4

RESULTS AND DISCUSSION

The present chapter results and discussion deals with physicochemical parameters, microbial population during biocomposting and FTIR characteristics of raw and biocomposted sugarcane trash and sugarcane bagasse waste as well as their effect on the biometric, yield and biochemical characteristics, antibacterial and antioxidant analysis of selected test crops Onion (*Allium cepa* L.), Black Night shade (*Solanum nigrum* L.), Tomato (*Solanum lycopersicum* L.) and Brinjal (*Solanum melongena* L.). The results of the current research on **"Effect of Biocomposted Sugarcane Trash and Bagasse on Selected Crop Plants and Soil Nutrient Status"** are discussed under the following headings in five phases of experimental studies as previously mentioned in chapter 3 (Materials and Methods). The current chapter provides the significant outcomes of the present research (Table 1-49 & Figure 1-24).

PHASE 1

4.1 COMPOSTING

Physico-chemical composition of the raw and composted sugarcane trash and sugarcane bagasse are analyzed. The physico chemical parameters lignin, cellulose, pH, electrical conductivity, organic carbon, nitrogen, phosphorus, potassium, calcium, magnesium and C:N were analyzed in six different types of compost and control (Raw sugarcane trash and Raw sugarcane bagasse) to assess the compost maturity. The results were presented in Table 1.

Lignin and Cellulose

The Lignin content of non-composted substrates varied from 26.2% in sugarcane trash and 24.6% in sugarcane bagasse. It was reduced to C_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/h (6.87 %), C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.94 %) and C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium

(7.23%). This drastic reduction was maximum in the treatment C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.34%) as shown in Table 1.

Cellulose is a superior indicator to evaluate the degree of maturity of the compost. Raw sugarcane trash (36.1 %) and sugarcane bagasse (45.8 %) contains enormous amount of cellulose. After composting it gets reduced. In C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium it is 6.21 % and C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5 t/h (7.43 %) respectively. (Table 1)

Similar results were obtained by Suresh Kumar and Ganesh, (2012) who recorded an initial value of lignin (34.23%) and cellulose (27.28%) when compared to the reduction value (6.24% and 5.65 %) in the treatment inoculated with 1 kg of coirpith + 5 ml of (*Phanerochaete chrysosporium*) + 5 % of cow dung + 5 % of panchagavya.

Similar results were observed by Reghuvaran and Ravindranath, (2012) who observed coirpith composted with *Pleurotus sajor-caju* promoted the degradation of lignin effectively. The present observation is in accordance with the findings of Sunitha Kumari *et al*., (2013) observed that composting with *pleurotus florida* reduced lignin content (12.70%) and cellulose (18.05%), compared with raw coirpith lignin was (35.10 %) and cellulose (30. 40 %) respectively.

Significant reduction in lignin and cellulose content after composting with fungal bioinoculants in different combinations were reported by Jaybhaye and Satish, (2016), Thenmozhi (2015), Zhang *et al*., (2019) and Prashija and Parthasarathi, (2020).

Disposal of sugarcane trash and sugarcane bagasse into the environment causes environmental pollution and health hazards due to the presence of high lignin content. Organic substances like lignin and cellulose is a complex heteropolymer deposited in the walls of specialized plant cell as a result of secondary cell wall biosynthesis which is insoluble and it is made up of a lengthy chain of glucose molecules that are mostly joined together by glycosidic linkage. A significant decrease in lignin content was observed in the present study due to the action of lignocellulolytic microflora, microbial consortium and earthworms the resulting biocompost serve as a good source of plant nutrient and increased the production and soil fertility.

pH

The pH value of the compost is considered to be an indicator of process in decomposition and stabilization. The pH value of the raw sugarcane trash and sugarcane bagasse was 6.5 and 7.1. The pH value was moderately increased in all the treatments. Maximum pH value (7.8) was obtained in the treatment C_4 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} to C_6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (7.7), followed by other treatments as shown in Table 1.

Similar increase in pH was observed by Suresh Kumar and Ganesh, (2012) in vermicompost coirpith + cow dung + panchagavya and Jaybhaye and Satish, (2016) in composted paddy straw compost (6.97) as compared to the raw sample (6.35). The pH trend was moving upward from acidic condition. The pH change might be due to mineralization during vermicomposting our studies correlates with Das and Dakhar, (2012) who reported that breakdown of organic materials releases K^+, Ca^{2+} and Mg^{2+} as well as OH into the soil which leads to a elevation in soil pH following compost addition. Our studies also correlate with Abood *et al*., (2022) who reported that pH neutralization prior to aerobic digestion of composting materials improved the humification phase and microbial activity which has an impact on degree of degradation.

The pH elevation in final stage of composting may be due to the production of nitrogenous compounds and decomposition of organic acids. Higher pH levels at the final stage of vermicomposting was also reported by Rashad *et al.,* (2010); Sundaram and Vincent, (2017); Erana *et al.,* (2019); Karanja *et al.,* (2019); Behera and satapathy, (2020); Bharadwaj, (2020) and Rupani *et al.,* (2023).

The fact that various microorganisms can grow at various pH levels, the pH of the compost initial raw materials has minimal effect on the composting process Beck-friis *et al.,* (2003) reported that pH range between 6.5 and 8 is the optimal range for microbial activity. Quick rise in pH resulted in faster acid decomposition and lower maximum organic acid concentration in the compost that were caused by higher oxygen concentrations.

Electrical Conductivity

The EC value of the raw sugarcane trash and sugarcane bagasse was found to be 3.1 and 3.5 millimhos cm^{-1}. Electrical conductivity was gradually decreased (1.25 millihos cm^{-1}) in the treatment C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium, followed by C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (1.43 millihos cm^{-1}) as shown in Table 1.

Similar results were observed by Suresh Kumar and Ganesh, (2012) that EC value is reduced from 2.80 dsm^{-1} to 1.25 dsm^{-1} initial levels in coirpith vermicomposting. The present result is comparable with Sakthivigneswari and Vijayalakshmi, (2016) who reported that vermicomposted corncob + *Pleurotus sajor caju* had a lower EC value 1.48 millimhos cm^{-1} when compared to control of 2.97 millimhos cm^{-1}. The present observation is in accordance with the findings of Sridevi *et al.*, (2016) The electrical conductivity was reduced in final phase of composting because of volatilization ammonia and the precipitation of mineral salt could be possible reason for the decrease of EC. Similar result was observed by Ganesan *et al*., (2022) who also reported a decrease in EC on the vermicompost of solid waste.

The mineral ions during earthworm consumption and excretion and the bacterial consortium may be the cause for reduction in electrical conductivity. The significant decrease in EC combination in microorganism inoculated samples might be due to the bioconversion of organic materials into various intermediate types of organic acids. Reduction in EC may liberate the mineral salts slowly from the organic manure which is adequate for the flourish growth of the plants.

Organic Carbon

The organic carbon content in the raw and composted sugarcane trash and sugarcane bagasse is given in Table 1. A significant decrease in organic carbon of 13.29 % was observed in the treatment of C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium followed by C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5 t/h (15.15%) against the initial value of sugarcane trash (37.50%) and sugarcane bagasse (40.30 %) as compared to the other treatments. The organic carbon was found to be low in the final product compared to the control.

TABLE 1

PHYSICO-CHEMICAL COMPOSITION OF THE RAW AND COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE

Physico-Chemical Composition	Treatment							
	Raw Sugarcane Trash	Raw Sugarcane Bagasse	T_1	T_2	T_3	T_4	T_5	T_6
Lignin (%)	26.2	24.6	6.87	6.34	7.23	7.89	6.94	7.73
Cellulose (%)	36.1	45.8	9.76	8.65	8.27	8.78	7.43	6.21
pH	6.5	7.1	7.3	7.2	7.4	7.8	7.5	7.7
Electrical conductivity (Milli mhos cm^1)	3.1	3.5	1.98	1.76	1.43	1.87	1.63	1.25
Organic carbon (%)	37.50	40.30	30.01	21.07	20.12	18.02	15.15	13.29
N (%)	0.62	0.64	1.66	1.68	1.70	1.72	1.75	1.71
P (%)	1.12	1.25	1.58	1.43	1.23	1.69	1.95	1.42
K (%)	1.36	1.38	2.93	2.98	2.17	3.11	3.28	2.87
Ca (%)	0.98	0.95	1.67	1.55	1.34	1.29	1.87	1.32
Mg (%)	0.23	0.27	0.34	0.56	0.65	0.71	0.79	0.36
C:N ratio	60:1	62:1	18:1	12:1	11:1	10:1	8:1	7:1

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

The present result coincides with the result of Sengar *et al*., (2009) who reported maximum reduction in organic carbon content from 35.12% to 15.14% during degradation of bagasse. The result is also on par with Pandey *et al.*, (2012) who observed that sugarcane bagasse treated with urea and hot water along with *Pleurotus citrinopileatus* decreased the carbon content. The result is also in par with Patil *et al*., (2017) that minimum organic carbon content was recorded (20.45%) after 180 DAI whereas M6 i.e. Cowdung (100%) and M1 i.e. Coirpith waste (100%) recorded maximum (28.48%).

The result is also on par with Viji and Neelanarayanan, (2014) who recorded a significant reduction of organic carbon from (43.29% and 10.08%) in vermicompost prepared by using predigested coirpith with *pleurotus spp* and cow dung in 50:50 concentrations. The work is in harmony with the findings of Sivakumar and Karthikeyan, (2016) who reported reduction of organic carbon in vermicompost. This work is in harmony with the findings of Theradimani *et al.*, (2018) who revealed that inoculation of coir waste with six *Pleurotus spp* antagonists and biofertilizers reduced the organic carbon content.

The results also coincide with the finding of Jain *et al.*, (2019) who also recorded reduction in organic carbon content initial value of 41.0 to 36.3 after 20 days of composting. This result also coincided with the report of Rashad *et al.*, (2010); Viji and Neelanarayanan, (2014); Varma *et al.*, (2015); Sivakumar and Karthikeyan, (2016); Patil, *et al.*, (2019) and Karpagavalli *et al.,* (2020).

Compost reaches maturity when its organic carbon content decreases. The result of the composting process will be a stable compost if the carbon concentration degrades more quickly. Reduction of organic carbon content of the composted sugarcane trash and sugarcane bagasse might be due to the decomposition process by the microflora which leads to the loss of carbon in the form of CO_2 from the substrates during the decomposition and mineralization of organic wastes by farming stabilized end products.

Nitrogen

The present study revealed that the total nitrogen content showed an increasing trend during decomposition. The initial nitrogen content of raw sugarcane trash (0.62 %) and sugarcane bagasse (0.64 %). Maximum amount was noticed in the compost C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (1.75%) followed by other treatments as shown in Table 1.

The present observation is in accordance with the findings of Prabhakaran and Manivannan, (2014) who observed an increase in total nitrogen content from 1.40 to 2.69 in poultry dropping wastes amended with bagasse inoculated with Fungal consortium (*Aspergillus flavus, Asperigillus niger, Trichoderma viride and Phanerochacte chrysoporium*) after 30 days of decomposition.

The present study coincides with the result of Porkodi and Amruththa, (2014) who recorded increased nitrogen content from 0.62% to 0.89 % by using *Eudrilus eugeniae* in market waste. Similar result was obtained by Selvamuthukumar and Neelanarayanan, (2012) who stated that maximum total nitrogen content (3.06 ± 0.05) in vermicompost produced by *Eudrillus eugeniae* utilizing poultry waste, groundnut husk and soil in 70:20:10 concentration.

Total nitrogen was found to be increased significantly with better results of prepared compost over farmyard manure Bharadwaj, (2020). The present observation is positively correlated with the findings of Theunissen *et al*., (2010) and Indumathi, (2017).

