?
9. What is the return on investment of bell pepper (*Capsicum annuum L.*) as applied with vermitea as organic fertilizer?

METHOD

Research Locale

Generally, the soil type in Buhangin was characterized by an alluvial sandy loam. However, a portion of the area was silt clay loam that extended to the shoreline of Davao Gulf. The experimental area where the study was conducted has an elevation of approximately 53 meters above sea level. Based on the Agro-climatic Map developed by the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA), Davao Occidental has an average rainfall of 87.85 mm per month with a mean temperature of 34.3°C. It was blessed with a favorable climate, and the rainfall pattern generally conformed to Type IV, characterized by evenly distributed rainfall throughout the year. According to Mariano and Jimenez (2017), bell pepper grows well in any soil with a pH of 5.5 to 6.5. Production is best in sandy loam soil. Its temperature requirement ranges from 25 to 32 degrees Celsius.

Experimental Design

This study was laid out in a Randomized Complete Block Design (RCBD) with five (5) treatments replicated three (3) times. Each treatment was randomly selected using the draw-lot technique.

The treatments were as follows:

T1 – Control.
T2 – 150 ml of vermitea/liter of water
T3 – 200 ml of vermitea/liter of water
T4 – 250 ml of vermitea/liter of water
T5 – 300 ml of vermitea/liter of water

Experimental Field Layout

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

Randomization

The drawlot technique was used to assign treatments to their respective plots. Laying out and putting up placards for every treatment in each replication ensured proper identification of the treatments.

Procurement of Materials

Bell pepper (Capsicum annuum L.) seeds were purchased from Digos City Agricultural Supply. Vermicompost and molasses were also purchased from Basiawan, Sta. Maria, Davao Occidental.

Preparation of Vermitea

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.

Cultural Management and Practices

Land Preparation

Good soil preparation was crucial for growing bell peppers. The field was prepared, plowed, and harrowed twice to remove weeds and facilitate pulverization and good soil tillage.

Seeding of Bell pepper

Seeds were soaked in water overnight to encourage water absorption and sown in the seed tray. Pre-germinated seeds result in successful seedlings and even crop establishment. When they have one or two pairs of real leaves, the seedlings are ready for transplantation.

Pricking and Transplanting

When the seeds had already germinated, they were pricked individually to avoid disturbing them, resulting in high mortality. During their subsequent treatment and replication, 50 cm was left between hills and 50 cm between rows. The bell pepper seedlings were transplanted when they were fully mature and able to withstand direct sunlight and heat.

Transplanting

Transplanting was best done during late afternoon or on a cloudy day to prevent heat and sun damage to the seedling's tender roots and leaves. One (1) seedling per hill was planted at a depth of five (5) centimeters with a 0.5-meter distance per hill and 0.5 meter between furrows.

Fertilizer Application

Vermitea was sprayed three (3) days after planting and at seven (7) day intervals until the study was terminated. This was done early in the morning, before sunrise, using a hand sprayer to ensure sufficient results.

Watering

Watering was done to prevent soil drying and establish crop growth and development. It was done every day or as necessary, except on rainy days, to maintain the moisture condition of the soil and plants until they were harvested.

Weeding and Cultivation

Weeding was done as soon as weeds emerged on the ground—shallow

cultivation at the base promotes aeration and water absorption of the soil.

Pest and Disease Management

To prevent the occurrence of pests such as stem borers, leaf hoppers, birds, and rodents, strict and constant monitoring was conducted. When diseases occur, infected plants are uprooted and burned.

Harvesting

Harvesting was done seventy (70) days after planting, or at the mature green stage, and was done manually. The harvested fruits were in good shape, waxy, firm, and shiny. A clear segregation between each treatment must be ensured for reliable data gathering. Harvesting was done early in the morning using a sharp knife to avoid fruit damage. The fruits were sorted according to the marketable standards.

Data Gathered

Plant height (initial, 15, 30, and 45 DAP)

This was done using a measuring tape, extending from the base to the last open leaf of the 12 sample plants per treatment and replication.

Number of marketable fruits

This was done by counting the number of marketable fruits in every treatment and replication.

