Response of Ratooned Eggplant (*Solanum Melongena L.)* To Various Organic Plant Food Supplements

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Abstract

The study was conducted to evaluate the response of ratooned eggplant to various organic plant food supplements as affected by the season of growth. The study was conducted in a two-cropping season, laid out in a 2×4 factorial experiment using a Randomized Complete Block Design (RCBD) with three replications. Factor A was the different cropping seasons, which comprised A1- first cropping (January-May) and A2- second cropping (June- October). Factor B was different plant food supplements B1- Control, B2 - Vermitea, and B3- Fermented Plant Juice (FPJ). The data were analyzed using STAR software and LSD test for mean comparisons. The field experiment study revealed that the season of growth and the different plant food supplements applied did not influence all the growth and yield parameters except the stem girths of eggplant before ratooning and stems produced after ratooning, which was affected by the season of growing and width, of leaves and length of stem produced after ratooning which were affected by the application of various organic plant food supplements. Both factors influenced the number of non-marketable fruit, the weight of non-marketable fruit, and the number of leaves of ratooned eggplant. Generally, plant food supplements can grow ratooned eggplant at any growing season.

Keywords: ratooned, eggplant, food supplements, cropping season

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Introduction

Eggplant (Solanum melongena) is one of the major vegetable crops (Briones, 2009). As of 2003, eggplant production contributed PhP1.8 billion to the Philippine economy (Francisco, 2009), with an average production of 9.95 t·ha–1 (Vijayraghavan, 2010). At the provincial level, the Davao Region, one of the top eggplant producers, contributed a total of 6.6 mt in 2010 (BAS, 2010)

Ratoon cropping is defined as the cultivation of crop growth after cane harvest, although not necessarily for grain (Francis, 1989). This practice is widely used to cultivate rice, sugarcane, banana, and pineapple crops. Ratoon crops cannot be perennially renewed and may be harvested only for a few seasons, as a decline in yield tends to occur due to increased crowding, damage by pests and diseases, and decreasing soil fertility. When ratooning, the plant crop is cut back and allowed to regrow for a short time to achieve a subsequent crop (Kahn, 2001). In contrast, Pluckett et al. (1970) reported that yields of ratooned crops such as sugarcane, cotton, bananas, and forage sorghum have shown no decline over a reasonably long period. The contradictory results may relate to the different conditions that prevailed in the 1970s and 1980s and so much this 2020s.

A literature search also showed that ratooning is generally done on grain crops, but very few were done on vegetable crops. In Amaranthus, ratooning can be done up to 3 times without sacrificing growth parameters, while ratooning up to 2 times gives the highest nutritional values (Samuel et al., 2019). Legaspi et al. (2020) reported that ratooned kangkong under organic culture made higher profits than single harvesting.

Considering the above findings, the researchers considered exploring the ratoon eggplant response on different organic plant food supplements. Hence, this study was conducted.

Materials and Methods

The experiment was established at the Organic Agriculture area of CapSU Burias. It was conducted in two cropping seasons, laid out in a 2x4 factorial experiment using Randomized Complete Block Design (RCBD) with three replications. Factor A was the different cropping seasons comprising A1- first cropping (January-May) and A2- second cropping (June- October). Factor B was different plant food supplements B1- Control, B2 - Vermitea, and B3- Fermented Plant Juice (FPJ). The parameters gathered were stem girth, the width of leaves, number of leaves, the height of stem produced, stem girth of the stem produced, diameter of fruit, length of fruit, the total number of marketable fruits, number of non-marketable fruit, the weight of marketable fruits, and weight of non-marketable fruits. The data was analyzed using STAR software.

Results and Discussion

Stem Girth

Table 1. The different organic plant food supplements affect the stem girth of ratooned eggplant during the wet and dry seasons.

