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Response of Some Vegetable Plants to Green Biomass-Enriched Compost

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Abstract: *Effects of crop residue compost enriched with increasing volume of green biomass were studied on green pepper (Capsicum annuum), eggplant (Solanum melongena), and Okra (Abelmoscus esculentus). The study used experimental research method laid out in Completely Randomized Design (CRD) in three replicates. Enriched composts used as treatments were mixed with garden soil at 1:1 ratio and were used as growing media in pot culture. Data on plant height, leaf number, fresh weight, and yield were measured 60 days after planting. Results revealed that enriched compost significantly promoted the growth and yield of green pepper, eggplant and okra. Application of composts mixed at 3:5, 3:4 and 3:3 crop residue-green biomass ratios were the most effective in improving height, number of leaves, biomass weight and yield of crops in that order. Comparison indicated the superiority in terms of yield of plants treated enriched compost over the ordinary compost.*
Keywords: *Enriched compost, green biomass, growth performance, vegetable plants*

I. Introduction

The use of organic composts has long been recognized in agriculture to enhance growth and yield performance of plants while maintaining good soil environment. Techniques and approaches in producing organic composts or amendments have been improved and the use of compost in farming have proven to be effective means of improving soil structure, enhancing soil fertility and increasing crop yields [1]. Compost as an organic matter is an excellent source of nutrients need by plants.

Various studies had been conducted on the effect of compost on soil and plant growth. In summary, the addition of compost increase soil nutrient availability and thereby increase nutrient uptake by plants directly and/or indirectly [2]. Direct effect are due to readily available nutrients from applied compost while indirect effects are through improvement of soil structure and nutrient and water retention favorable to plant growth. In a particular experiment, the authors found that application of organic amendments have potential to increase the growth and chemical composition of two cultivars of safflower and therefore, might be a good alternative to chemical fertilizers [3]. Similar experiment indicated that vegetative development and fruit yield of okra were significantly influenced by compost treatments [4]. They also observed that the effect varies depending on the type of compost used. Another study demonstrated that plant height and canopy diameter of hot pepper were significantly greater in the mushroom compost treatment but yield were not significantly affected by treatment [5]. They further disclosed based from their study that peppers may be grown using relatively inexpensive organic fertilizers because the use of synthetic chemical fertilizers does not result in higher yields, and compost treatment yields reported compare favorably against other findings. The study of [6] also demonstrated that plants treated with organic-N fertilizer showed significantly higher photosynthesis rate compared with the control plants in pepper cultivars. The author demonstrated that the increased photosynthesis rate correspond to the increased pigment content which is one of the reasons for the higher photosynthetic rate in plants treated with organic fertilizer. Likewise it was concluded that maize plants fertilized with various compost treatments performed better than those planted on soil only due to enhancement by the organic matter and various nutrients contained in the composts [7]. Also, enriched compost enhance exchangeable, non-exchangeable and total K in soil after crop harvest. With this, 50% N could be substituted for wheat, potato, soybean and other crops. Demerits of bulky organic materials like FYM and ordinary compost can also be overcome to a greater extent through the enriched compost [8].

The above studies demonstrated that compost indeed enhances plant growth. However there are variations on the effect depending on the type of materials used in the production of compost. As explained by [9], variation in the nutrient content of compost depends upon the nature of the material being composted. It is thus important to use materials in composting that can give compost product with high nutrient contents for plant growth. Another consideration in the production of compost is the availability of raw material. Ideally, the materials should be readily available or accessible, affordable or can be grown by somebody interested in composting. The study thus used compost materials that fit the foregoing criteria in producing compost by using crop residue of rice and corn as main compost material enriched with green biomasses of some plants known to be nutrient-rich particularly Ipil-ipil (*Leucaena leucocephala* (Lam.) de Wit), Wild sunflower (*Tithonia* *diversifolia* (Hemsl.) A. Gray) and Malungay (*Moringa oleifera* Lam.). The effectiveness of the compost products in enhancing plant growth were then tested to three most widely cultivated vegetable plants in the Philippines particularly eggplant (*Solanum melongena* L.), green pepper (*Capsicum annuum* L.) and Okra (*Abelmoscus esculentus* (L.) Moench*).* It was conceptualized in this study that compost enriched with green biomass are good source of nutrient for plant growth and increasing the amount would result to better growth performance and yield.