Number of non-marketable fruits

This was done by counting the number of non-marketable fruits in every treatment and replication.

Number of harvested fruits

This was done by counting all harvested fruits in every treatment and replication.

Weight of marketable fruits

This was done by weighing the marketable fruits in every treatment and replication using a digital weighing scale.

Weight of non-marketable fruits

This was done by weighing the non-marketable fruits in every treatment and replication using a digital weighing scale.

Weight of fruits harvested

This was done by weighing all fruits harvested in every treatment and replication using a digital weighing scale.

Yield in tons per hectare.

The yield in tons per hectare was computed using the formula:

$$\text{Yield (ton/ha)} = \frac{\text{No. of hills} \times \text{Weight of fruits} \times 1\text{ kg} \times 1\text{ ton}}{\text{hectare} \quad \text{no. of hills/ha} \quad 1000\text{g} \quad 1000\text{kg}}$$

Return on Investment

All treatments were calculated based on production costs.

$$\text{ROI} = \frac{\text{Net Income} \times 100}{\text{Investment}}$$

Statistical Analysis

All data were analyzed using the Analysis of Variance (ANOVA) in Randomized Complete Block Design (RCBD). Treatment results with significant differences were further analyzed using the Least Significant Difference (LSD) test.

RESULTS AND DISCUSSION

Plant Height (Initial, 15, 30, and 45 Days After Planting)

Table 1 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of plant height at initial, 15, 30, and 45 days after planting (DAP) as affected by the application of vermitea as an organic fertilizer.

At the initial measurement, Treatment 4 recorded the highest plant height, with a mean value of 6.07 cm, followed by Treatment 3 (5.95 cm), Treatment 5 (5.85 cm), Treatment 1 (5.77 cm), and Treatment 2, which had the lowest mean of 5.72 cm.

At 15 DAP, Treatments 4 and 5 had the highest plant heights, both with a mean value of 11.25 cm, followed by Treatment 3 (11.05 cm), Treatment 2 (10.67 cm), and Treatment 1, which had the lowest mean of 8.42 cm.

At 30 DAP, Treatment 4 again showed the highest plant height, with a mean of 23.27 cm, followed by Treatment 3 (22.75 cm), Treatment 5 (20.48 cm), Treatment 2 (20.43 cm), and Treatment 1, which had the lowest mean of 16.00 cm.

At 45 DAP, Treatment 3 recorded the highest plant height, with a mean of 48.75 cm, followed closely by Treatment 4 (48.43 cm), Treatment 2 (43.07 cm), and Treatment 5 (41.35 cm). Treatment 1 had the lowest mean value of 29.60 cm.

Analysis of Variance (ANOVA) revealed a highly significant difference among the treatments in terms of growth and yield performance of bell peppers, as measured by plant height at 15, 30, and 45 days after planting. However, there was no significant difference in initial plant height due to the application of vermitea.

Least Significant Difference (LSD) tests showed that at 15 and 30 DAP, Treatments 5, 4, 3, and 2 were highly significantly different from Treatment 1