Significant increase in nitrogen content in sugarcane trash and sugarcane bagasse compost was not only due to the enhancement of nutrients but also due to the mineralization of organic matter by microorganisms. The mineral nitrogen may be retained in the nitrate form by nitrogen transformation by earthworms in manure by enhancing nitrogen mineralization of the compost. The inoculation of worms agro-waste material (Sugarcane trash and Sugarcane bagasse) considerably enhanced the amount of nitrogen due to earthworm mediated nitrogen mineralization of waste. The increase in nitrogen content could be due to the decrease in the carbon content. The microorganisms utilize the carbon for its metabolism.

Phosphorus

The data presented in the Table 1. indicates highest phosphorus content (1.95 and 1.69%) in the treatment C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* followed by C_4 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}. In other treatments the phosphorus content recorded are C_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (1.58%), C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (1.43%), C_6 - Predecomposted sugarcane bagasse + *Trichoderma* *asperelloides* + Microbial consortium (1.42%) and C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (1.23%) when compared with raw sugarcane trash (1.12%) and sugarcane bagasse (1.25%).

The present observation is in accordance with the finding of Muthurayar and Dhanarajan, (2013) who observed maximum total phosphorous content from 0.02 to 0.47 % in the treatment inoculated with coirpith + cow dung + vegetable market waste + poultry waste + mixed microbial culture (*Trichoderma viridae* + *Pleurotus sajor-caju*) after 12 weeks of composting. Similar increase in total phosphorous content was obtained by Thiruneelakandan and Subbulakshmi, (2014) in biocomposted solid waste after 60 days of composting.

The present result coincides with the results of Lakshmi Prabha *et al*., (2015) who obtained an increase in level of phosphorous content (1.06 %) on 60^{th} day of vermicomposted leaf litter. Rupani *et al.*, (2017) also reported an increased phosphorus content from 0.93 to 1.11% in a mixture of palm oil mill wastes during vermicomposting. These results agreed with the findings of Sultana *et al.*, (2021) that different types of amended MSW compost under anaerobic conditions released more phosphorus content. The increase in total phosphorus content was reported by Zhang *et al*., (2021).

The release of phosphorous in available form is mainly due to the action of microbial phosphates of gut microbiota as well as presence of phosphate solubilizing microorganisms in worm casts. The total phosphorus content studied in the experiment shows an increasing pattern in both sugarcane trash and sugarcane bagasse. An increase in phosphorus content results from the direct action of enzymes in the worm gut and microbial activities.

Potassium

It is evident from Table 1 that the initial total potassium content in raw sugarcane trash was (1.36%) and sugarcane bagasse (1.38%). A significant increase in potassium content (3.28% and 3.11%) was recorded in the compost C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} and C_4 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}. The potassium content recorded in other treatments are C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (2.98%), C_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (2.93%), C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (2.87%) and C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (2.17%).

The present observation is in accordance with the findings of Suresh Kumar and Ganesh, (2012) who also observed an increase in total potassium content from 0.85% to 4.18% in coirpith waste inoculated with *Pleurotus sajor-caju* and cow urine. Similar result was obtained by Reghuvaran and Ravindranath, (2012) who observed an increase in total potassium content from 0.28% to 0.42% and 0.28% to 0.41% composted by lignocellulolytic fungi (*Pleurotus sajor-caju*) inoculated coirpith sample over 15th and 30th day of degradation.

The results are also on par with Wani *et al*., (2013) who reported an increase in total potassium content from 0.60 % to 1.01 % in kitchen waste inoculated with *Eisenia fetida*. The present observation is in accordance with the findings of Vijayakumar *et al*., (2014) who observed a municipal solid waste (MSW) treated with *Eudrilus eugeniae* significantly increased the total potassium content from 0.24 % to 0.42 % on 60th day. The present observation is in accordance with the findings of Shyamala and Belagali, (2012); Patil *et al.*, (2019) and Bharadwaj, (2020).

The production of acids by the microorganisms and enhanced mineralization rate through increased microbial activity during the vermicomposting process play a key role in solubilizing insoluble potassium. The enhanced number of microflora present in the gut of earthworms in the cast of vermicomposting might have played an important role in this process and thus potassium content increased.

Calcium and Magnesium

A perusal of data presented in Table 1 in the present study revealed an increasing trend in total calcium and magnesium content of the raw sugarcane trash and sugarcane bagasse. A significant increase from C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (1.87%) to C_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 1.67 followed by C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (1.55%), C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* +

Microbial consortium (1.34%), C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (1.32%) and C_4 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (1.29%) and C_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (0.79%) to C_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (0.71%) followed by C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (0.65%), C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (0.56%) and C_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (0.36%) was recorded.

The result is also on par with Suresh Kumar and Ganesan, (2012) reported a significant increase in total calcium and magnesium content from (0.82% to 3.20 %) and (0.24 % to 2.41 %) by *pleurotus sajar caju*, coirpith and cow urine. Similar result was obtained by Viji and Neelanarayanan, (2014) who observed highest total calcium (5.26 %) and magnesium (2.34%) in vermicompost produced by *Eudrilus eugeniae*, *Perionyx exclavates*, *Eisenia fetida* and cowdung in 50:50 concentration.

Similar result was observed by Chellachamy and Dinakaran, (2015) who observed an increase in calcium content in vermicomposted sathukudi waste (0.99%) followed by pomegranate waste (0.94%). Our results agreed with the findings of Ravimycin, (2016) who reported that increase in calcium (7.8%) and magnesium (2.44%) in the vermicompost and farmyard manure compost (4.5 %, 1.1%). Similar results were positively correlated with the findings of Velmourougane and Raphael, (2012); Chander *et al*., (2018) and Karanja *et al.,* (2019).

The increased calcium content in the biocompost is due to the presence of calciferous glands present in the earthworm that are involved in the production of calcium carbonate that might favour the calcium availability in the biocompost. The increased level of calcium is due to the gut process associated with calcium metabolism which primarily enhanced calcium content in worm cast. Increase of magnesium content of biocompost is due to the mineralization of this element by the earthworm activity. It is assumed that raw materials of the substrate and the microbial activities in the earthworm gut directly affect the variation in nutrient contents during the vermicomposting.

C:N ratio

The C:N ratio of the final compost represents the degree of stabilization of a biowaste during the degradation process. Final C:N ratio below 20 indicates the maturity of the compost, which has been reported by several researchers. The results regarding C:N ratio are depicted in Table 1.

A significant reduction of C:N ratio was observed in the treatment C_6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium followed by C_5- (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}). C:N ratio was narrowed down from 62:1 to 7:1 (raw sugarcane bagasse: C_6) followed by 60:1 to 8:1 (raw sugarcane trash: C_5) respectively.

The other treatments recorded the following reduction in C:N ratio. C_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (18:1), C_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (12:1), C_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (11:1) and C_4 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (10:1) was recorded.

This is an accordance with the findings of Muthurayar and Dhanarajan, (2013) who reported drastic reduction in C:N ratio from 162:1 to 21:8 during degradation of coirpith vegetable market waste and poultry waste along with cow dung. The present result coincides with the result of Sunitha Kumari, (2013) who reported decrease in C:N ratio from 113:1 to 33:8 by *Pleurotus florida* inoculated coirpith sample. The results were comparable with Viji and Neelanarayanan, (2014) who reported a reduction in C:N ratio in vermicomposted leaf litter.

The present finding correlated with Bhat *et al.,* (2017) the C:N ratio of initial cattle dung was 34.53 and as the composting process the C:N ratio was decreased to 33.79 in final vermicompost. Similar results were obtained by Sundaram and Vincent, (2017) who observed that C:N ratio drastically decreased in all treatments during composting period. The present finding coincides with the result of Gebeyehu and Kibret, (2013); Kim *et al*., (2018); Owis *et al*., (2016); Indhumathi, (2017) and Yanqoritha, (2023).

Similar to the present study, shows lower organic material availability and results in higher ammonia emissions. On the other hand, the C:N ratio of all the waste mixtures decreased during vermicomposting due to the reduction in organic carbon and increased total nitrogen. The C:N ratio reduction might be due to the loss of carbon as carbon dioxide due to respiratory activities of earthworms and associated microflora and simultaneously adding of nitrogen in substrate material by inoculated earthworms (through production of mucus, enzymes and nitrogenous excrements). The C:N ratio reduction may also be due to reduction in organic carbon and increased total nitrogen. Hence the C:N ratio reduction in the present study indicated the compost maturity.

4.1.2. Microbial Population

The six different composts were prepared by using sugarcane trash and sugarcane bagasse agro waste. Composting treatments consists of C – Control (Raw sugarcane trash and sugarcane bagasse) Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}), Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}), Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 5t/h), Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}), Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) and Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium. The results from the examination of the total microbial populations (bacteria, fungi, and actinobacteria) in the waste from sugarcane trash and sugarcane bagasse waste determined the quality of biocompost. Figure I-III displays 30 to 90 days of microbial fluctuation in each biocomposting unit.

Bacterial Population

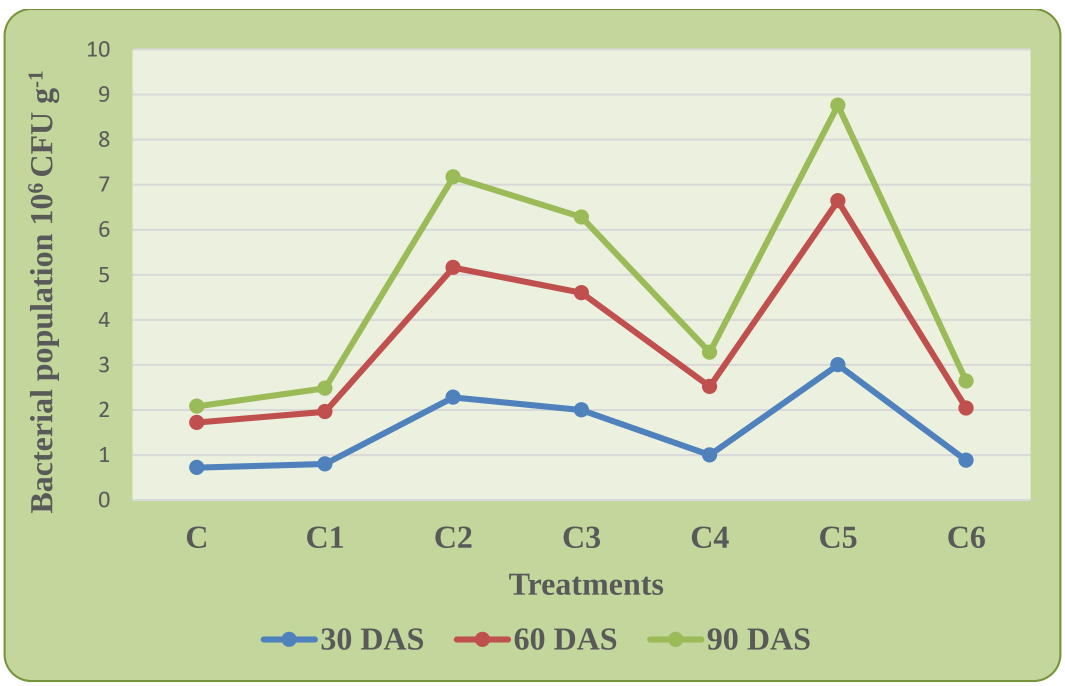
The overall changes in the microbial population were recorded in 30, 60 and 90 days as shown in Figure I. The beginning of mesophilic phase at 30 days revealed that C_5 (3.00×10^6 CFU g^{-1}), had higher total bacterial counts followed by C_2 (2.28×10^6 CFU g^{-1}) over the control (0.72×10^6 CFU g^{-1}). On the 60th day C_5 (3.64×10^6 CFU g^{-1}) followed by C_2 (2.88×10^6 CFU g^{-1}) as compared to the control (1.00×10^6 CFU g^{-1}) in terms of outstanding bacterial load in the thermophilic phase. The bacterial population appeared to have slightly declined during the maturation period, which lasted till 90 days. The highest populations of bacteria were seen in the C_5 (2.12×10^6 CFU g^{-1}) followed by C_2 (2.01×10^6 CFU g^{-1}) which outperformed the control (0.36×10^6 CFU g^{-1}).