II. Methodology

The study used the experimental method of research laid out in Completely Randomized Design (CRD) in two replicates. Completely Randomized Design is the simplest experimental design in which the subjects are randomly assigned to treatments. The design relies on randomization to control for the effects of extraneous variables. The experimenter assumes that, on average, extraneous factors will affect treatment conditions equally, so any significant differences between conditions can fairly be attributed to the independent variable [10].

In this study, the subjects were the vegetable plants, eggplant (*Solanum melongena* L.), green pepper (*Capsicum annuum* L.) and Okra (*Abelmoscus esculentus* (L.) Moench*)* and the treatments or independent variables were the compost materials enriched with green biomass and wood ash. The dependent variables were the growth parameters such as plant height, leaf number, fresh weight, and yield. In this study, it was hypothesized that if compost enriched with greater volume of green biomass is more effective in enhancing plant growth, plants treated with compost enriched with greater volume of green biomass should show significantly higher growth performance than the control treatment.

Crop residues from threshing of rice (*Oryza sativa* L.) and corn (*Zea maize* L.) stalks were mixed at a ratio of 3:1 rice straw - corn stalks/leaves ratio, while the green biomass or nitrogenous plant materials, Ipil-ipil (*Leucaena leucocephala* (Lam.) de Wit), Wild sunflower (*Tithonia diversifolia* (Hemsl.) A. Gray) locally known as *Lappao*, and Malungay (*Moringa oleifera* Lam.) were mixed at a ratio of 1:2:1. Wood ash was added to compose about 1% of the compost material. Crop residues were pre-composted following rapid heap composting procedure [11] and the pre-compost were further enriched with additional green biomass to form the treatments (T) as follows: T_0 Pre-compost crop residue only or 3:0 ratio or Control treatment; T_1 Pre-compost crop residue + Green biomass at 3:1 ratio; T_2 Pre-compost crop residue + Green biomass at 3:2 ratio; T_3 Pre-compost crop residue + Green biomass at 3:3 ratio; T_4 Pre-compost crop residue + Green biomass at 3:4 ratio; T_5 Pre-compost crop residue + Green biomass at 3:5 ratio. Table 1 shows the nutrient content of the different treatments.

Table1. Nutrient quality of compost used as treatments

Treatments	N (%)	(P_2O_5), (%)	K_2O, (%)	Zn, ppm	Fe, ppm	Mn, ppm	Cu, ppm	Organic C, %	pH
T_0 - 3:0-Control	0.58 ^{c}	1.14^{c}	2.46^{e}	132.7^{d}	2373.0^{e}	899.4^{a}	122.46^{a}	12.47^{b}	4.55^{d}
T_1 - 3:1 ratio	2.19 ^{b}	1.37^{b}	2.94^{e}	138.1^{d}	2927.0^{d}	892.8^{a}	86.26^{b}	24.46^{a}	5.70^{c}
T_2 - 3:2 ratio	2.39 ^{a}	1.46^{b}	4.31^{d}	173.5^{c}	6006.0^{c}	828.3^{b}	92.06^{b}	25.51^{a}	5.75^{c}
T_3 - 3:3 ratio	2.45 ^{a}	1.55^{ab}	5.25^{c}	182.6^{c}	6126.0^{c}	713.0^{c}	82.47^{bc}	26.28^{a}	6.35^{b}
T_4 - 3:4 ratio	2.51 ^{a}	1.73^{a}	6.54^{b}	210.7^{b}	6976.0^{b}	698.8^{c}	70.24^{d}	27.63^{a}	6.50^{b}
T_5 - 3:5 ratio	2.49 ^{a}	1.74^{a}	9.28^{a}	377.7^{a}	8593.0^{a}	711.8^{c}	74.05^{cd}	31.37^{a}	6.80^{a}