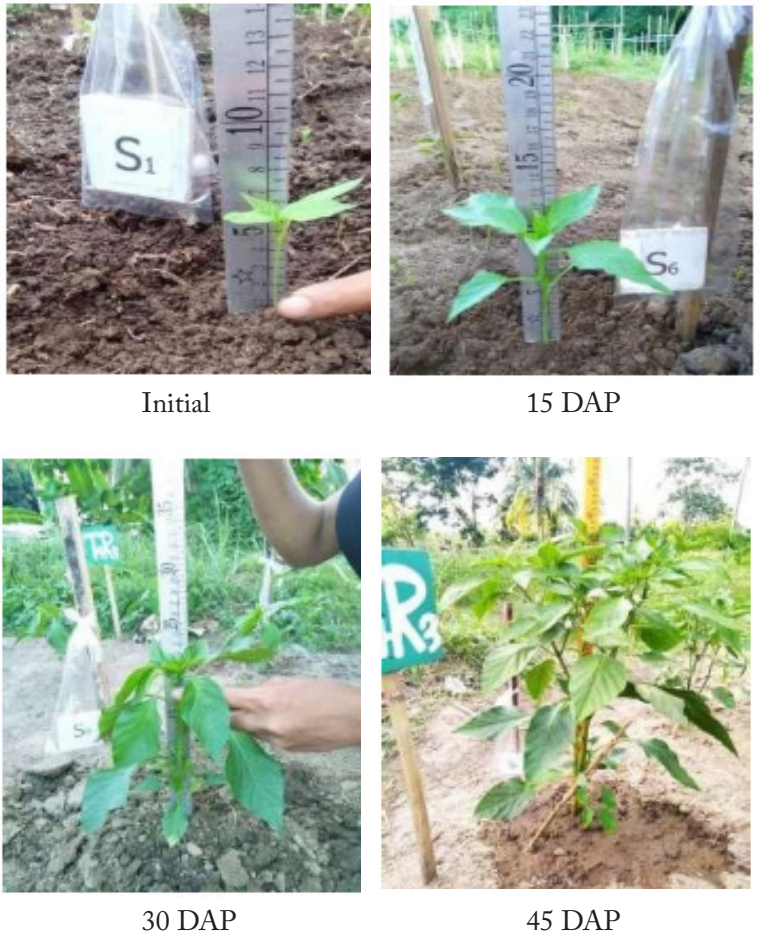
(Control). At 45 DAP, Treatments 3 and 4 were highly significantly different from Treatment 1, while Treatments 2 and 5 were significantly different from Treatment 1. This implies that vermitea application had a highly significant effect on plant height at 15, 30, and 45 days after planting.

Vermitea contains about one-third of the microbial activity and diversity of solid vermicompost on a volume-to-volume basis (Aracon, 2007a). Magpantay (2015) stated that the liquid mixture derived from vermicompost can be used as an additional fertilizer to enhance crop growth and increase nutrient availability. Vermitea is also an excellent plant growth promoter and soil amendment. It produces significant growth differences between plants grown in soil and water and those grown in soil and vermitea (Chang, 2013). These findings coincide with Aracon's (2007b) statement that the presence of plant growth regulators in vermitea can positively influence plant growth.

Table 1. *Plant height (initial, 15, 30, and 45 DAP) of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean Initial (cm)	Mean 15 DAP (cm)	Mean 30 DAP (cm)	Mean 45 DAP (cm)	Tabular F 5%	1%
T1-Control	5.77	8.42	16.00	26.90		
T2-150ml vermitea/L of water	5.72	10.57**	20.43**	43.7*	3.84	7.01
T3-200ml vermitea/L of water	5.95	11.05**	22.75**	48.75**		
T4-250ml vermitea/L of water	6.07	11.25**	23.27**	48.43**		
T5-300ml vermitea/L of water	5.85	11.25**	20.48**	41.35*		
CF	2.11ns	33.19**	9.50**	7.48**		
CV%	2.11ns	3.44	7.83	11.66		

Figure 1
Measuring plant height (Initial, 15, 30, and 45 DAP)



Initial 15 DAP

30 DAP 45 DAP

Number of Marketable Fruits

Table 2 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the number of marketable fruits as affected by the application of vermitea as an organic fertilizer. Treatment 3 recorded the highest number of marketable fruits with a mean value of 4.12 fruits, followed by Treatment 4 (3.72 fruits), Treatment 2 (3.69 fruits), Treatment 5 (3.29 fruits), while Treatment 1 had the lowest mean value of 2.29 fruits.

Analysis of Variance (ANOVA) revealed a highly significant difference among the treatments in terms of the number of marketable fruits. Least Significant Difference (LSD) tests showed that Treatments 2, 3, and 4 were highly significantly different from Treatment 1 (Control), whereas Treatment 5 was significantly different from Treatment 1. This implies that the application of vermitea has a highly significant effect on the number of marketable bell

peppers.

Edwards et al. (2006) explained that the beneficial response may be due to plant growth regulators or hormones produced by the high microbial activity in vermitea. Pava (2000) reiterated that essential nutrients such as nitrogen, phosphorus, potassium, and other macronutrients are responsible for plant growth and development. Nitrogen is essential for greening and growth, while potassium aids in the translocation of photosynthates necessary for fruit bearing.