Fungal population

In comparison to the control (0.20×10^4 CFU g^{-1}) on the 30th day, the total fungal count in C_5 (0.53×10^4 CFU g^{-1}) were significantly greater in the mesophilic phase followed by C_2 (0.50×10^4 CFU g^{-1}). The thermophilic phase showed a significant increase in C_5 (0.77×10^4 CFU g^{-1}) on the 60th day followed by C_2 (0.61×10^4 CFU g^{-1}) over the control (0.18×10^4 CFU g^{-1}). The fungal population reduced in C_5 (0.45×10^4 CFU g^{-1}) followed by C_2 (0.40×10^4 CFU g^{-1}) as compared to the control (0.10×10^4 CFU g^{-1}) during the maturation phase on 90 days as shown in Figure II.

FIGURE I

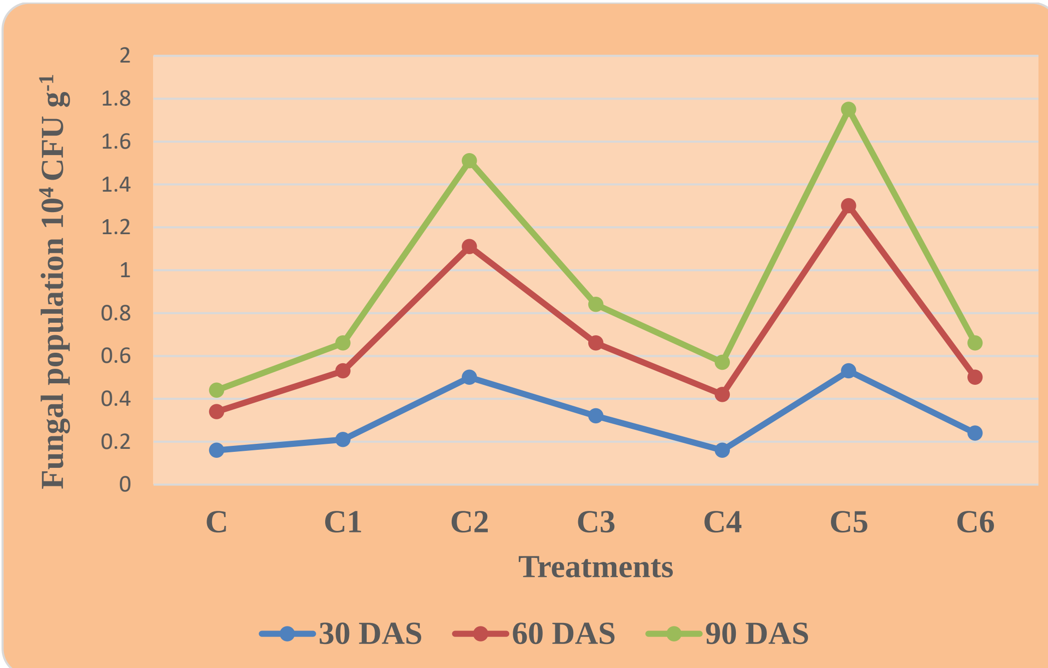
IMPACT OF BIOCOMPOSTING ON BACTERIAL POPULATION



C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

FIGURE II

IMPACT OF BIOCOMPOSTING ON FUNGAL POPULATION



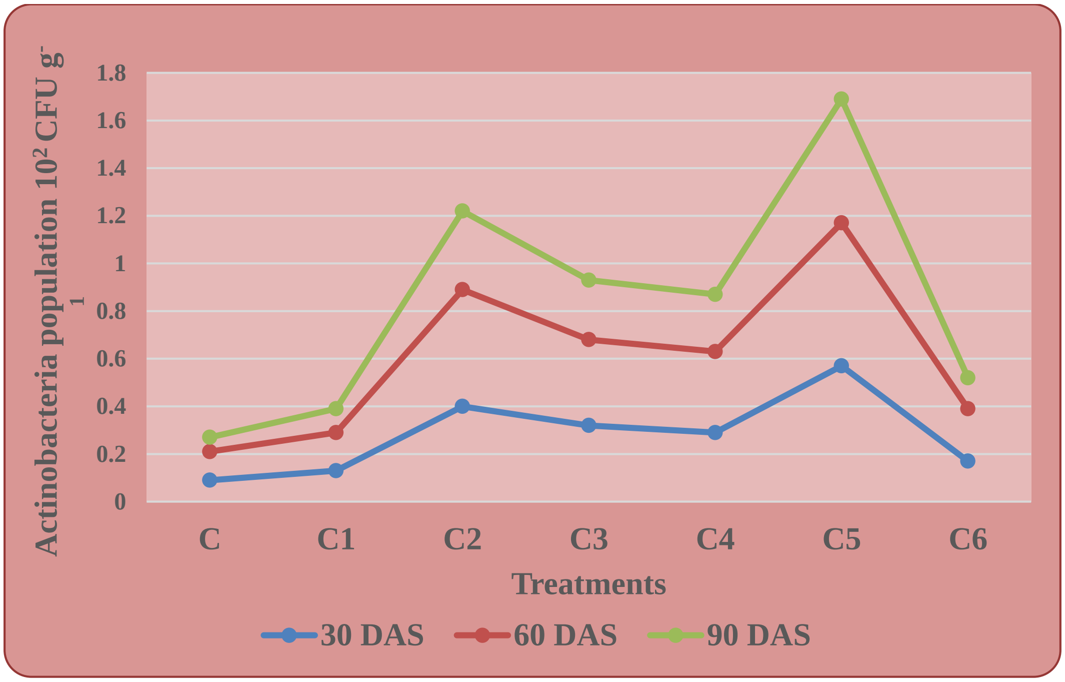
Actinobacteria population

C_5 had the greatest actinobacteria population (0.57×10^2 CFU g^{-1}) on the 30^{th} day followed by C_2 (0.40×10^2 CFU g^{-1}) over the control (0.09×10^2 CFU g^{-1}) in the mesophilic phase when compared to the control (0.12×10^2 CFU g^{-1}). On the 60^{th} day of the thermophilic phase, a significant number of actinobacteria were identified in C_5 (0.60×10^2 CFU g^{-1}) followed by C_2 (0.49×10^2 CFU g^{-1}). The population of actinobacteria decreased from 90^{th} day and the highest population of actinobacteria was found in C_5 (0.52×10^2 CFU g^{-1}) followed by C_2 (0.33×10^2 CFU g^{-1}) as compared to the control (0.06×10^2 CFU g^{-1}) in the maturation phase as shown in Figure III.

Temperature is the primary factor influencing microbial activity and other physicochemical changes in composting material. Decomposable materials temperature changed the temperature spectrum. When a heap has different communities of decomposers that constitute a typical succession of three temperature phases (Mesophilic, Thermophilic and Maturation phase or Cooling phase) during this period the temperature in the heap fluctuates.

FIGURE III

IMPACT OF BIOCOMPOSTING ON ACTINOBACTERIA



These findings were in line with the work of Suresh Kumar and Ganesan, (2012) who reported that the combined application of vermicomposted coirpith + cowdung + panchagavya showed maximum bacteria ($28.34 x 10^5$ CFU g^{-1}) and fungi ($12.34 x 10^5$ CFU g^{-1}). Mushan *et al*., (2014) found that maximum bacterial population 28.5% and fungal population 63.5% by using *Eudrilus eugeniae* treated substrate of tendu leaf litter.

Similar results were obtained by Emperor and Kumar, (2015) who reported that the total microbial population of vermicompost was found to have significantly higher numbers in treatment T_4 600 (g) Tea waste + 100 (g) Cow dung + 300 (g) Kitchen waste and T_3 500 (g) Cow dung + 400 (g) Kitchen waste than in T_2 and T_1. Esakkiammal *et al*., (2015) who observed that the application of vermicompost and vermiwash prepared from *Eudrilus eugeniae* highest bacterial count ($79.9 x 10^5$ /g) fungal count ($21.7 x 10^4$/g) in initial stage.

Similar reports were positively correlated with the findings of Sridevi *et al*., (2016) in water hyacinth compost integrated with cow dung (1:3) which significantly increased bacteria ($93.07 x 10^6$ CFU/g), fungi ($118 x 10^2$ CFU g^{-1}) and actinomycetes ($77.52 x 10^{-3}$ CFU g^{-1}). Aher *et al*., (2018) observed the higher soil microbial population in treatments receiving organic nutrient inputs as compared to the other treatments. Similar observations were made by many earlier researchers (Chandna *et al.*, 2013) in agricultural by products; Sakthivigneswari and Vijayalakshmi, (2016) in coirpith; Bharadwaj, (2020) in farmyard waste. The present study positively correlated with the findings of Aguilar- Paredes, (2023);

Bacteria, fungi and actinobacteria count was increased from 30 to 60 days and 90 days it was reduced. The C_5 and C_2 compost showed the best treatments. The present study, indicated that combined use of organic substrates improved the microbial load of the compost rather than single organic substrate application.

The drastic increase in microbial population in the biocompost was not only due to increment of nutrients but also due to the mineralization of organic matter produced by microorganisms. The enhancement of the microbial population might be due to the contribution of intestinal flora of the earthworm which helps in the mineralization of sugarcane trash and sugarcane bagasse.

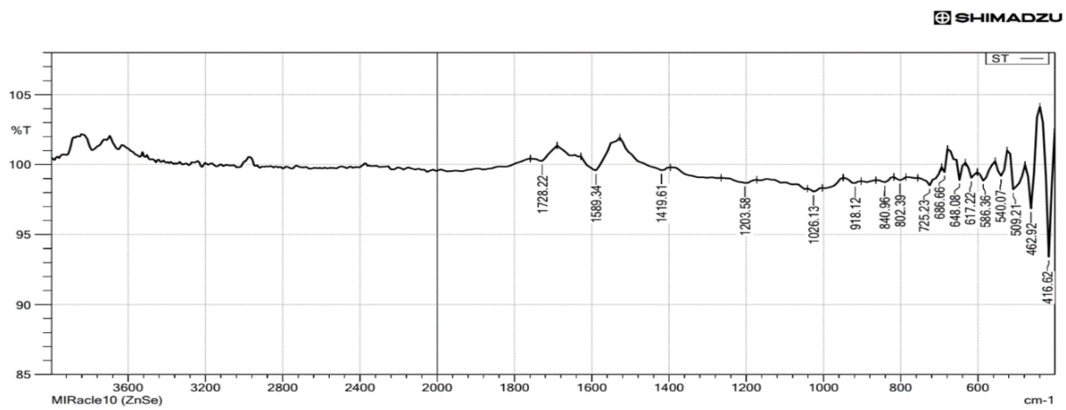
4.1.3. Fourier Transform-Infrared (FT-IR) Spectrum Analysis

The raw sugarcane trash and sugarcane bagasse waste and best treatment i.e. Compost 3 and Compost 5 were subjected for FT-IR studies. The results of FTIR spectroscopy showed the presence of alcohol, alkene, halo compound, aliphatic amides etc. These compounds presence has been observed in FT-IR analysis by their functional group's vibrational bands. The FTIR analysis is presented in Figure IV, V, VI & VII. The peak values, absorption bands and functional groups of raw and biocomposted Sugarcane trash waste and Sugarcane bagasse waste spectrum showed different characteristic strong bands.