Pot experiment laid out in CRD was conducted in an open area to assess the effect of green biomass-enriched compost on the growth performance of eggplant, green pepper and Okra. Compost products from each of the different treatments (T_0 to T_5) were mixed with garden soil at 1:1 soil- compost ratio and were potted in a 6 x 10 inches polyethylene bags to serve as growing media for the experimental plant species. The garden soil came from the same source and was mixed thoroughly prior to mixing with the compost treatments. Except for Okra which was sown directly to the pots, pre-germinated eggplants and green pepper were bought from a vegetable seedling dealer. The pre-germinated plants about 3 inches tall were carefully uprooted and were transplanted to the pots. Three plants per replicate or a total of 6 plants per treatment were used in the study. The pots were arranged in an open area and were fenced for protection from destruction by animals.

Data on plant height from the soil surface to the shoot tip, leaf number, fresh weight, and yield were recorded after 60 days from transplanting. Leaf number means the number of leaves of plants at the time of counting. Fresh weight refers to the weight of the whole plant without drying, and yield refers to the number of young visible fruits after 60 days. Data in this study were analyzed following the one way Analysis of Variance for Completely Randomized Designs (CRD) experiment using statistical software.

III. Results and Discussion

3.1. Effect of Green Biomass-Enriched Compost on the Growth of Green Pepper

The finished composts derived from the treatments were each mixed with garden soil at 1:1 ratio and was used as growing media purposely to evaluate the effect of enriched compost on the growth performance of green pepper (*Capsicum annuum*) after 60 days in pot culture. The summary of the data is shown in Table 2.

3.1.1. Height of Green Pepper

Treatment levels were found to have significant effect on height of young pepper plants. Among the treatments, pepper plants grown in T_5 treatment showed the highest height (65.5 cm) which was significantly superior over control or T_0 (21.33 cm), T_1 (27.33 cm), T_2 (41.83 cm), T_3 (46.67 cm) and T_4 (56.50 cm) treatments. All the composts enriched with green biomass were significantly higher than the control treatment. In the study of [5] on the effect of organic and chemical fertilizer on the growth of hot pepper, they found that plant heights were significantly greater in the compost treatment, despite all treatments receiving equivalent amounts of soil nutrients. [12] also demonstrated in their experiments that compost application to soils increased plant height (PH), leaf area index (LAI) and biomass dry matter yield (DMY) of corn significantly ($p<0.001$) as compared to the control (soil-only) treatment. The finding in this study was similar to the above findings.

The green biomass-enriched compost with good amount of plant nutrients has promoted plant growth of pepper in terms of height. The data in Table 2 indicate that, the composted crop residue enriched with green biomass had an influence on the plant height when compared to the control. The significantly higher nutrient content in the enriched compost must have influenced the plant height to a maximum average of 65.5 cm 60 days after planting where as in the control treatment, the height was as low as 21.33 cm on the average.

Table2. Summary of the effect of green biomass-enriched compost fertilizer on growth parameters of pepper plants

Parameters	Treatments					
	T_0 - 3:0-Control	**T_1 - 3:1 ratio**	**T_2 - 3:2 ratio**	**T_3 - 3:3 ratio**	**T_4 - 3:4 ratio**	**T_5 - 3:5 ratio**
Plant height (cm)	21.33	27.33*	41.83*	46.67*	56.60*	65.50*
Leaf Number	30.33	45.17*	66.50*	82.67*	108.83*	137.67*
Fresh weight (whole plant) (g)	14.00	26.00*	37.67*	42.00*	45.33*	51.60*
Yield (fruits)	5.00	9.00	15.50*	18.22*	18.33*	24.50*

Measurements were made 60 days after transplanting. Each data point represents the mean value of six plant samples except for fresh weight which represents the mean value of three samples. Values with an asterisk are statistically significant from control at p-0.05 level.

