Production Performance of Eggplant (Solanum melongena) Applied with Different Plant Food Supplements (PFS)

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Abstract

The study was conducted at the Organic Agriculture Project of Capiz State University, Burias Campus, Mambusao, Capiz, to determine the production performance of eggplant applied with different plant food supplements. It was laid out in a 2×4 factorial experiment using a Randomized Complete Block Design (RCBD) with three treatments replicated three times. Factor A was the cropping season: A1- first cropping (July to December) and A2- second cropping (November to March). Factor B comprised different plant food supplements: A- Control, B- Vermitea, and Fermented Plant Juice (FPJ). All eggplant growth and yield parameters were analyzed using the STAR software and the Least Significant Difference (LSD) test for mean comparisons. The result of the study showed that the growth and yield of eggplant were not affected by the application of the different plant food supplements. On the other hand, plant height, stem girth, number of leaves, length of fruits, diameter of fruits, and weight of marketable fruit were affected by the growing season. No interaction effect between the season of growing and the applications of different plant food supplements was noted in all growth and yield parameters except for the width of leaves. Generally, bigger, longer, heavier fruits were harvested during the dry season.

Keywords:*eggplant, organic fertilizer, FPJ, vermitea*

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Introduction

Eggplant (Solanum melongena L.) is a vital vegetable crop in the Philippines, leading in terms of cultivated area, production volume, and economic value (Hautea and Narciso, 2007 as cited by Gerpacio & Aquino, 2014). It is recognized for its considerable health and nutritional benefits, serving as a valuable source of vitamins, fiber, and minerals; and is thought to remedy various health issues, such as toothaches, asthma, bronchitis, diabetes, poor eyesight, high levels of cholesterol, inflammation and swelling, as well as liver problems (Gerpacio & Aquino, 2014).

Eggplant cultivation can be lucrative, but significant challenges include infestations from the fruit and shoot borer (FSB), bacterial wilt, issues with irrigation supply, and climatic challenges. This type of production heavily relies on pesticides, which poses risks to both human health and the environment. The high pest pressure from EFSB forces farmers to frequently apply insecticides to safeguard their crops. Nevertheless, the overuse of pesticides can result in residues accumulating in the soil and water, as well as on the crops themselves (Feedfuture, 2022).

Considering the harmful effect of the intensive use of chemicals in eggplant production, which poses serious damage to the part of the producers, consumers, and the environment, the use of organic plant food supplements is a better option. Plant food supplements are effective microorganism concoctions applied to increase the population of beneficial microorganisms. They were proven to increase crop yields like cucumber, rice, and corn, improve crop quality, protect plants from pests and diseases, and revitalize the soils. These plant food supplements include fermented plant juice (FPJ) and vermin tea (Legaspi and Sarimong, 2019).

FPJ is used in solutions for seed and soil treatments and plant nutrition. It consists of the young shoots of vigorously growing plants that are allowed to ferment for approximately seven days with the aid of brown sugar. The brown sugar draws the juices out of the plant material via osmosis and also serves as a food source for the microbes carrying out the fermentation process. The weak alcohol produced during fermentation extracts chlorophyll (soluble in ethanol) and other plant components. It is non-toxic and edible. (Miller et. al., 2013).

Vermitea is a liquid that is collected after the passage of water through earthworm compost. Vermicompost or worm compost is an organic matter that earthworms have decomposed and recycled. It is a collection of excretory products and mucus secretion of earthworms along with micronutrients from soil organic molecules. Vermi tea is rich in nutrients such as nitrogen, phosphorus, potassium, calcium, and growth-promoting rhizobacteria. It plays an important role in plant growth and development, contributes to the initiation of rooting and root growth, increases the soil organic matter, and also preserves the environmental quality (Musa et al. 2017).

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The effectiveness of these two EM concoctions was not tested on eggplants. Hence, this study was conducted.