All the samples raw sugarcane trash, raw sugarcane bagasse and best treatment (T_3 & T_5). Sugarcane trash the broad band C-H stretching vibrational band at 1728 cm^{-1}. In addition, disappearance C-Cl bending vibrational band at 648 cm^{-1} also ensure the degradation process. Compost 3 appears at 3302 cm^{-1} and continues uses to the next small peak at 1643 cm^{-1} which is attributed to (O-H, C-H) and C-H stretching vibrational modes, respectively C-H indicates aromatic compound. This O-H (stretching) indicates alcohol molecules, the stretching peak at 686 cm^{-1} indicates the presence of C-Cl halo compound. Sugarcane bagasse appears at 3734 cm^{-1} indicates the presence of O-H and to the next small peak at 2916 cm^{-1} which is attributed to C-H stretching. The distinct peak at 1026 cm^{-1} consists of C-O-C of carbohydrates and confirm the presence of aliphatic amides. Compost 5 appears at broad band of O-H stretching at 3309 cm^{-1} and C-H stretching vibrational band at 1643 cm-1 stands as strong evidence for the degradation.

FIGURE IV

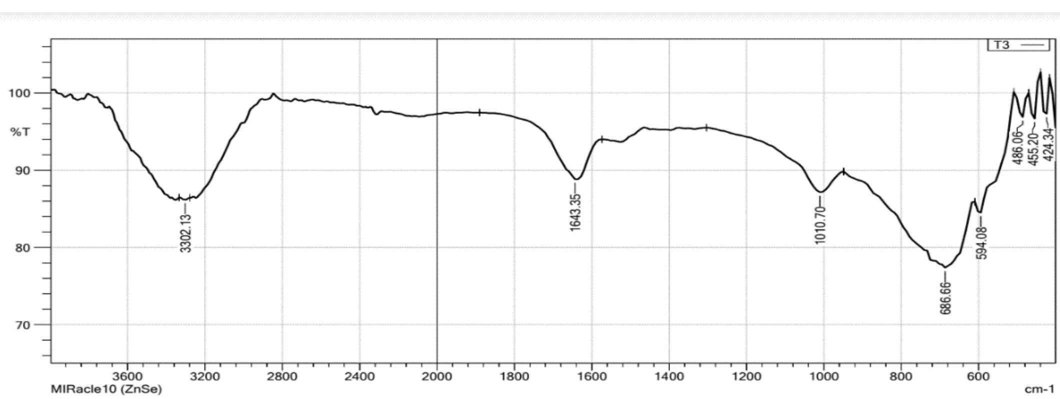
FT-IR PEAK OF SUGARCANE TRASH



ST – Sugarcane trash

FIGURE V

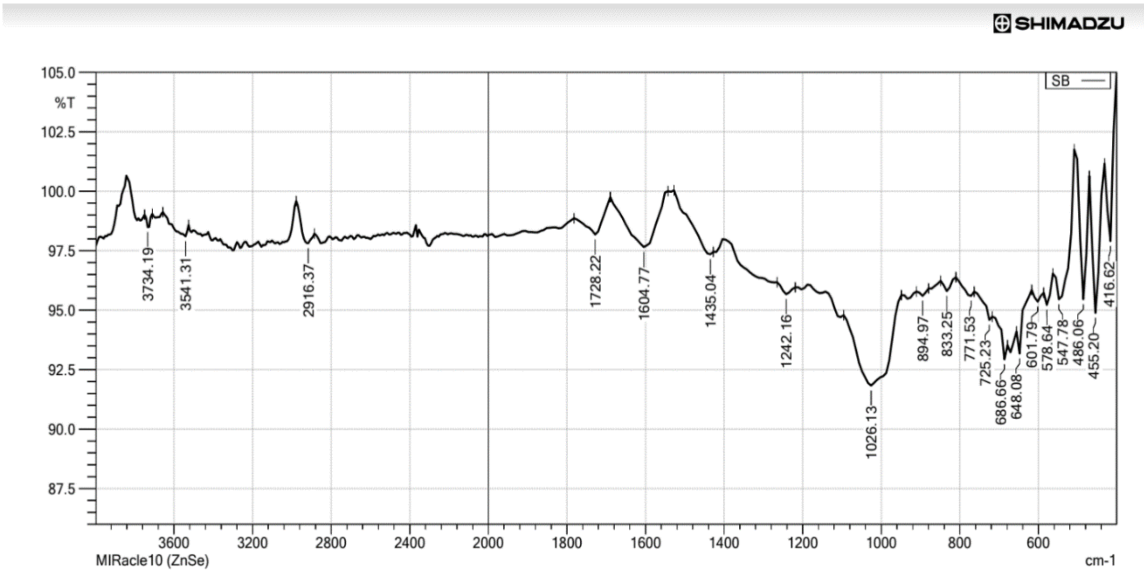
FT-IR PEAK OF COMPOSTED SUGARCANE TRASH



T_3 – (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

FIGURE VI

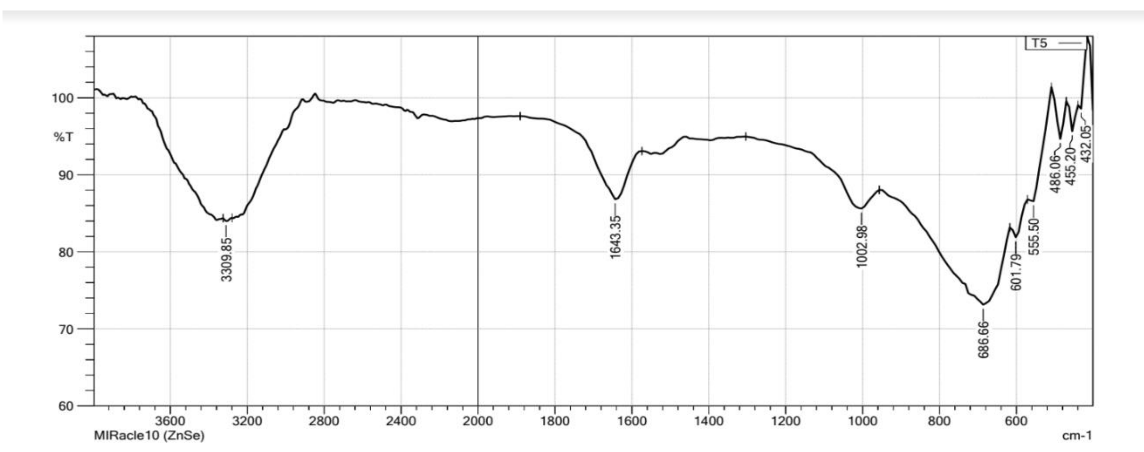
FT-IR PEAK OF SUGARCANE BAGASSE



SB – Sugarcane bagasse

FIGURE VII

FT-IR PEAK OF COMPOSTED SUGARCANE BAGASSE



T5 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniea*)

Hussain *et al*., (2016) studied fourier transform infrared (FT-IR) spectroscopy and revealed that the phenols, the sesquiterpene lactones that are responsible for the negative allelopathic impact of parthenium was reduced during vermicomposting.

Bhat *et al*., (2017) stated that FT-IR spectroscopy technique is used to confirm the decomposition of polypeptides, polysaccharides, aliphatic, aromatic, carboxylic, phenolic groups and lignin during vermicomposting process. The spectrum of initial and final vermicomposted samples are generally obtained in the mid-infrared area range of 4000–400 cm−1.

Kauser and Khwairakpam, (2022) investigated the FT-IR spectra of vermicompost using earthworm species and without earthworm. The peaks in VrEF (Vermicompost with *Esenia fetida*) reactor are shallower than in the other reactors after treatment, owing to degradation by various types of enzymes found in the earthworm gut and microflora which show a significant reduction during the vermicomposting process.

Similar findings have been supported by Dai *et al*., (2013); Hussain *et al*., (2016); Arumugam *et al*., (2018); Kamnev *et al*., (2023).

The increase in pH, EC and available NPK levels were probably due to the production of NH4 during proteolysis by microbes and also due to progressive increase in mineral of sugarcane trash and sugarcane bagasse waste compost into the soil. A decrease in C:N ratio indicate an increase the humification of organic waste and due to the loss of carbon mainly as carbon dioxide due to respiratory of earthworms and inoculated earthworms lowers the C:N ratio. The low C:N ratio indicated stabilization, maturity and the value of the decomposed sugarcane trash and sugarcane bagasse.

PHASE II

4.2 Field experiment

The field was located in Alanthurai (10.9536 N, 76.7885 E) Coimbatore, Tamil Nadu, India. The field experiment were carried out using random block design. The soil type in alanthurai is red soil. It is deep with good aggregate structure, abundant moisture, and permeability.

Field experiment was conducted with Onion (*Allium cepa* L.), Black nightshade (*Solanum nigrum* L.), Tomato (*Solanum lycopersicum* L.), Brinjal (*Solanum melongena* L.) as the test crops to evaluate the effect of six different types of compost. The treatments were named as T_1 - Compost 1 (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}), T_2 - Compost 2 (Predecomposted sugarcane trash + *Trichoderma* *asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}), T_3 - Compost 3 (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 5t/ha^{-1}), T_4- Compost 4 (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}), T_5- Compost 5 (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) and T_6 - Compost 6 (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium. The compost effect on the test plants were compared to the control (without manures).

A number of biometric observations and yield parameters were recorded at different stages during the growth of onion (*Allium cepa* L.), black nightshade (*Solanum nigrum* L.), tomato (*Solanum lycopersicum* L.) and brinjal (*Solanum melongena* L.) as influenced by different time intervals of 30, 60 and 90 DAS (Days after sowing) were statistically scrutinized. The data obtained were subjected to SPSS (version sigma stat 3.1) statistical analysis one – way and two – way Anova and conclusion were drawn based on results.

4.2.1 Biometric characters

4.2.1.1 Effect of composted sugarcane trash and sugarcane bagasse on vegetative parameters of the test crops

4.2.1.1a Onion (*Allium cepa* L.)

Shoot length

The research findings indicated that the shoot length of the plant increased significantly in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (30.9, 40.4 and 55.2 cm) on 30, 60 and 90 DAS, followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (28.3, 38.0 and 50.6 cm) on 30, 60 and 90 DAS when compared to the control (19.0, 28.6 and 33.0) on 30, 60 and 90 DAS as shown in Table 2 & Plate 10 and 11.

Our results findings are it in line with the observation of Gandhi and Sivakumar, (2010) who reported that application of vermicompost promoted the plant height (cm) in rice (*Oryza Sativa* L.) C.V.NLR 145. It was also supported by Mohanty *et al.*, (2015) in onion who observed maximum plant height (38.20 cm) with the application of 50%

FYM + 50% NPK over the control of (23.20). The present findings are on par with Abolmaaty and Fawaz, (2016) who reported that the application of vermicompost and EM 1 increase plant height in onion.

Similar observations were reported by Kumar *et al.*, (2017) who found the combined application of organic manures + biofertilizers + micronutrients enhanced in plant height (65.14 cm) in onion plant. The present findings is in conformity with Singh and Singh, (2018) who reported that the application of vermicompost and 75 % RDF showed highest plant height (57.33 cm) in onion (*Allium cepa* L.) CV. Nasik red. The present result is in accordance with Kalirawna *et al.,* (2022) who reported that the application of organic manure and inorganic fertilizer increases plant height (77.39 cm) in onion.

Root length

There was a gradual increase in root length in all the treatments, as shown in Table 2. A significant increase in root length was recorded in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (8.1, 20.3 and 25.0 cm) followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (7.0, 18.7 and 22.9 cm) on 30, 60 and 90 DAS over the control (4.0, 8.7 and 11.1 cm) on 30, 60 and 90 DAS.

The present findings are in conformity with the results of Pradeepa *et al.,* (2011) who reported that application of 50% vermicomposted food waste and 10kg of soil significantly increased the root length (4.4 cm) of *vigna unguiculata*. The present findings are in conformity with Abdissa *et al.,* (2012) who found a significant increase in root length (13.37 cm) over the control (12.88 cm) in sweet potato with the application of farmyard manure at 20 t ha^{-1}. A similar result was obtained by Morina *et al*., (2019) in onion who observed maximum root length (7.59 cm) with the application of vermicompost 14 t ha^{-1}. The present findings are in conformity with Bhadwal *et al.,* (2022) who found that the application of compost from food waste increase root length in onion.