3.1.2. Number of Leaves of Green Pepper

The application of enriched compost at all levels significantly increased the number of leaves of pepper plants compared to control. Plants grown in T_5 showed the highest average number of leaves per plant (137.67) followed by T_4 treatment (108.83), and were significantly superior over control and the rest of the treatments. All composts enriched with green biomass were found significantly higher than the control treatment and were significantly different from each other. This implies that green pepper grown in compost treated with increasing amount of green biomass produces greater number of leaves. This could be attributed to the above findings wherein there were higher macronutrients content of green biomass-enriched compost compared to non-enriched compost.

The data in Table 2 indicate that, the green biomass-enriched compost had an influence on the number of leaves when compared to control. The enriched compost influenced number of leaves to a maximum average of 137.67 60 days after planting where as in the control, the number of leaves were as low as 30.33 on the average. The higher nutrient content of composts enriched with green biomass must have been helpful in increasing number of leaves of green pepper.

3.1.3. Fresh Weight of Green Pepper

Highest weight (51.50 g) was recorded from the plants in the T_5 treatment followed by the T_4 and T_3 treatments with mean weights of 45.33 and 42.0 grams, respectively. The fresh biomass weights of green pepper plants grown with green biomass-enriched compost were higher than the control. The increase of fresh biomass weight was mainly on the account of the increased mass of the above the ground organs [6]. This tendency was more pronounced in plants from the T_5 treatment.

Data analysis showed significant differences in fresh weight of plants from the six treatments. All of the plants grown with compost enriched with green biomass were significantly higher than control by DMRT. The T_5 treatment was found statistically higher than the rest of the treatments including the control. This was followed by the T_4 and T_3 treatments which were found identical with each other by DMRT but were significantly higher than the rest of the treatments except T_5. The significant differences in weight could be attributed to the effect of green biomass-enriched compost added to the soil which contains more nutrient than the control treatment.

3.1.4. Yield of Green Pepper

The data presented in Table 2 indicate that, treatment levels were found to have significant effect on number of visible young fruits of pepper 60 days after transplanting. Among all the treatments, plants from T_5 treatment showed the highest average number of young fruits (24.5) which was significantly superior over the all other treatments. Except for T_1 which was statistically at par with control, all compost enriched with green biomass had significantly higher yield compared to control. This implies that higher yield can be obtained by using compost that was enriched with green biomass. Treatments T_2, T_3 and T_4 however showed no significant difference with each other implying that increasing the ratio of crop residue and green biomass from 3:2 to 3:4 do not significantly increase yield of pepper. The findings supported the conclusion of [5] stating that peppers may be grown using relatively inexpensive organic fertilizers because the use of synthetic chemical fertilizers does not result in higher yields, and treatment yields reported compare favorably against other findings.

The data in table 2 indicate that, the green biomass-enriched compost had a positive influence on the yield express in terms of number of young fruits of green pepper compared to control. The enriched compost influenced fruit formation to a maximum of 24.50 on the average 60 days after planting, where as using compost not enriched with green biomass or control yielded as low as 5.0 fruits on the average. The findings in this study were similar to the findings of [6] where in the number of fruits and mass of flower buds were significantly higher after application of organic fertilizer. The significantly higher amount of phosphorous and potassium substances present in the compost must have beneficial effect on fruit and flower bud formation.

The above findings were similar to the findings of [1] wherein they found that the application of vermicompost increased the growth and yields of peppers significantly; including increased leaf areas, plant shoot biomass, and marketable fruits. Accordingly, humic materials and other plant growth-influencing substances, such as plant growth hormones, produced by microorganisms during vermicomposting, and produced after increased microbial biomass and activity in soils, may have been responsible for the increased pepper growth and yields, independent of nutrient availability. The significant increase in yield was in agreement with the findings of [13] wherein sunflower-enriched compost resulted to 20% increase on yield of Red Creole onions, improved physical quality of the bulbs, bigger, heavier and more uniform size bulbs.

3.2. Effect of Green Biomass-Enriched Compost on the Growth of Eggplant

The finished compost products from compost treatments T_0 to T_5 were each mixed with soil at 1:1 ratio each and their effects on the growth performance of eggplant (*Solanum melongena*), were assessed up to 60 days in pot culture.