Vermitea is an effective amendment for promoting plant growth, yield, and suppressing diseases and insect pests (Aracon et al., 2012). It contains vitamins, amino acids, and various nutrients, including nitrogen, potassium, calcium, magnesium, zinc, iron, copper, as well as growth regulators such as auxin and cytokinin (Sinha et al., 2010).

Table 2. *Number of marketable fruits of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean (Fruit)	CF	Tabular F 5%	1%
T1 - Control	2.29			
T2 - 150ml vermitea/liter of water	3.69**	7.14**	3.84	7.01
T3 - 200ml vermitea/liter of water	4.12**			
T4 - 250ml vermitea/liter of water	3.72**			
T5 - 300ml vermitea/liter of water	3.29**			

** = highly significant

CV = 13.19%

Figure 2

Counting the marketable fruits of bell pepper

Number of Non-Marketable Fruits

Table 3 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the number of non-marketable fruits as affected by the application of vermitea as organic fertilizer. Treatment 1 yielded the highest number of non-marketable fruits, with a mean value of 1.87 fruits, followed by Treatment 4 with a mean of 1.62 fruits, Treatment 3 with a mean of 1.56 fruits, Treatment 5 with a mean of 1.44 fruits, and Treatment 2 with the lowest mean value of 1.32 fruits.

Analysis of Variance (ANOVA) exhibited that there was no significant difference among the treatments on the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the number of non-marketable fruits as affected by the application of vermitea as organic fertilizer at 5% and 1% level of significance.

Table 3. *Number of non-marketable fruits of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean (Fruit)	CF	Tabular F 5%	1%
T1 - Control	1.87			
T2 - 150ml vermitea/liter of water	1.32	2.10ns	3.84	7.01
T3 - 200ml vermitea/liter of water	1.56			
T4 - 250ml vermitea/liter of water	1.62			
T5 - 300ml vermitea/liter of water	1.44			

ns = not significant
CV = 15.98%

Figure 3
Counting the non-marketable fruits of the bell pepper

Number of Fruits Harvested

Table 4 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the number of fruits harvested as affected by the application of vermitea as an organic fertilizer. Treatment 3 recorded the highest number of fruits harvested with a mean value of 5.68 fruits, followed by Treatment 4 (5.33 fruits), Treatment 2 (5.01 fruits), Treatment 5 (4.73 fruits), while Treatment 1 had the lowest mean value of 4.17 fruits.

Analysis of Variance (ANOVA) revealed a highly significant difference among the treatments in terms of the number of fruits harvested. Least Significant Difference (LSD) tests showed that Treatment 3 was significantly different from Treatment 1 (Control). Treatments 2 and 4 were significantly different from Treatment 1, while Treatment 5 was not significantly different from Treatment 1. This implies that the application of vermitea had a significant effect on the number of fruits harvested.

The beneficial effects of vermitea are likely due to the presence of microorganisms. Plant growth regulators such as plant hormones, fulvic and humic acids promote germination, growth, and yield increases. Vermitea is rich in beneficial soil microorganisms, fulvic and humic acids, plant growth hormones, and available nutrients that enhance plant health (Gunadi, 2016). Arancon et al. (2005) reported positive effects of vermitea on pepper yield in field experiments, partly attributing this to increased microbial biomass and activity, as well as the addition of macronutrients such as phosphorus. However, they suggested that the significant contribution might be from plant growth regulators, such as humic acids and plant hormones, adsorbed onto humic acids.

Plant growth regulators, such as auxins, gibberellins, cytokinins, abscisic acid, and ethylene, are signaling molecules that regulate various processes of plant development, including fruit development and the formation of mature fruit (Ozga & Reinecke, 2003).