Materials and Methods

The experiment was established at the Organic Agriculture area of CAPSU Burias. It was laid out in a 2x4 factorial experiment using a Randomized Complete Block Design (RCBD) with three treatments replicated three times. For Factor A was the different cropping seasons, comprised of A1- first cropping (July to November), and A2- second cropping (November to March). Factor B was different plant food supplements B1- Control, B2 - Vermitea, and B3- Fermented Plant Juice (FPJ). The data was analyzed using STAR software.

Results and Discussions

Plant Height

The analysis of variance for the plant height of eggplant revealed a highly significant result for the effect of cropping season and a not significant result for the effect of different plant food supplements applied. The mean plant height, as affected by different plant food supplements, ranged from 80.37cm to 86.43cm.

Eggplants grown during the wet season were taller (89.54 cm) than those obtained from eggplants grown during the dry season (75.62cm). No significant interaction was observed between the season of growing and different plant food supplements applied to influence the height of eggplant.

Stem Girth

The stem girth of eggplant was significantly affected by the growing season but not by the different plant food supplements applied. No interaction effect between the two factors was also observed.

Mean stem girth ranged from 14.10 cm to 18.40 cm for the effect of plant food supplements. For the growing season, bigger stem girth was recorded from plants grown during the first cropping (2.13 mm) compared to plants grown during the second cropping (1.22 mm).

Number of Leaves

The ANOVA for the number of leaves revealed a significant effect for the growing season but not a significant result for the effect of different plant food supplements. For the effect of different plant food supplements, means ranged from 53.96 to 58.64. As to the effect of season, more leaves were produced during the first cropping (116.63) compared to the number

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of leaves produced by eggplant during the second cropping (50.25)

Width of Leaves

A significant interaction effect was obtained between the season of growing and the different plant food supplements. This implies that the two factors influence the width of the leaves of eggplant.

Eggplants applied with termite grown during the dry season produced the widest leaves (14.90 cm), which were found to be comparable with the width of leaves of eggplants applied with fermented plant juice (14.62 cm) grown during the second cropping. The narrowest leaves were produced by eggplants applied with fermented plant juice grown during the first cropping (9.58 cm), which was found to be comparable with the width of leaves of eggplant applied with termites (10.48 cm and no plant food supplement application (10.76 cm) grown during the first cropping. It can be noted that narrower leaves were produced during the first cropping (July to December) regardless of the plant food supplement (PFS) applied, which might be due to the abundance of water, which renders the PFS more diluted.

Length of Fruits

The length of fruits of eggplant was significantly affected by the season of growing, but a not significant result was obtained for the effect of the different plant food supplements. It was also noted that the two factors did not influence the fruit's length.

The mean length of fruits ranged from 19.70 cm to 20.14 cm for the plant food supplements applied. Longer fruits were produced by the plants grown during the dry season (21.28 cm) compared to the fruits of eggplant produced during the wet season (18.49 cm).

Diameter of Fruit

The analysis of variance for the length of fruits revealed a significant result for the season of growing and a not significant result on the effect of different plant food supplements applied.

Fruit diameter ranges from 20.06 mm to 27.16 mm for the different plant food supplements. For the season of growing, bigger eggplant fruits were produced by eggplants during the second cropping (32.59 mm) compared to the first cropping (15.93 mm).

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The ANOVA further revealed that eggplants grown during the dry season had the biggest fruit with a mean of 32.59cm. The smallest fruits were recorded from plants grown during the wet season. Likewise, there was an interaction effect between the season of growing and different plant food supplements applied.

Number of Marketable fruit

The ANOVA for the number of marketable fruits of eggplant was not significant for both different plant food supplements applied and the season of growing. The mean ranged from 1.14 to 1.46 for plant food supplements and 1.27 both for the dry and wet seasons.No significant interaction effect between the different plant food supplements applied and the growing season was noted.

Weight of Marketable fruit

The analysis of variance for the weight of marketable fruit was significantly affected by the growing season but not with the plant food supplements applied. The mean weight of marketable fruit ranged from 92.18 g to 106.31 g. for the effect of plant food supplements. For the effect of the season of growing, eggplants grown during the second cropping gave heavier marketable fruit (118.58 g) than those eggplants grown during the first cropping (82.81 g).No interaction effect between the two factors was observed. This implies that the two factors did not interact in influencing the weight of harvested fruits.