3.2.1. Height of Eggplant.

Table 3 shows the height of young eggplants subjected to the different treatments. Treatment levels were found to have significant effect on the height of eggplants. Among the treatments, plants grown in the T_5 treatment exhibited the tallest plants at 43.83 cm on the average and were found to be significantly taller over control and the rest of the treatments. Aside from $T_{5,}$ the other treatments (T_1 to T_4) composed of compost enriched with increasing amount of green biomass were also found statistically taller over T_0-control treatment. The findings were similar to the results obtained by [14] that municipal solid waste compost had significant effect on height of eggplant and there were significant differences between control and other compost treatments. Control (no compost) had lower height and other treatment had no significant differences together. It is important to register that increasing plant height redounds to enhancement of number of node and fruit set in plants.

The green biomass-enriched compost with good amount of plant nutrients has promoted the height growth of eggplants. The data in Table 3 indicate that, the composted crop residue enriched with green biomass had a significant influence on the plant height of eggplant compared to control. The significantly higher nutrient content in composts enriched with green biomass must have influenced the plant height to a maximum average of 43.83 cm 60 days after planting where as in the control, the height was as low as 25 cm on the average.

Table 3. Summary of the effect of green biomass-enriched compost fertilizer on the growth of eggplant

Parameters*	Treatments					
	T_0 - 3:0-Control	**T_1 - 3:1 ratio**	**T_2 - 3:2 ratio**	**T_3 - 3:3 ratio**	**T_4 - 3:4 ratio**	**T_5 - 3:5 ratio**
Plant height (cm)	25.00	28.83*	31.33*	33.67*	35.67*	43.83*
Leaf Number	9.83	11.33*	12.50*	14.67*	16.50*	22.33*
Fresh weight (whole plant)	21.00	27.50*	39.67*	42.50*	54.17*	67.00*
Total Yield (No. of fruits)	0.0	1	3	5*	5*	8*

**Measurements were made 60 days after transplanting. Each data point represents the mean value of six plant samples except for fresh weight which represents the mean value of three samples. Values with an asterisk are statistically significant from control at p-0.05 level.*

3.2.2. Number of Leaves of Eggplant.

The application of green biomass-enriched compost prepared at 3:5 crop residue-green biomass ratio (T_5 treatment) resulted in a significantly higher number of leaves of eggplants plants compared to control and the other treatments. Except for T_1, the other plants grown at treatments T_2 to T_4 were also found significantly taller than the plant grown at the control treatment. This implies that growing media, composed of soil and compost enriched with green biomass will result to taller eggplants compared to those eggplants grown in growing media composed of soil and compost not enriched with green biomass. The heights of eggplant were statistically the same under the T_1 and control treatments according to DMRT. Analysis further showed that T_4 and T_3 were statistically the same although they were significantly different from control, T_1 and T_2 treatments. The number of leaves in the T_3 and T_2 treatments were superior over control and T_1 treatments but were not significantly different from each other. Similar findings were reported by [14] who found that municipal solid waste compost applied in four increasing levels (0, 50, 100, 150 and 200 t/ha) revealed significantly higher number of leaf per plant at 0.05 level compared to control.

3.2.3. Fresh Weight of Eggplants.

The highest weight was observed from the plants grown in the T_5 treatment with mean weight of 67 grams. The second highest weight was recorded from the T_4 treatment (54.17 grams) followed by the T_3 treatment with mean weight of 42.5 grams. T_2 and T_1 treatments showed a mean weight of 39.67 and 27.5 grams, respectively. The least weight was from the plants in the control treatment (21 grams).

All plants raised with enriched compost had higher fresh biomass weight than the plants under the control treatment. Statistical analysis showed that there were significant differences on the weight of eggplant among treatments. Plants in T_5 were significantly heavier than the rest of the treatments. The plants in the other treatments (T_1 to T_4) grown with enriched compost were also significantly heavier than the plants under the control treatment. Weight of eggplants under the T_2 and T_4 treatments were statistically the same by DMRT. The findings imply that growing media with enriched compost significantly increase fresh weight of eggplant biomass.