TABLE 2

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF ONION (*ALLIUM CEPA* L.)

Treatment	Shoot Length (cm)			Root Length (cm)			Number of Leaves		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	19.0	28.6	33.0	4.0	8.7	11.1	7.00	11.00	13.00
T_1	28.3	38.0	50.6	7.0	18.7	22.9	12.00	16.00	18.00
T_2	25.1	35.4	47.0	6.0	15.4	20.5	11.00	15.00	17.00
T_3	30.9	40.4	55.2	8.1	20.3	25.0	13.00	17.00	19.00
T_4	23.2	34.2	46.2	5.5	12.4	18.7	10.00	14.00	16.00
T_5	24.6	33.1	41.2	4. 7	10.6	15.3	9.00	13.00	15.00
T_6	22.3	31.5	38.4	4.2	9.3	13.4	8.00	12.00	14.00
SED	0.26867			0.30431			0.46980		
CD (p<0.05)	0.54233			0.61427			0.94832		
CD (p<0.01)	0.72494**			0.82111**			1.26763**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

Number of leaves

An appropriate increase in the number of leaves / plant were recorded in the treatment on 30, 60 and 90 DAS as shown in Table 2. A sustainable increase in the number of leaves /plant were recorded in T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium), T_1 - (Predecomposted sugarcane trash + *Pleurotus* *florida* + *Eudrilus eugeniae* 5t/ha^{-1}) and T_2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) treatments in (13.00, 17.00 and 19.00), (12.00, 16.00 and 18.00) and (11.00, 15.00 and 17.00) on 30, 60 and 90 DAS. Lowest number of leaves /plant were noted in control on 30 (7.00), 60 (11.00) and 90 (13.00) DAS.

The result is in agreement with the result of Seran *et al*., (2010) who reported increased number of leaves per plant (27.13) with the application of inorganic fertilizers (urea 100 kg ha^{-1}) and muriate of potash (50 kg ha^{-1}) in onion (*Allium cepa*. L). Similar results was obtained by Lee, (2012) who found that the application of composted cattle manure showed maximum number of leaves in onion. Similar result was also obtained by Mohanty *et al.*, (2015) in onion who observed maximum number of leaves (10.90) with the application of 50% FYM + 50% NPK over the control of (6.10). The present findings is on par with Abolmaaty and Fawaz, (2016) who reported that the application of vermicompost and EM 1 increase the number of leaves in onion. Similar observations were reported by Kumar *et al.*, (2017) who found that combined application of organic manures + biofertilizers + micronutrients showed maximum number of leaves (73.02) in onion. The present findings is in conformity with Singh and Singh, (2018) who reported that the application of vermicompost and 75 % RDF showed highest number of leaves (10.00) in onion (*Allium cepa* L.) CV. Nasik red.

Length of leaf

Maximum leaf length was obtained in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (16.55, 39.55 and 45.80 cm) on 30, 60 and 90 DAS followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (15.65, 38.55 and 44.40 cm) on 30, 60 and 90 DAS. Minimum leaf length was noted in control (11.10, 30.35 and 35.55 cm) on 30, 60 and 90 DAS as shown in Table 3

The results are in agreement with Rao *et al.*, (2010) in onion who noted an increase in the length of leaves (69.60 cm) with the application of vermicompost 50 % + NPK. The present findings are in conformity with Naik *et al.*, (2014) who observed application of T_5 treatment (biocompost + castor cake) showed maximum leaf length (44.8) in onion plant. Similar observations were reported by Vedpathak and Chavan, (2016) who reported that application of organic and chemical fertilizers increases leaf length (43.42 cm) in 90^{th} day of onion (*Allium cepa* L.).

The present findings also agrees with the results of Gebremichael *et al.*, (2017) who found that the application of vermicompost 5 t ha^{-1} + 50% RDFN increase leaf length (45.19 cm) in onion (*Allium cepa* L.). The present findings are also in conformity with Singh and Singh, (2018) who reported application of vermicompost and 75 % RDF recorded highest length of leaf (35.3 cm) in onion (*Allium cepa* L.) CV. Nasik red.

Fresh weight and Dry weight

It is inferred from Table 3 that there was an appropriate increase in fresh weight and dry weight of plant from 30, 60 and 90 DAS in all treatments.

A significant increase in fresh weight T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (24.20, 29.80 and 35.75 g) on 30, 60 and 90 DAS followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (22.60, 27.70 and 33.65 g) on 30, 60 and 90 DAS as compared to the control (13.55, 17.15 and 23.25 g) on 30, 60 and 90 Days after sowing.

The highest dry weight content was registered in the treatment T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (7.35, 8.15 and 9.05g), T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (7.05, 7.85 and 8.80g) followed by T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.40, 7.50 and 8.30 g) on 30, 60 and 90 DAS over the control (4.30, 6.30 and 6.75g) on 30, 60 and 90 Days after sowing.

The present findings are on par with Abolmaaty and Fawaz, (2016) in onion who observed increase in fresh weight and dry weight with the application of vermicompost and EM 1. A similar result was obtained by Alvarez-solis *et al.*, (2016) who found that the application of vermicompost leachate recorded maximum fresh weight (28.6 g) and dry weight (1.9 g) in onion. The present findings are in conformity with Singh and Singh, (2018) who reported that the application of vermicompost and 75 % RDF showed highest fresh weight (137.37 g) and dry weight (14.37 g) in onion (*Allium cepa* L.) CV. Nasik red.

The present findings coincide with the El-Shaieny A-HAH *et al.,* (2022) who reported that combined application of compost + compost tea + vermicompost tea showed maximum plant fresh weight and dry weight in *Allium cepa* L.

4.2.1.1b Black Nightshade (*Solanum nigrum* L.)

Shoot length

Among the treatments a significant shoot length of (32.7 cm) was registered in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (28.3 cm) T_5 -Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} and (26.3 cm) in T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium on 30 DAS. A significant increase in shoot length in T_4 treatment (54.3 cm and 91.3 cm) followed by T_5 treatment (50.8 cm and 88.3 cm) on 60 and 90 DAS when compared to the control (17.0, 33.1 and 65.3 cm) on 30, 60 and 90 DAS as shown in the Table 4 & Plate 12 & 13.

The present research in *solanum nigrum* are also in agreement with the results of Muruganandam, (2011) who found a significant increase in shoot length in Ambrette (*Abelmoschus Moschatus* Medic) with the combined application of organic manure + consortium biofertilizer and biostimulants.

The results were positively correlated with the findings of Umesha *et al.,* (2011) who reported that the application of FYM 20 t ha^{-1} + V.C 1.0 t ha^{-1} + NC 1.0 t ha^{-1} increased the plant height (95 cm) in Makoi (*Solanum nigrum* L.). The results were positively correlated with the findings of Ravi *et al*., (2013) who revealed that application of germplasm significantly improved the plant height (cm) in Makoi (*Solanum nigrum* L.). The present results are in accordance with Sakthivigneshwari and Vijayalakshmi, (2016) who observed that application of biocomposted corncob and coirpith enhanced the shoot length (90.47 cm) in *solanum nigrum* (L.).

TABLE 3

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE LEAVES LENGTH, FRESH WEIGHT AND DRY WEIGHT OF ONION (*ALLIUM CEPA* L.)

Treatment	Leaves Length			Fresh Weight (g)			Dry Weight (g)		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	11.10	30.35	35.55	13.55	17.15	23.25	4.30	6.30	6.75
T_1	15.65	38.55	44.40	22.60	27.70	33.65	7.05	7.85	8.80
T_2	14.75	36.75	42.85	21.00	25.55	31.55	6.40	7.50	8.30
T_3	16.55	39.55	45.80	24.20	29.80	35.75	7.35	8.15	9.05
T_4	14.30	35.45	41.45	19.90	23.40	29.80	6.10	7.45	7.95
T_5	13.30	33.85	39.90	18.30	20.95	27.35	5.45	7.10	7.50
T_6	12.40	32.75	38.35	16.70	19.20	25.25	5.15	6.80	7.20
SED	0.39672			0.32936			0.67157		
CD (p<0.05)	1.25698			0.66483			1.35560		
CD (p<0.01)	1.45871**			0.88869**			1.77988**		

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 10

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF ONION (*ALLIUM CEPA* L.)

VEGETATIVE PARAMETERS ON 30 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 11

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF ONION (*ALLIUM CEPA* L.)

60 DAS

90 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

The present findings coincide with the results of Jjagwe, (2020) who observed that application of organic fertilizers showed maximum plant height (58.9 cm) in maize (*Zea mays* L.). The present study is in accordance with Mostofa Amin *et al*., (2022) who observed that the application of organic manure enhanced shoot length (cm) in 30 days after sowing in Maize. Similar results were obtained by Pinky and Vijayalakshmi, (2022) who observed that the application of vermicompost increased shoot length in black gram (*Vigna mungo* L.). Similar observations were reported by Silpa and Vijayalakshmi, (2022) who reported that the application of biocomposted maximum in shoot length in *Vigna unguiculata* (L.).

Root length

Among the treatments maximum root length was recorded in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (13.17, 20.43 and 45.20 cm) and T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) (11.93, 19.07 and 43.73 cm) followed by T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (10.10, 16.33 and 41.53 cm) on 30, 60 and 90 DAS when compared to the control (6.40, 10.47 and 31.27 cm) on 30, 60 and 90 DAS as shown in Table 4

The present findings agreed with the results of Prakash and Hemalatha, (2013) who revealed that application of leaf litter vermicompost + PGPR significantly enhanced the root length in Black gram. The present results are in accordance with Sekar *et al*., (2013) who revealed that highest root length in chilli (*Capsicum annum* L.) due to the application of vermicompost with inorganic fertilizers. The present result is in accordance with Sakthivigneshwari and Vijayalakshmi, (2016) who observed application of biocomposted corncob and coirpith increased the root length (60.10 cm) in *Solanum nigrum* (L.). Similar observations were reported by Tensingh Baliah and Muthulakshmi, (2017) who found a significant in root length (cm), in Okra (*Abelmoschus esculentus* (L.) Moench) with the application of vermicompost. Similar results were obtained by Pinky and Vijayalakshmi, (2022) that application of vermicompost increased root length in black gram (*Vigna mungo* L.). Similar observations were also reported by Silpa and Vijayalakshmi, (2022) who reported due to the application of biocomposted cocoa shell and Jackfruit peel maximum root length in *Vigna unguiculata* (L.).

TABLE 4

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Shoot Length (cm)			Root Length (cm)			Number Of Leaves		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	17.0	33.1	65.3	6.40	10.27	31.27	29	68	105
T_1	21.7	39.1	71.4	7.30	11.67	37.40	30	74	111
T_2	23.3	43.5	74.4	9.00	13.00	39.33	33.0	78.67	114.67
T_3	24.0	45.4	77.3	8.90	14.67	40.77	37.0	84.67	119.00
T_4	32.7	54.3	91.3	13.17	20.43	45.20	48.0	95.33	131.33
T_5	28.3	50.8	88.3	11.93	19.07	43.73	46.0	90.33	126.67
T_6	26.3	48.3	78.3	10.10	16.33	41.53	42.67	87.0	124.67
SED	0.42878			0.98895			1.03236		
CD (p<0.05)	0.86552			1.99625			2.08387		
CD (p<0.01)	1.15696**			2.66842**			2.78555**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

Number of leaves

A substainable increase in the number of leaves/plant were recorded in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (48.0, 95.33 and 131.33) on 30, 60 and 90 DAS followed by T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (46.0, 90.33 and 126.67) on 30, 60 and 90 DAS over the control (29, 68 and 105) on 30, 60 and 90 Days after sowing as shown in the Table 4.