Treatment	Stem Girth		Total	Mean	Number of Leaves**		Total	Mean
	Season **				Season			
	Dry	Wet			Dry	Wet		
A- Control	33.72	39.61	73.33	36.67	61.02b	119.60a	180.62	90.31
B- Vermitea	35.60	38.93	74.53	37.27	67.78b	63.22b	131	65.5
C- FPJ	37.08	41.19	78.27	39.14	104.28a	41.19b	145.47	72.74
Total	106.4	119.73			233.08	224.01		
Mean	35.46b	39.91a			77.69	74.67		

The stem girth of ratooned eggplant differed significantly with cropping seasons but not among the organic plant supplements used. As affected by organic plant supplements, the mean stem girth ranged from 36.67 mm to 39.14 mm. Ratooned eggplants grown during the wet season had the most considerable stem girth (39.91 mm). The smallest width of stem girth was obtained from rationed eggplant grown during the dry season (35.46 mm).

No significant interaction effect was observed between the season of growing and organic plant supplements in influencing the stem girth of ratooned eggplant.

Number of Leaves

Table 2. The number of leaves of ratooned eggplant is affected by the different organic plant food supplements during the wet and dry seasons.

Treatment	Width of Leaves*		Total	Mean	Length of Leaves^{ns}		Total	Mean
	Season				Season			
	Dry	Wet			Dry	Wet		
A- Control	13.81	13.79	27.6	13.8b	26.01	25.75	51.76	25.88
B- Vermitea	14	14.31	28.31	14.16b	26.92	26.08	53	26.5
C- FPJ	15.43	15.11	30.54	15.27a	29.58	26.50	56.08	28.04
Total	43.24	43.21			82.51	78.33		
Mean	14.41	14.40			27.50	26.11		

The number of leaves was significantly affected by the plant food supplements applied but not by the season of ratooning. A positive interaction effect between the two factors was also noted. This implies that the two factors influence the number of leaves of ratooned eggplant.

Most leaves were recorded from ratooned eggplants with no plant food supplement

application grown during the wet season (119.60), comparable with the number of leaves of ratooned plants applied with FPJ during the dry season (104.28). The least number of leaves was recorded from ratooned eggplants applied with FPJ during the wet season (41.19), which was found comparable with the number of leaves of plants applied with vermitea during the wet season (63.22) and dry season (67.78) and several leaves of plants with no plant food supplement application during the dry season (61.02).

Width of Leaves

The analysis of variance for the width of leaves revealed significant results on the different plant food supplements used but not on the season of growing. The mean range for seasons of growing is 14.40 mm to 14.41 mm. For the different plant food supplements, ratooned eggplants with fermented plant juice got the most considerable width of leaves with a mean of 15.27 mm. In comparison, the narrowest leaf width was recorded from plants with no plant food application (13.80 mm), which was comparable with the width of leaves of plants applied with vermi tea (14.16 mm).

The ANOVA further revealed that the two factors did not influence the width of ratooned eggplant leaves.

Length of Leaves

The ANOVA revealed a not significant result on the effect of various organic plant food supplements and seasons of growing on the length of leaves of ratooned eggplant. Means ranged from 25.88 mm to 28.04 mm. For the growing season, means ranged from 26.11 mm to 27.50 mm.

There was no significant interaction between the plant food supplements and the growing season.

Length of Stem Produced After Ratooning

Table 3. The length of the stem produced by ratooned eggplant is affected by the different organic plant food supplements during the wet and dry seasons.

Treatment	Length of stem produced after ratooning**		Total	Mean	Stem Girth of Stem Produced after Ratooning		Total	Mean
	Season				Season**			
	Dry	Wet			Dry	Wet		
A- Control	71.62	109.80	181.42	90.71b	15.33	17.22	32.55	16.28
B- Vermitea	72.46	111.54	184	92b	14.91	17.91	32.82	16.41
C- FPJ	90.70	131.62	222.32	111.16a	16.53	18.74	35.27	17.64
Total	234.78	352.96			46.77	53.87		
Mean	78.26	117.65			15.59b	17.96a		

The length of stem produced after ratooning was significantly affected by the applications of various organic plant food supplements and the growing season. Ratooned eggplants applied with FPJ had the most extended stem produced, with a mean of 111.6 cm. In comparison, plants with no plant food supplement application obtained the shortest stem with a mean of 90.71 cm and were found to be comparable with the length of the stem of plants applied with vermitea. Likewise, ratooned eggplant grown during the wet season produced the longest stem with a mean of 117.65 cm, while ratooned eggplant grown during the dry season recorded the shortest stem with a mean of 78.26 cm.