Table 4. *Number of fruits harvested of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer.*

Treatment	Mean (Fruit)	CF	Tabular F 5%	1%
T1 – Control	4.17			
T2 - 150ml vermitea/liter of water	5.01*	5.31*	3.84	7.01
T3 - 200ml vermitea/liter of water	5.68*			
T4 - 250ml vermitea/liter of water	5.33*			
T5 - 300ml vermitea/liter of water	4.73ns			

* = significant

CV = 8.74

Figure 4
Counting the fruits of the bell pepper harvested

Weight of Marketable Fruits

Table 5 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the weight of marketable fruits as affected by the application of vermitea as an organic fertilizer. Treatment 3 recorded the highest weight of marketable fruits with a mean value of 115.23 grams, followed by Treatment 2 (104.60 grams), Treatment 4 (96.20 grams), Treatment 5 (86.14 grams), while Treatment 1 had the lowest mean value of 59.45 grams.

Analysis of Variance (ANOVA) revealed a highly significant difference among the treatments in terms of the weight of marketable fruits. Least Significant Difference (LSD) tests showed that Treatments 2 and 3 were highly significantly different from Treatment 1 (Control), whereas Treatments 4 and 5 were significantly different from Treatment 1. This implies that the application of vermitea had a highly significant effect on the weight of marketable fruits.

The positive response in the weight of marketable fruits due to vermitea application could be attributed to the synthesis of more assimilates, which play a significant role in producing more and larger bell pepper fruits. Application of vermitea increases the fresh weight values of marketable bell pepper fruits (Abid et al., 2014).

Vermitea promotes plant growth by providing a source of macro and micronutrients. While some nutrients are present in inorganic forms and are readily available to plants, most are released gradually through mineralization of organic matter. Thus, vermitea acts as a gradual-release fertilizer, supplying

plants with a dynamic and stable source of nutrients (Kumar, 2016).

Table 5. *Weight of marketable fruits of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean (Fruit)	CF	Tabular F 5%	1%
T1 – Control	59.45			
T2 - 150ml vermitea/liter of water	104.60**	7.24*	3.84	7.01
T3 - 200ml vermitea/liter of water	115.23*			
T4 - 250ml vermitea/liter of water	96.20*			
T5 - 300ml vermitea/liter of water	86.14ns			

** = highly significant
CV = 14.82

Figure 5
Weighing the marketable fruits of bell pepper

Weight of Non-Marketable Fruits

Table 6 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the weight of non-marketable fruits as affected by the application of vermitea as an organic fertilizer. Treatment 1 recorded the highest weight of non-marketable fruits with a mean value of 32.62 grams, followed by Treatment 2 with a mean of 25.09 grams, Treatment 4 with 22.26 grams, Treatment 3 with 22.06 grams, while Treatment 5 had the lowest mean value of 19.66 grams.

Analysis of Variance (ANOVA) revealed no significant difference among the treatments in terms of the weight of non-marketable fruits at both the 5% and 1% levels of significance. This indicates that the application of vermitea did not significantly affect the weight of non-marketable fruits in bell pepper.

Table 6. *Weight of non-marketable fruits of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean (Fruit)	CF	Tabular F 5%	1%
T1 – Control	32.62			
T2 - 150ml vermitea/liter of water	25.09	3.11ns	3.84	7.01
T3 - 200ml vermitea/liter of water	22.06			
T4 - 250ml vermitea/liter of water	22.26			
T5 - 300ml vermitea/liter of water	19.66			

ns = not significant
CV = 20.21

Figure 6
Weighing the non-marketable fruits of bell pepper

Weight of Fruits Harvested

Table 7 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of the weight of fruits harvested as affected by the application of vermitea as an organic fertilizer. Treatment 3 recorded the highest weight of fruits harvested, with a mean value of 137.29 grams, followed by Treatment 2 (129.69 grams), Treatment 4 (118.45 grams), Treatment 5 (105.80 grams), while Treatment 1 had the lowest mean value of 92.07 grams.

Analysis of Variance (ANOVA) revealed no significant difference among the treatments regarding the weight of fruits harvested at both 5% and 1% levels of significance. This indicates that the application of vermitea did not significantly affect the overall weight of the fruits harvested from bell peppers.