The present findings coincide with Muruganandam, (2011) who obtained a maximum number of leaves per plant in Ambrette (*Abelmoschus moschatus* Medic) with the combined application of organic manure + consortium biofertilizer and biostimulants. The results were positively correlated with the findings of Umesha *et al.,* (2011) who reported that the application of FYM 20 t ha^{-1} + V.C 1.0 t ha^{-1} + NC 1.0 t ha^{-1} increased the number of leaves in Makoi (*Solanum nigrum* L.). The results were positively correlated with the findings of Ravi *et al*., (2013) who revealed that application of germplasm significantly increased the number of leaves in Makoi (*Solanum nigrum* L.). The present results are in accordance with Sakthivigneshwari and Vijayalakshmi, (2016) who observed that application of biocomposted corncob and coirpith enhanced the number of leaves (180.33) in *Solanum nigrum* (L.).

The present findings is in conformity with Ramnarain *et al*., (2018) who obtained significant increase in number of leaves in pak choi (*Brassica rapa* var: chinensis) due to the application of vermicompost. The present findings coincide with the result Jjagwe, (2020) who observed application of organic fertilizers increased number of leaves (5.56) in maize (*Zea mays* L.). Similar observations were reported by Silpa and Vijayalakshmi, (2022) that application of biocomposted cocoa shell and jack fruit peel waste showed maximum number of leaves in *Vigna unguiculata* (L.).

Number of Flowers / plant and Number of Branches / plant

An appreciable increase in the number of flowers/plant and number of branches /plant was observed in all the treatment in 60, and 90 DAS as elucidated in Table 5.

The number of flowers/ plant showed maximum increase in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (33.33 and 40.33) on 60 and 90 DAS followed by T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (32.33 and 36.33) on 60 and 90 DAS over the control (21.00 and 24.67) on 60 and 90 DAS.

The number of branches showed a significant increase in T_4 Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (15.33 and 20.00), T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (13.00 and 17.67) on 60 and 90 DAS when compared to the control (5.67 and 8.00) on 60 and 90 DAS.

This is also in agreement with the results of Muruganandam, (2011) who found a significant increase in number of branches in Ambrette (*Abelmoschus moschatus* Medic) with the combined application of organic manure + consortium biofertilizer and biostimulants. The results were positively correlated with the findings of Umesha *et al.,* (2011) in Makoi *Solanum nigrum* L. who observed maximum number of branches (19.6) due to the application of FYM 20 t ha^{-1} + V.C 1.0 t ha^{-1} + NC 1.0 t ha^{-1}. The results were positively correlated with the findings of Ravi *et al*., (2013) who revealed that application of germplasm significantly increased in number of branches in Makoi (*Solanum nigrum* L.). The present findings agreed with the results of Prakash and Hemalatha, (2013) who revealed application of leaf litter vermicompost + PGPR significantly enhanced the number of flowers in Black gram.

A similar result was obtained by Singh *et al*., (2014) organic manures increasing the number of branches (14.85) and number of flowers (26.32) in chilli (*Capsicum annum* L.). The present result is in accordance with Sakthivigneshwari and Vijayalakshmi, (2016) who observed that application of biocomposted corncob and coirpith increased the number of flowers (28.65) in *Solanum nigrum* (L.). Similar observations were reported by Silpa and Vijayalakshmi, (2022) that application of biocomposted cocoa shell and jack fruit peel enhanced the number of flowers in *Vigna unguiculata* (L.).

TABLE 5

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE NUMBER OF FLOWERS / PLANT AND NUMBER OF BRANCHES / PLANT OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Number of Flowers / Plant		Number of Branches / Plant	
	60 DAS	90 DAS	60 DAS	90 DAS
C	21.00	24.67	5.67	8.00
T_1	23.00	27.33	7.00	10.33
T_2	26.33	29.00	8.00	12.33
T_3	27.33	31.33	9.33	14.00
T_4	33.33	40.33	15.33	20.00
T_5	32.33	36.33	13.00	17.67
T_6	31.00	33.00	10.33	16.33
SED	0.92949		0.80672	
CD ($p<0.05$)	1.90402		1.65253	
CD ($p<0.01$)	2.56880**		2.22950**	

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

Fresh weight and dry weight

It is inferred from Table 6 there was an appreciable increase in fresh weight and dry weight of plant from 30 to 90 DAS in all treatment.

A significant increase in fresh weight T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (26.60, 44.93 and 50.57) followed by T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (24.50, 43.00 and 47.67 g) on 30, 60 and 90 DAS as compared to the control (14.83, 24.63 and 34.17 g) on 30, 60 and 90 DAS.

Dry weight was more in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} and T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (4.87, 5.70, 6.60) and (4.53, 5.57 and 6.43) followed by T_6 treatment (4.20, 5.20 and 6.10) on 30, 60 and 90 DAS over the control (2.53, 3.57 and 4.33) on 30, 60 and 90 DAS as shown in Table 6.

The present result is in accordance with Sekar *et al*., (2013) who revealed that highest fresh weight and dry weight in chilli (*Capsicum annum* L.) due to application of vermicompost with inorganic fertilizers. The present result is in accordance with Sakthivigneshwari and Vijayalakshmi, (2016) who observed that application of biocomposted corncob and coirpith enhanced the fresh weight (55.47 g) and dry weight (6.17 g) in *Solanum nigrum* (L.). Similar observations were reported by Tensingh Baliah and Muthulakshmi, (2017) who found maximum fresh weight and dry weight in Okra (*Abelmoschus esculentus* (L.) Moench) with the application of vermicompost.

The present findings is in conformity with Ramnarain *et al*., (2018) that application of vermicompost increased plant fresh weight of pak choi (*Brassica rapa* var: chinensis). Similar results were obtained by Pinky and Vijayalakshmi, (2022) application of vermicompost increased fresh weight and dry weight in black gram (*Vigna mungo* L.). Similar observations were also reported by Silpa and Vijayalakshmi, (2022) who reported that the application of biocomposted cocoa shell and jack fruit peel maximum in fresh weight and dry weight in *Vigna unguiculata* (L.).

TABLE 6

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE FRESH WEIGHT AND DRY WEIGHT OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Fresh Weight (g)			Dry Weight (g)		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	14.83	24.63	34.17	2.53	3.57	4.33
T_1	16.53	28.80	36.03	3.17	4.00	4.77
T_2	17.63	33.43	38.83	3.47	4.43	5.23
T_3	19.10	35.13	42.77	3.70	4.77	5.60
T_4	26.60	44.93	50.57	4.87	5.70	6.60
T_5	24.50	43.00	47.67	4.53	5.57	6.43
T_6	22.77	38.97	45.20	4.20	5.20	6.10
SED	1.05319			0.10483		
CD (p<0.05)	2.12592			0.21161		
CD (p<0.01)	2.84176**			0.28287**		

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

4.2.1.1c Tomato (*Solanum lycopersicum* L.)

Shoot length

There was a gradual increase in shoot length observed in all the treatment. Among the treatments the maximum shoot length was registered in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (57.1, 71.6 and 99.2 cm) on 30, 60 and 90 DAS. The following treatments T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} and T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (50.3, 68.3 and 95.4 cm) on 30, 60 and 90 DAS and (41.5, 62.3, 91.5 cm) when compared with the control (31.5, 47.0 and 78.3 cm) on 30, 60 and 90 DAS.

Senapati *et al*., (2007) found significant plant height from the treatment combination (50% recommended dose of fertilizer + 50% vermicompost). Rodge and Yadlod, (2009). Abduli *et al*., (2013) observed the highest plant height with vermicompost: soil (1:1) ratio. Najar and Khan, (2013) found highest shoot length (76 cm) with application of vermicompost 6 t ha^{-1}. The present findings coincide with the results of Ogundare *et al.*, (2015) who found that the combined use of organic and inorganic fertilizers increased plant height in tomato plant. This is also in agreement with the results of Adhikary *et al.*, (2016) who observed combination of manures and fertilizers increased plant height (cm) in tomato. The results were also positively correlated with the findings of Vijaya and Seethalakshmi, (2011) in *Abelmoschus esculentus*; Javed and Panwar, (2013) in urad and soyabean.

Root Length:

The root length was significantly increased in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (14.17, 22.77 and 44.20 cm) following treatments T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (12.60, 20.73 and 41.73 cm), T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (10.80, 18.70 and 39.33 cm) on 30, 60 and 90 DAS as compared to the control (6.40, 10.27 and 27.27 cm) respectively. (Table 7 & Plate 14 & 15)

The results were positively correlated with the findings of Abbiramy and Ross, (2012) who reported an increase in root length in *Abelmoschus esculentus* with the application of vermicomposted coirpith. The result is in agreement with the Hyder *et al*., (2015) that different rates of vermicompost increased the root length in tomato plant. Their study confirms that the vermicompost has a tremendous potential of plant nutrients supply for sustainable crop production. Similar observations were reported by Eswaran and Mariselvi, (2016) that highest root length was found to be recorded in plants grown in vermicompost in tomato (*Lycopersicum esculentum*).

The results were also positively correlated with the findings of Singh *et al*., (2014); Vijaya and Seethalakshmi, (2011) in *Abelmoschus esculentus*; Javed and Panwar (2013) in Urad and Soyabean.

Number of Leaves/Plant

The highest number of leaves were obtained in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium, T_1 - Predecomposted sugarcane trash + *Pluerotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} followed by T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} on 30 DAS (37.00, 30.67 and 28.67), 60 DAS, (81.00, 75.00, 72.00) and 90 DAS (110.33, 106.00, 103.00) minimum number of leaves were noted in control on 30 (18.33), 60 (68.00) and 90 (90.00) DAS as shown in Table 7.

Joshi and Vig, (2010) found higher number of leaves from 30% vermicompost and soil mixture. The present findings coincide with the result of Ogundare *et al.,* (2015) that the combined use of organic and inorganic fertilizers increasing the number of leaves in tomato plant. The present results are in accordance with Kasheem *et al.,* (2015) that application of vermicompost and NPK fertilizer increased number of leaves in tomato (*Solanum lycopersicum* L.). Similar results was obtained by Adhikary *et al.,* (2016) in tomato and found significant increase in number of leaves per plant due to the combination of manures and fertilizers. The present findings is in conformity with Eswaran and Mariselvi, (2016) who revealed that application of vermicompost showed maximum number of leaves per plant in tomato (*Lycopersicum esculentum*).

Number of Flowers / plant and Number of Branches / plant

The highest number of flowers were shown in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (34.67 and 44.67) followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (32.00 ad 42.00) on 60 and 90 DAS over the control (19.67 and 24.00).

A sustainable increase in the number of branches were recorded in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (16.00 and 22.00) followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (13.00 and 20.33) on 60 and 90 DAS when compared to the control (5.67 and 8.00) as shown in the Table 8.

The present findings is also on par with Meenakumari and Shekhar, (2012) who observed significant increase number of branches in tomato (*Lycopersicon esculentum*) due to the application of vermicompost and other fertilizers. The present findings agreed with the results of Saraswathy and Prabhakaran, (2014) that the number of flowers per plant was maximum in tomato (*Lycopersicon esculentum* Mill.). The present findings coincide with the result of Ogundare *et al.,* (2015) that combined use of organic and inorganic fertilizers increased number of branches in tomato. Similar observations were reported by Mullaimaran and Haripriya, (2016) that application of organic manure significantly increasing the number of flowers and number of branches in tomato.