Number of Non-Marketable Fruit

The ANOVA for the number of non-marketable was not significantly affected by season and with the plant food supplements applied. There was no significant interaction effect between the two factors was observed. The number of non-marketable fruits affected by the different plant food supplements ranged from 1.22 to 1.26. For the number of non-marketable fruits as affected by the season of growing, the means ranged from 1.15 to 1.32.

Implications of the results

The result of the study revealed that all the growth and yield parameters gathered from the study were not affected by the application of the different plant food supplements. The growth and yield of plants with and without plant food application were just the same. The experimental area used in this study was previously utilized for organic crop

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production, where abundant amounts of compost materials, decomposed rice hulls, and carbonized rice hulls were added. The addition of these materials rendered the experimental area fertile, thus giving comparable results to plants without plant food supplement application with those plants with plant food application. It is, therefore, a must to have conducted soil analysis at the start and after the study, but due to financial constraints, the said analysis was not performed.

Table 1. Growth parameters of eggplant as affected by different plant food supplements in grown in two cropping season

Treatment	Length of Fruits		Diameter of Fruit		Number of Marketable Fruit		Weight of Marketable Fruit		Number of Non-marketable Fruit^{ns}		Total Number of Harvested Fruits	
			Cropping*		Cropping		Cropping *		Cropping			
	1st	2nd	1st	2nd	1st	2nd	1st*	2nd*	1st	2nd	1st	2nd
A- Control	19.20	20.20	19.65	34.67	1.70	1.21	110.55	102.07	1.07	1.44	1.30	1.73
B- Vermitea	17.78	21.84	13.97	30.14	1.13	1.22	82.21	124.98	1.10	1.33	0.83	1.46
C- FPJ	18.48	21.80	14.17	32.96	0.97	1.37	55.66	128.70	1.27	1.19	1.03	1.42
Total	**55.46**	**63.84**	**47.79**	**97.77**	**3.8**	**3.8**	**248.42**	**355.75**	**3.44**	**3.96**	**3.16**	**4.61**
Mean	**18.49b**	**21.28a**	**15.93b**	**32.59a**	**1.27**	**1.27**	**82.81b**	**118.58a**	**1.15**	**1.32**	**1.05**	**1.57**

In terms of the growing season, better growth was obtained from plants grown during the first cropping, that is, during July to November, while better yields were during the second cropping which falls under the month of November to March. It is, therefore, better to plant eggplants in the months of November to March for better crop yield.

Table 2. Yield parameters are affected by different plant food supplements grown in two cropping seasons.

Treatment	Plant height		Stem girth		Number of Leaves		Width of Leaves**	
	Cropping*		Cropping *		Cropping*		Cropping	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
A- Control	92.71	69.10	16.27	11.92	119.07	56.86	10.76**bc**	11.77**b**
B- Vermitea	92.84	80.01	23.40	12.37	113.50	49.32	10.48**bc**	14.90**a**
C- FPJ	83	77.73	24.35	12.43	117.32	44.52	9.58**c**	14.62**a**
Total	**268.55**	**226.84**	**64.02**	**36.72**	**349.89**	**150.7**	**30.82**	**41.29**
Mean	**89.52a**	**75.62b**	**21.34a**	**12.24b**	**116.63a**	**50.23b**	**10.27**	**13.76**

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Conclusions and Recommendations

Based on the results of the study the following conclusion have been drawn:

1.Growthand yield of eggplant were not affected by the application of the different plant food supplements.

2. The growing season affected the plant height, stem girth, number of leaves, length of fruits, diameter of fruits, and weight of marketable fruit

3. . There was no interaction effect between the season of growing and the applications of different plant food supplements except for the width of leaves.

4. Generally, bigger, longer, and heavier fruits were harvested during the dry season.

Recommendations

The following recommendations are forwarded based on the results of the study:

1. Plant eggplant during the dry season (November to March).
2. Conduct soil analysis of the area to use for experiments using plant food supplements
3.Conduct a similar study to verify the result, either using the same crop or other crops.

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