3.2.4. Yield of Eggplant.

The eggplants under the control treatment did not bear fruit after 60 days. Only one (1) fruit was observed in T_1, 3 fruits in T_2, 5 fruits each in T_3 and T_4 and 8 fruits in T_5 which translates into a mean yield of 0.17, 0.50, 0.83, 0.83 and 1.33 for T_1, T_2, T_3, T_4 and T_5, respectively. Among all the treatments, plants from T_5 treatment showed the highest number of fruits which was significantly higher over the T_0-control, T_1, and T_2 treatments but was statistically at par with T_3 and T_4 treatments by DMRT.

The finding were in agreement with the findings of [14] wherein they found that mean comparison between control and other compost levels showed significant difference and that highest yield of eggplant was achieved from 150 Mg.ha-1 treatments while lowest yield was achieved from control treatment. The same author cited that compost increases yield by improving long term physical and chemical properties such as water holding capacity, cation exchange capacity, bulk density, and percentage organic matter and increase microbial rather than the value as a fertilizer. The study of [15] found that the application of compost in addition to inorganic fertilizer improve the growth and yield performance of eggplant which gave evidence on the importance of using organic fertilizer in agricultural production.

The data indicate that, the green biomass-enriched compost had a significant influence on flower and fruit formation. The green biomass-enriched compost influenced fruit formation to a maximum of 8 fruits 60 days after planting, where as in the control treatment, no visible fruit was observed. The significantly higher amount of phosphorous and potassium substances present in the compost must have beneficial effect on fruit formation.

3.3. Effect of Green Biomass-Enriched Compost on the Growth Performance of Okra

Finished compost products from compost treatments T_0 to T_5 were each mixed with garden soil at 1:1 ratio and were used as growing media purposely to evaluate the effect of enriched finished compost on the growth performance of directly sown Okra (*Abelmoscus esculentus)* up to 60 days in pot culture.

3.3.1. Height of Okra.

The height of Okra subjected to the different treatments is shown in Table 4. Treatment levels were found to have significant effect on the height of okra plants. Among the treatments, plants grown in the T_5 treatment exhibited the highest plant height at 44.33 cm on the average. This was followed by T_4 and T_3 treatments with a mean height of 39 and 37 cm, respectively. The T_1 and T_2 treatments had almost the same average height while the control treatment had the lowest height at 32.8 cm. Analysis showed that the height of plant grown under the T_5 treatment was significantly higher than the rest of the treatments. The plants under the other treatment that contain enriched compost were also significantly higher than the T_0 or control treatment except T_1 which was statistically the same with the control. By DMRT, no significant differences were observed between the T_1, T_2, and T_3 treatments. The findings are in agreement with the findings of [16] on their study on the response of okra on organic and inorganic fertilization. The authors found that okra plants treated with organic based fertilizer had the tallest plants compared to plants treated only with NPK and control.

The green biomass-enriched compost with good amount of plant nutrients has promoted the height growth of okra. The data in Table 4 indicate that most of the composted crop residue enriched with green biomass had a significant influence on the plant height when compared to control. The significantly higher nutrient content in composts (except T_1) enriched with green biomass must have influenced the plant height of Okra to a maximum average of 44.33 cm 60 days after sowing where as in the control, the height was as low as 32.83 cm on the average.

Table4. Summary of the effect of green biomass-enriched compost fertilizer on the growth of Okra

Parameters*	Treatments					
	T_0 - 3:0-Control	**T_1 - 3:1 ratio**	**T_2 - 3:2 ratio**	**T_3 - 3:3 ratio**	**T_4 - 3:4 ratio**	**T_5 - 3:5 ratio**
Plant height (cm)	32.83	35.00*	35.83*	37.00*	39.00*	44.33*
Leaf Number	9.50	10.5*	10.67*	11.33*	12.33*	13.33*
Fresh weight (whole plant)	56.50	73.5*	86.33*	103.67*	104.50*	109.83*
Total Yield (No. of fruits)	0.17	1.5*	1.67*	2.33*	2.33*	2.83*