No significant interaction effect was noted between the seasons of growing and various organic plant supplements in affecting the height length of stem produced after ratooning.

Stem Girth of Stem Produced After Ratooning

The stem girth produced after ratooning was not significantly affected by the different plant food supplements applied but was significantly affected by the season of growth. For the various plant food supplements applied, means ranged from 16.28 to 17.64 mm.

The most oversized diameter of the stem girth was observed in ratooned eggplant grown during the wet season with a mean of 17.96 mm, while ratooned eggplant grown during the dry season got the minor diameter of stem girth with a mean of 15.59 mm.

Analysis of variance revealed that there was no interaction effect between the two factors in influencing the stem girth of the stem produced.

Diameter of Fruit

Table 4. The diameter of the fruit by ratooned eggplant is affected by the different organic plant food supplements during the wet and dry seasons.

Treatment	Diameter of Fruit^{ns}		Total	Mean	Length of Fruit^{ns}		Total	Mean
	Dry	Wet			Dry	Wet		
A- Control	39.14	49.9	89.04	44.52	18.24	22.88	41.12	20.56
B- Vermitea	36.37	32.28	68.65	34.33	19.18	16.25	35.43	17.72
C- FPJ	48.45	48.63	97.08	48.54	22.68	23.42	46.1	23.05
Total	123.96	130.81			60.1	62.55		
Mean	41.32	43.60			20.03	20.85		

A not significant result on the diameter of the fruit of ratooned eggplant for both the different plant food supplements and season of growth was noted. This implies that both factors did not influence this parameter. The mean ranged from 34.44 mm to 48.54 mm for plant food supplements and 41.32 mm to 43.60 mm by growing season.

Likewise, ANOVA revealed that the two factors did not influence the diameter of the fruit of ratooned eggplant.

Length of fruit

The length of the fruit of ratooned eggplant was not significantly affected by the different plant food supplement and season of growing. For plant food supplements, means ranged from 17.72 mm to 23.05 mm, while for season of growing, means ranged from 20.03 mm to 20.85 mm.

The various organic plant supplements and seasons of growing did not interact to influence the length of the fruit of ratooned eggplant.

Number of Harvested Fruit Per Priming

Table 5. The number of harvested fruits per priming by ratooned eggplant is affected by the different organic plant food supplements during the wet and dry seasons.

Treatment	Number of Harvested Fruit per Priming^{ns}		Total	Mean	Marketable Fruit per Priming		Total	Mean
	Dry	Wet			Dry	Wet		
A- Control	1.38	2.58	3.96	1.98	1.31	2.05	3.36	1.68
B- Vermitea	1.79	1.63	3.42	1.71	1.63	1.57	3.2	1.6
C- FPJ	2.21	2.75	4.96	2.48	1.65	2.44	4.09	2.05
Total	5.38	6.96			4.59	6.06		
Mean	1.79	2.32			1.53	2.02		

The number of harvested fruits per priming was not affected by the application of the different plant food supplements and season of growing. For plant food supplements, means ranged from 1.71 to 2. 48. For season of growing, means ranged from 1.79 to 2.32.

There was no significant interaction between plant food supplements and season of growing in affecting the total number of harvested fruits per priming.

Number of marketable fruits per priming

The number of marketable fruits per priming of ratooned eggplant was not affected by the different plant food supplements applied and the growing season. For

the plant food supplements, means ranged from 1.6 to 2.05, while for the season of growing, means ranged from 1.53 to 2.02.

There was no interaction effect between the different plant food supplements applied and the season of growth affecting the number of marketable fruits per priming.

Weight of Marketable Fruit

Table 6. The weight of the marketable fruit of ratooned eggplant is affected by the different organic plant food supplements during the wet and dry seasons.