PLATE 12

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

VEGETATIVE PARAMETERS ON 30 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 13

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

60 DAS

90 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

TABLE 7

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	Shoot Length (cm)			Root Length (cm)			Number of Leaves		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	31.5	47.0	78.3	6.40	10.27	27.27	18.33	68.00	90.00
T_1	50.3	68.3	95.4	12.60	20.73	41.73	30.67	75.00	106.00
T_2	36.3	34.4	82.8	7.33	12.60	31.00	20.67	78.67	91.67
T_3	57.1	71.6	99.2	14.17	22.77	44.20	37.00	81.00	110.33
T_4	41.5	62.3	91.5	10.80	18.70	39.33	28.67	72.00	103.00
T_5	36.9	59.8	88.6	9.03	16.83	35.73	26.00	68.33	98.33
T_6	35.1	50.4	80.4	8.10	14.73	34.20	22.67	64.67	94.67
SED	0.36697			1.17854			1.44843		
CD (p<0.05)	0.74074			2.37894			2.31092		
CD (p<0.01)	0.99016**			3.17998**			3.08905**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

Fresh Weight and Dry Weight

A remarkable increase in the fresh weight was registered in the T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (26.60, 44.93, 52.23 g), T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (24.50, 43.00, 48.67 g) and T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/h (22.43, 39.03, 44.67 g) on 30, 60 and 90 DAS as compared to control (14.83, 23.63 and 33.83 g).

The Maximum dry weight was observed in the T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} and T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} on 30 DAS (5.83, 5.53, 4.97) on 60 DAS (6.73, 6.17, 5.87 g) and 90 DAS (7.93, 7.47, 6.90 g). The lowest dry weight content was observed in control (2.53, 3.57, 4.33 g) as shown in Table 9.

The results is in line with the observation of Lenin *et al.,* (2012) that application of vermicompost increased fresh weight and dry weight in groundnut *Arachis hypogaea* L.

Similar results were recorded earlier in various fertilizers and various crops such as (Singh *et al*., 2003) in chickpea, (Waller *et al.,* 2005 and Erashin *et al.*, 2009) in barley, (Alam *et al.,* 2007) in potato, (Azouni *et al.,* 2008) in *Arachis hypogaea* L., (Prajapati *et al.,* 2008) in rice, (Suthar, 2009) in *Allium sativum* and (Ahmed, 2010) in sorghum.

TABLE 8

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE NUMBER OF FLOWERS / PLANT AND NUMBER OF BRANCHES / PLANT OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	Number of Flowers / Plant		Number of Branches / Plant	
	60 DAS	90 DAS	60 DAS	90 DAS
C	19.67	24.00	5.67	8.00
T_1	32.00	42.00	13.00	20.33
T_2	23.00	26.67	6.67	11.67
T_3	34.67	44.67	16.00	22.00
T_4	28.67	38.67	11.33	18.33
T_5	27.00	35.00	10.00	16.00
T_6	26.00	31.00	8.00	14.00
SED	1.06904		1.00452	
CD (p<0.05)	2.18990		2.05773	
CD (p<0.01)	2.95449**		2.77618**	

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* $5t/ha^{1}$)

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* $5t/ha^{-1}$)

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* $5t/ha^{-1}$)

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* $5t/ha^{-1}$)

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 9

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE FRESH WEIGHT AND DRY WEIGHT OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	Fresh Weight (g)			Dry Weight (g)		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	14.83	23.63	33.83	2.53	3.57	4.33
T_1	24.50	43.00	48.67	5.53	6.17	7.47
T_2	17.63	29.43	38.50	3.13	4.43	5.23
T_3	26.60	44.93	52.23	5.83	6.73	7.93
T_4	22.43	39.03	44.67	4.97	5.87	6.90
T_5	19.63	35.80	42.13	4.23	5.40	6.10
T_6	16.43	32.30	40.87	3.63	4.73	5.43
SED	1.11715			0.16509		
CD (p<0.05)	2.25503			0.33325		
CD (p<0.01)	3.01434**			0.44547**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

PLATE 14

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

VEGETATIVE PARAMETERS ON 30 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 15

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

60 DAS

90 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

4.2.1.1d Brinjal (*Solanum Melongena* L.)

Shoot Length

A significant increase in shoot length was noted from 30 to 90 DAS in all the treatments as compared to control (Table 10 & Plate 16 & 17). Among the treatments a significant increased shoot length was registered in T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}, T_2 - Predecomposted sugarcane trash+ *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} and T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium in three samplings days 30 (32.9, 29.5, 25.4 cm), 60 (55.3, 51.4, 48.2 cm) and 90 (98.5, 93.7, 93.3 cm) DAS respectively. Lowest shoot length was observed in control treatment (17.3, 33.5, 75.3 cm) on 30, 60 and 90 DAS.

Similar results were also obtained by Lallawmsanga *et al.*, (2012) that application of vermicompost and cow dung increased shoot length in *Solanum melongena* L. The result is in agreement with the results of Nandhini Devi *et al.*, (2013) who recorded increase in plant height with the application of 75% RDF +VC (1 t/ha) + PSB in soybean. The present results also coincide with the result of Pavithra and Lakshmi Prabha, (2014) who obtained an increase in shoot length of *Cyamopsis tetragonaloba* due to the application of vermicompost. Similar results were obtained by Manimegala and Gunasekaran, (2020) who found that the application of vermicompost and NPK fertilizer increased plant height in brinjal (*Solanum melongena* L.). The present findings coincide with the result of Palia *et al*., (2021) who revealed application of organic and inorganic fertilizers showed maximum plant height (cm) in brinjal (*Solanum melongena* L.).

TABLE 10

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Shoot Length (cm)			Root Length (cm)			Number of Leaves		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	17.3	33.5	75.3	8.35	13.40	21.30	9.00	26.00	54.67
T_1	21.3	39.5	80.4	9.60	16.15	24.00	9.67	30.67	56.67
T_2	29.5	51.4	93.7	16.30	22.85	30.75	19.33	46.00	72.67
T_3	25.4	48.2	93.3	14.25	21.40	28.60	15.67	42.00	68.33
T_4	23.3	46.1	89.6	12.45	18.80	26.60	13.67	37.33	64.00
T_5	32.9	55.3	98.5	17.85	25.10	33.30	21.33	50.00	77.00
T_6	22.4	41.4	85.4	11.25	17.50	24.05	11.67	34.00	61.33
SED	0.34231			0.24887			0.27391		
CD (p<0.05)	0.69096			0.50235			0.55290		
CD (p<0.01)	0.92362**			0.67150**			0.73907**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

PLATE 16

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.)

VEGETATIVE PARAMETERS ON 30 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 17

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON VEGETATIVE PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.)

60 DAS

90 DAS

C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

Root length

There was a gradual increase in root length from 30 to 90 DAS in all the treatments as shown in Table 10. The T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) showed an increase in root length on all the three days examined (17.85, 25.10 and 33.30 cm) on 30, 60 and 90 DAS. Lowest root length was observed in Control (8.35, 13.40 and 21.30 cm) when compared to the other treatments.

The results are also in agreement with the result of Vijaya *et al.,* (2008) who reported that the application of garden soil + vermicomposted coirpith enhanced the root length in *Andrographis paniculata*. Similar results was observed by Sinha *et al.,* (2010) who reported that the application of vermicompost increased the root length as compared to the farmyard manure in *Pisum* species. The results were positively correlated with the findings of Lallawmsanga *et al.,* (2012) who reported that the application of vermicompost and cow dung showed maximum in root length in *Solanum melongena* L. Similar results were also obtained by Saikrithika *et al*., (2015) who stated that application of vermicomposted coirpith enhanced the root length over control in *Vinca rosea*.

Number of Leaves

Appreciable increase in the number of leaves / plants was recorded in all the treatments on 30, 60 and 90 DAS as shown in Table 10. Number of leaves were more in T_5 - (Predecomposed sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) T_2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) and T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium) on 30 DAS (21.33, 19.33, 15.67), 60 DAS (50.00, 46.00, 42.00) and 90 DAS (77.00, 72.67, 68.33) when compared to the control (9.00, 26.00 and 54.67) on 30, 60 and 90 DAS.

Similar results were obtained by Thankamani *et al.,* (2007) who found a substantial increase in number of leaves/plant of black pepper by the combined application of coirpith and granite powder. The present finding is in conformity with Singh and Chauhan, (2009) who revealed a significant increase in the number of leaves due to the application of vermicompost.

Similar results were also obtained by Manimegala and Gunasekaran, (2020) who found that the application of vermicompost and NPK fertilizer showed maximum number leaves and in brinjal (*Solanum melongena* L.). The present findings also coincided with the result of Palia *et al*., (2021) who revealed that the application of organic and inorganic fertilizers increased the number of leaves in brinjal (*Solanum melongena* L.).

Number of Flowers / plant and Number of Branches / plant

An appreciable increase in the number of flowers / plant and number of branches / plant was obtained on 60 and 90 DAS as depicted in Table 11. The effect of combined application of predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* T_5 showed a significant result in increasing the number of flowers / plant (27.50 and 55.50) followed by T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (25.50 and 52.50) when compared to the control (12.50 and 38.00) on 60 and 90 DAS.

The number of branches showed maximum in T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (22.50 and 27.50) followed by T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (20.50 and 25.00) over the control (9.50 and 14.00) on 60 and 90 DAS.

The present result is in accordance with Arancon, (2004) who revealed that highest number flowers in strawberries grown in the soil treated with food waste and paper waste vermicomposts (5 t ha). Similar results were obtained by Manimegala and Gunasekaran, (2020) that application of vermicompost and NPK fertilizer increased number of branches (17.66) and number of flowers (63.50) in brinjal (*Solanum melongena* L.). The present findings coincide with the result of Palia *et al*., (2021) who revealed that application of organic and inorganic fertilizers showed maximum number of branches in brinjal (*Solanum melongena* L.)

Fresh Weight and Dry Weight

A remarkable increase in the fresh weight and dry weight of plant was observed from 30 to 90 DAS in all the treatments (T_1-T_6) shown in Table 12.

Plant fresh weight was increased in T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} on 30 DAS (31.10 g), on 60 DAS (48.30 g) and 90 DAS (55.55 g) followed by T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} on 30 DAS (28.90 g), on 60 DAS (45.35 g) and 90 DAS (52.20 g) when compared to the control (16.70, 27.05, 34.65 g).

Maximum dry weight was noted in T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (7.10, 7.95, 9.30 g) in all the three days followed by T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.75, 7.45, 8.80 g) when compared to the control (3.75, 5.30, 5.50 g) on 30, 60 and 90 DAS respectively.

The results were positively correlated with the findings of Lallawmsanga *et al.,* (2012) that application of vermicompost and cow dung showed maximum fresh weight and dry weight in *Solanum melongena* L. Similar results were observed by Biswas, (2014) who reported that application of vermicompost combination with bioinoculants influenced the fresh weight and dry weight content in *Rumex acetosella*. The present results coincide with the result of El-Mohamedy *et al.,* (2015) who observed maximum fresh weight and dry weight content due to the application of biocompost in *Solanum tuberosum*. The present finding is in conformity with that of Sivakumar and Karthikeyan, (2016) who concluded that increase in fresh weight and dry weight content was due to the application of vermicomposted weed plants waste using *Eudrilus eugeniae* in brinjal plant.

From the field experiments it is clear that the vegetative parameters of Onion (*Allium cepa* L.), Black nightshade (*Solanum nigrum* L.), Tomato (*Solanum lycopersicum* L.) and Brinjal (*Solanum melongena* L.) are all significantly enhanced in field supplied with soil-enrinched biocompost this might be due to the uptake of readily available nitrogen, phosphorus, potassium, calcium and magnesium in T_1-T_6 biocompost and its associated microbes.

The increase in root length might be due to the improved nutrient availability in the soil due to the application of composted sugarcane trash and sugarcane bagasse by reducing soil bulk density and enhancing its moisture content. This improvement in characters might have led to significant increase in root length of the plant. The combined application showed better results and performed better when compared to other treatments. Combined application of acts as a catalytic agent in accelerating cell division and photo assimilation which boosts plant growth and also improved the plant building structures. This significant influence on growth characters might have been due to the enhancement of uptake of nutrients favored by the addition of organic manures.