**Measurements were made 60 days after seed sowing. Each data point represents the mean value of six plant samples except for fresh weight which represents the mean value of three samples. Values with an asterisk are statistically significant from control at p-0.001 level.*

3.3.2. Number of Leaves of Okra.

Observation revealed increasing number of leaves of Okra with increasing amount of green biomass used. The highest number of leaves was observed at the T_5 treatment (13.33 on the average) and was found to be significantly higher than the rest of the treatment. Next highest number of leaves was recorded under the T_4 treatment (12.33) followed by T_3 treatment (11.33) but were statistically at par with each other. T_1 and T_2 were also found significantly higher than the control but were at par with each other by DMRT. The application of green biomass-enriched compost prepared at 3:1 to 3:5 ratios significantly increased the number of leaves of Okra plants compared to control.

The data indicate that, compost enriched with green biomass had a favorable influence on number of leaves of okra when compared to control. The compost influenced number of leaves to a maximum average of 13.33 leaves on 60 days after seed sowing where as in non-enriched compost or control, the number of leaves remained as low as 9.5 leaves on the average.

3.3.3. Fresh Weight of Okra.

The heaviest was observed from the plants grown in the T_5 treatment with mean weight of 109.83 grams and was significantly higher than the rest of the treatments. The second heaviest was recorded from the T_4 treatment (104.5 g) followed by the T_3 treatment with mean weight of 103.67 grams but the treatments were statistically at par with each other according to DMRT. The T_2 and T_1 treatments had a mean weight of 86.33 g and 73.5 g, respectively and were significantly different from each other. The least weight was from the plants under the control treatment (56.5 g). All the plants grown with enriched compost had significantly heavier than the control. This implies that mixing compost enriched with green biomass with soil promotes the growth of Okra resulting to heavier biomass weight.

3.3.4 Yield of Okra.

The treatment levels were found to have significant effect on number of fruits of okra. Among all the treatments, plants from T_5 treatment showed the highest average number of fruits (2.83) which was significantly higher than the rest of the treatments. The next highest yield was recorded under the T_4 and T_3 treatments (2.33 each) which are statistically the same but were significantly higher than T_2, T_1 and T_0-control treatments. The findings agreed with that of [4] who found that higher growth and yield values of okra were recorded under compost treatments than the raw organic materials. This agreed with [17] that composts are more important than inorganic fertilizer because it consists of relatively stable decomposed materials resulting from accelerated biological degradation of organic matter under controlled aerobic conditions. The significantly higher yield of okra treated with greater volume of green biomass shows the ability of these organic materials to be used as soil amendments. This has also proved that green biomass materials can be used as an alternative in improving compost quality, thus reducing cost of agricultural input and promote good environment.

The data indicate that, the green biomass-enriched compost had an influence on the formation of fruits of Okra when compared to control. The compost influenced fruit formation to a maximum on the average of 2.83 on 60 days after sowing where as in non-enriched compost the number of buds remained as low as 0.17 on the average. The significantly higher amount of phosphorous substances present in the enriched compost might have beneficial effect on fruit formation.

The overall findings is in congruence with the finding of [15] which stated in their conclusion that application of organic based fertilizer, poultry manure, *Gliricidia* leaves and inorganic fertilizer enhanced Okra plant growth and development when compared to untreated control.

IV. Conclusions

It could be concluded from this study that compost, derived from enriching pre-composted rice and corn residues with green biomasses and the addition of small quantity of wood ash, stimulates plant growth in terms of total height, number of leaves, fresh weight of plant biomass, and initial yield of green pepper (*Capsicum annuum*), eggplant (*Solanum melongena*), and Okra (*Abelmoscus esculentus*). The findings demonstrated that green biomass of *Leucaena leucocephala, Tithonia diversifolia* and *Moringa oleifera* can be used as an alternative in improving the quality of compost, the product of which could be used as a cheap but effective way of increasing the growth and yield of crops than ordinary compost. Nutrient quality of the compost might be improved further while maintaining its "organic" quality by addition of manures of grazing animal and free range chicken.

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