Treatment	Weight of marketable fruit		Total	Mean	Number of Non-marketable fruit*		Total	Mean
	Season				Season			
	Dry	Wet			Dry	Wet		
A- Control	83.18	105.62	188.8	94.4	0.10b	1.25a	1.35	0.68
B- Vermitea	83.92	92.55	176.47	88.24	0.38b	0.17b	0.55	0.28
C- FPJ	132.50	132.44	264.94	132.47	1.19a	0.79ab	1.98	0.99
Total	29.69	330.61			1.67	2.21		
Mean	99.87	110.20			0.55	0.74		

The weight of the marketable fruit of ratooned eggplant was not affected by the different plant food supplements applied and the growing season. For the plant food supplements, means ranged from 9.10 g to 38.80 g, while for the growing season, means ranged from 21.62g to 26.39 g.

There was no interaction effect between the different plant food supplements applied and the growing season affecting the weight of marketable fruit.

Number of non-marketable Fruit

Table 7. The different organic plant food supplements affect the number of non-marketable fruits of ratooned eggplant during the wet and dry seasons.

Treatment	Weight of non-marketable fruit*		Total	Mean
	Season			
	Dry	Wet		
A- Control	4.29b	43.96a	48.25	24.13
B- Vermitea	8.19b	10.00b	18.19	9.10
C- FPJ	52.38a	25.21ab	77.59	38.80
Total	64.86	79.17		
Mean	21.62	26.39		

The number of non-marketable fruits of ratooned eggplant per priming was not significantly affected by the various organic plant food supplements and season of ratooning. However, an interaction effect between the two factors was noted.

Ratooned eggplant grown during the wet season with no plant food supplement has the most significant number of non-marketable fruit with a mean of 1.25 and was found comparable with the number of the non-marketable fruits of ratooned eggplant grown during the wet season applied with FPJ, and ratooned eggplants grown during the dry season applied with FPJ. The least number of non-marketable fruit was recorded from eggplants ratooned during the dry season with no plant food supplement application (0.10), and this was found comparable with the number of non-marketable fruits of plants ratooned during the dry season applied with vermin tea, and plants rationed during the wet season applied with vermi tea and FPJ. It can be noted that the different plant food supplements seemed to combat the presence of pests and diseases during the wet season, which caused damage to the fruits of eggplant, rendering it non-marketable.

Weight of Non-marketable Fruit

The weight of non-marketable fruit of ratooned eggplant per priming was not significantly affected by the various organic plant food supplements and season of ratooning. However, an interaction effect between the two factors was noted.

Eggplant ratooned during the dry season applied with FPJ had the heaviest weight of non-marketable fruit with a mean of 52.38 g and was found comparable to the weight of non-marketable fruits of plants applied with FPJ during the wet season (25.21 g) and that of plants with no fertilizer application grown during the wet season. The lightest weight of non-marketable fruits was recorded from plants with no fertilizer application grown during the dry season (4.29 g), which was found comparable with the weight of non-marketable fruits of plants applied with vermin tea grown during the wet (10.00 g) and dry season (8.19 g), and that of plants applied with FPJ during the wet season.

Conclusions

Based on the results of the study the following conclusion have drawn. All the growth and yield parameters were not affected by the season of growing except the stem girths of eggplant before ratooning and stems produced after ratooning. Growth and yield parameters considered in this study except the width of leaves and length of stem produced after ratooning were significantly affected by the application of various organic plant food supplements. An interaction effect of the various plant food supplements and season of growing was observed on the number of non-marketable fruit, weight of non-marketable fruit, and the number of leaves of ratooned eggplant.

Recommendations

Based on the findings of the study, the following recommendations are forwarded. Use any of the plant food supplements in growing ratooned eggplant. The ratoon eggplant at any season of planting. Compute for the cost and return analysis in using the different plant food supplements for ratooned eggplant. Compute the economics of ratooning eggplant under organic culture. Conduct similar study using other vegetables.

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