Table 7. *Weight of fruits harvested of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	Mean (grams)	CF	Tabular F 5%	1%
T1 – Control	92.07			
T2 - 150ml vermitea/liter of water	129.69	3.77ns	3.84	7.01
T3 - 200ml vermitea/liter of water	137.29			
T4 - 250ml vermitea/liter of water	118.46			
T5 - 300ml vermitea/liter of water	105.80			

ns = not significant
CV = 13.90%

Figure 7
Weighting the fruits of the bell pepper harvested

Yield in Tons per Hectare

Table 8 shows the growth and yield performance of bell pepper (Capsicum annuum L.) in terms of yield in tons per hectare as affected by the application of vermitea as an organic fertilizer. Treatment 3 recorded the highest yield, with a mean value of 5.49 tons per hectare, followed by Treatment 2 with 5.19 tons per hectare, Treatment 4 with 4.74 tons per hectare, Treatment 5 with 4.23 tons per hectare, and Treatment 1 with the lowest mean value of 3.68 tons per hectare.

Analysis of Variance (ANOVA) revealed no significant difference among the treatments in terms of yield, measured in tons per hectare, at both the 5% and 1% levels of significance. This indicates that the application of vermitea did not significantly affect the yield of bell pepper in terms of tons per hectare.

Table 8. *Yield in tons per hectare of bell peppers (Capsicum annuum L.) as applied with vermicompost as an organic fertilizer.*

Treatment	Mean (ton/ha)	CF	Tabular F 5%	1%
T1 – Control	3.68			
T2 - 150ml vermitea/liter of water	5.19	3.46ns	3.84	7.01
T3 - 200ml vermitea/liter of water	5.49			
T4 - 250ml vermitea/liter of water	4.74			
T5 - 300ml vermitea/liter of water	4.23			

ns = not significant
CV = 13.90%

Figure 8
Bell pepper (Capsicum annuum L.)

Return on Investment (ROI)

Table 9 shows the return on investment (ROI) on the growth and yield performance of bell pepper (Capsicum annuum L.) as affected by the application of vermitea as an organic fertilizer. The results show that Treatment 2 (200 ml vermitea per liter of water) obtained the highest ROI of 68.22%, meaning that for every peso invested, it earned ₱0.68. This was followed by Treatment 3 with an ROI of 57.39%. Meanwhile, Treatment 4 (24.89%), Treatment 5 (13.90%), and Treatment 1 (3.88%) incurred losses.

Table 9. *Return on investment of bell pepper (Capsicum annuum L.) as applied with vermitea as organic fertilizer*

Treatment	MC	LC	TC	NI	ROI
T1 - Control	140.00	220.00	360.00	(14.00)	(3.88%)
T2 - 150ml vermitea/L of water	315.00	220.00	535.00	365.00	68.22%
T3 - 200ml vermitea/L of water	395.00	220.00	615.00	353.00	57.39%
T4 - 250ml vermitea/L of water	475.00	220.00	695.00	(173.80)	(24.89%)
T5 - 300ML vermitea/L of water	555.00	220.00	775.00	(107.80)	(13.90%)

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The study was conducted at the Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST), Institute of Agricultural Technology and Entrepreneurial Studies (IATES), Buhangin, Malita, Davao Occidental, from November 2019 to February 2020. It aimed to determine the growth and yield performance of bell pepper (Capsicum annuum L.) as affected by the application of vermitea as an organic fertilizer.

A Randomized Complete Block Design (RCBD) was used with five (5) treatments, each replicated three (3) times. The treatments were as follows:

- Treatment 1 (Control)
- Treatment 2 (150 ml vermitea per liter of water)
- Treatment 3 (200 ml vermitea per liter of water)
- Treatment 4 (250 ml vermitea per liter of water)
- Treatment 5 (300 ml vermitea per liter of water)

The parameters measured included initial plant height (at 15, 30, and 45 days after planting), number of marketable fruits, number of non-marketable fruits, number of fruits harvested, weight of marketable fruits, weight of non-marketable fruits, weight of fruits harvested, yield in tons per hectare, and return on investment.

Statistical analysis revealed a highly significant difference in initial plant height at 15, 30, and 45 days, as well as the number and weight of marketable fruits, due to the application of vermitea. There was a significant difference in the number of fruits harvested. However, no significant differences were found in the number of non-marketable fruits, weight of non-marketable fruits, weight of fruits harvested, and yield in tons per hectare. The highest return on investment recorded was 68.22%.

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