Leaves are the photosynthetic parts of the plant. The combined application of decomposed raw sugarcane trash predecomposted by using *Trichoderma asperelloides*, *Eudrilus eugeniae* (5 t/ha^{-1}) and Microbial consortium and raw sugarcane bagasse predecomposted by using *Trichoderma asperelloides*, *Eudrilus eugeniae* (5 t/ha^{-1}) and Microbial consortium supplied readily available nitrogen and organic matter and also increased the microbial population. This might have improved the physicochemical and biological properties of soil thus resulted in improved vegetative growth and photosynthesis.

Increased in number of flowers/plants might be due to the application of composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium in the soil which releases macro and micronutrients boosting the photosynthetic activity of the crop throughout the vegetative and reproductive phase. Agrowastes undergoes slow decomposition and mineralization which help in the release of nitrogen to meet the requirement of crop at the critical stage. Increased in number of flower/plants might be due to the application of composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium in the soil as a source of high concentration of nutrient which can be effectively used as an organic manure to enhance the growth of the crops.

TABLE 11

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE NUMBER OF FLOWERS / PLANT AND NUMBER OF BRANCHES / PLANT OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Number of Flowers / Plant		Number of Branches / Plant	
	60 DAS	90 DAS	60 DAS	90 DAS
C	12.50	38.00	9.50	14.00
T_1	15.50	42.00	12.00	16.50
T_2	25.50	52.50	20.50	25.00
T_3	23.00	50.50	18.00	22.50
T_4	21.00	47.50	16.00	21.00
T_5	27.50	55.50	22.50	27.50
T_6	18.00	44.50	14.50	18.50
SED	0.50170		0.53026	
CD (p<0.05)	1.02771		1.08622	
CD (p<0.01)	1.38653**		1.46547**	

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 12

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON THE FRESH WEIGHT AND DRY WEIGHT OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Fresh Weight (g)			Dry Weight (g)		
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS
C	16.70	27.05	34.65	3.75	5.30	5.50
T_1	20.45	34.05	37.95	4.40	5.75	6.40
T_2	28.90	45.35	52.20	6.75	7.45	8.80
T_3	27.30	41.95	48.35	6.25	7.10	8.20
T_4	24.95	39.35	45.20	5.65	6.75	7.50
T_5	31.10	48.30	55.55	7.10	7.95	9.30
T_6	22.70	35.95	41.10	5.20	6.30	7.10
SED	0.27772			0.27886		
CD (p<0.05)	0.56059			0.56289		
CD (p<0.01)	0.74935**			0.75243**		

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

The enhancement of fresh and dry weight of plant might be due to the fact the composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium supplied nutrients in available forms. Apart from this, the micro-organisms present in the soil and compost manufacture amino acid, vitamin, enzyme and plant growth promoting substances which will be the reason for improving the crop improvement.

4.2.2 Yield Parameters

4.2.2.1 Effects of composted sugarcane trash and sugarcane bagasse on yield parameters of test crops

4.2.2.1a Onion (*Allium cepa* L.)

The data presented in Table 13, Figure VIII and Plate 18 revealed that the number of bulbs, diameter of bulb (cm), bulb length (cm), single bulb weight (g) and bulb yield per plot (kg) were superior in the treatment T_3 when compared to other treatments and control on 90 DAS.

Maximum number of bulbs (19.00) diameter of bulb (8.35 cm), bulb length (7.25 cm), single bulb weight (24.75 g) and bulb yield per plot (10.25 kg) was observed in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* (17.50, 8.15 cm, 7.05 cm, 23.05 g and 10.00 kg), T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (16.00, 7.90 cm, 6.75 cm, 21.45 g, 9.25 kg) T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (15.00, 7.15 cm, 6.25 cm, 19.85 g and 8.90 kg), T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (13.50, 6.90 cm, 5.90 cm, 18.70 g and 8.25 kg) T6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (12.50, 6.35 cm, 5.75 cm, 16.75 g and 7.70 kg) as compared to control (11.50, 5.95 cm, 5.30 cm, 15.15 g and 6.40 kg) respectively.

4.2.2.2b Black Nightshade (*Solanum nigrum* L.)

It can be inferred from the Table 14, Figure IX and Plate -19 that the number of fruits, diameter of fruits (cm), fruit yield per plant (kg) and fruit yield per plot were maximum in T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (146.0, 1.9 cm, 3.88 kg, 7.92 kg), followed by T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (114.0, 1.7 cm, 3.75 kg and 6.75 kg) T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (98.0, 1.6 cm, 3.67 kg and 5.64 kg), T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (90.0, 1.3 cm, 2.68 kg and 4.54 kg), T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (74.7, 1.4 cm, 2.62 kg and 3.51 kg) T_6 – (67.7, 1.1 cm, 3.55 kg and 3.45 kg) when compared to the control (42.0, 0.9, 1.45kg and 2.36 kg) on 90 DAS.

4.2.2.3c Tomato (*Solanum lycopersicum* L.)

The data presented in Table 15, Figure X and Plate 20 revealed that a substantial increase in number of fruits (47.7), diameter of fruit (7.3 cm), single fruit weight (79.07 g), fruit yield per plant (5.82 kg), fruit yield per plot (39.66 kg) were examined in T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (33.7, 6.3 cm, 76.57 g, 5.68 kg and 38.37 kg) T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (32.0, 5.3 cm, 71.40 g, 5.35 kg and 36.56 kg) T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (28.0, 5.2 cm, 67.80 g, 4.86 kg and 34.88 kg) T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (24.3, 4.2 cm, 61.87 g, 3.96 kg and 30.76 kg) as compared to the control (19.0, 3.5 cm, 56.53 g, 2.96 kg and 28.96 kg) on 90 DAS.

4.2.2.4d Brinjal (*Solanum melongena* L.)

It can be inferred from the Table 16, Figure XI and Plate 21 that the number of fruits, fruit length, single fruit weight, fruit yield per plant, fruit yield per plot were superior in the treatment T_5 when compared to other treatments and control on 90 DAS. A conspisious increase in number of fruits (22.00), fruit length (15.70 cm), single fruit weight (93.15 g), fruit yield per plant (10.35 kg) and fruit yield per plot (37.25 kg) was examined in T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}, followed by T_2 – Predecomposted sugarcane trash +

Trichoderma asperelloides + *Eudrilus eugeniae* 5t/ha^{-1} (20.50, 15.40 cm, 91.80 g, 10.00 kg and 35.35 kg), T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (19.50, 14.70 cm, 88.85 g, 9.50 kg and 33.15 kg) T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (18.00, 13.95 cm, 80.65 g, 9.30 kg and 30.85 kg), T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (17.00, 13.05 cm, 75.50 g, 8.20 kg and 29.10 kg), T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (16.00, 12.20 cm, 70.60 g, 7.85 kg and 27.30 kg) over the control (14.50, 11.30 cm, 57.45 g, 7.30 kg and 25.10 kg) on 90 DAS.

The present findings coincide with the results of Seran *et al*., (2010) who reported that the application of inorganic fertilizers and compost showed maximum number of bulbs per plant (9.53) in onion (*Allium cepa* L.). A similar work was done by Gandhi and Sundari, (2012) who confirmed highest number of fruits per plant (14.12) and fruit length (9.05 cm) was obtained in brinjal (*Solanum melongena* L.) due to the application of vermicompost. A similar work was done by Singh *et al*., (2013) who confirmed that the application of vermicompost and mulching showed highest number of fruits, fruit weight (g) and fruit yield per plant (kg) in Tomato (*Solanum lycopersicum* L.). The present study was positively correlated with the findings of Samsangheile and Kanaujia, (2014) who observed maximum number of fruits, fruit weight (g), fruit length (cm) and diameter of fruit (cm) in chilli due to the application of vermicompost 10 t/ha.

The present study was also supported by Kanchilakshmi *et al*., (2015) who observed that the application of vermicompost increase the number of fruits (3) and single fruit weight (22.5 g) in *Solanum melongena* L. Similar result was obtained by Sakthivigneshwari and Vijayalakshmi, (2016) who observed a significant increase in number of fruits/plant (135.66) and diameter of fruit (1.73 cm) in *Solanum nigrum* L. due to the application of biocomposted corncob and coirpith. The result is on par with Adhikary *et al*., (2016) who observed that the application of manures and fertilizers increase the number of fruits/plants, fruit length (cm), fruit diameter (cm), single fruit weight (g) and fruit yield/plot (kg) in tomato plant. The present findings are in conformity with Vedpathak and Chavan, (2016) who observed that the application of organic and chemical fertilizers increase weight of single bulb (gm) and yield /plot (kg) in onion (*Allium cepa* L.).

The present finding is in conformity with Amman and Subramanian, (2017) who reported that the application of organic manures and biofertilizers enhanced the fresh herbage yield per plot (6.97 kg) on 90 DAS in Black nightshade (*Solanum nigrum* L.). Similar results was obtained by Kumar *et al.,* (2017) who observed a significant increase in diameter of bulb (cm) and bulb yield /plot (kg) (15.81 kg) with the application of Integrated Nutrient Management (INM) over control in onion (*Allium cepa* L.).

The present study was also supported by Kumar *et al*., (2018) who confirmed maximum fruit length (4.77 cm), diameter (5.70 cm) and fruit weight (9.33 g) in tomato (*Lycopersicon esculentum* Mill) due to the application of germplasm of ripening stage. The results are on par with the results of Dawood *et al.,* (2018) who also reported maximum bulb weight (87.39 g) and bulb diameter (7.06 cm) over the control (84.75 g) and (6.88 cm) in onion with the combined application of Trichoderma and compost manure. Similar results was observed by Manimegala and Gunasekaran, (2020) who reported maximum fruit length (15.28 cm) and single fruit weight (11.47 g) due to the application of vermicompost and NPK in Brinjal (*Solanum melongena* L.).

The present study was positively correlated with the findings of Palia *et al*., (2021) who observed that application of organic and inorganic fertilizers increased the diameter of fruit (cm), fruit length (cm), fruit yield per plant (kg), fruit yield per plot (kg) in brinjal (*Solanum melongena* L.).

Increase in yield parameters might be due to the beneficial effect of composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium on plant growth manifesting an increased chlorophyll production, rate of photosynthesis as well as nitrogen fixation and mobilizing native soil phosphorus resulted in better plant growth and superior yield attributes. The increase in yield characters of the crop might be due to the positive role of the organic manures with balanced supply of nitrogen throughout the life cycle of the crop which reduced the senescence and was able to furnish the increased assimilate demand of crops which resulted in higher yield.

TABLE 13

YIELD PARAMETERS OF ONION (*ALLIUM CEPA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90^{TH} DAY)

Treatment	Number of Bulbs	Diameter of Bulb (cm)	Bulb Length (cm)	Single Bulb Weight (g)	Bulb Yield Per Plot (kg)
	90 DAS	90 DAS	90 DAS	90 DAS	90 DAS
C	11.50	5.95	5.30	15.15	6.40
T_1	17.50	8.15	7.05	23.05	10.00
T_2	16.00	7.90	6.75	21.45	9.25
T_3	19.00	8.35	7.25	24.75	10.25
T_4	15.00	7.15	6.25	19.85	8.90
T_5	13.50	6.90	5.90	18.70	8.25
T_6	12.50	6.35	5.75	16.75	7.70
SEd	1.3032	0.6327	0.6908	0.9624	0.7793
CD (p<0.05)	2.7955	1.3572	1.4817	1.2354	1.6716
CD (p<0.01)	3.8798**	1.5814**	1.6851**	1.4879**	1.8523**

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

FIGURE VIII

YIELD PARAMETERS OF ONION (*ALLIUM CEPA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)

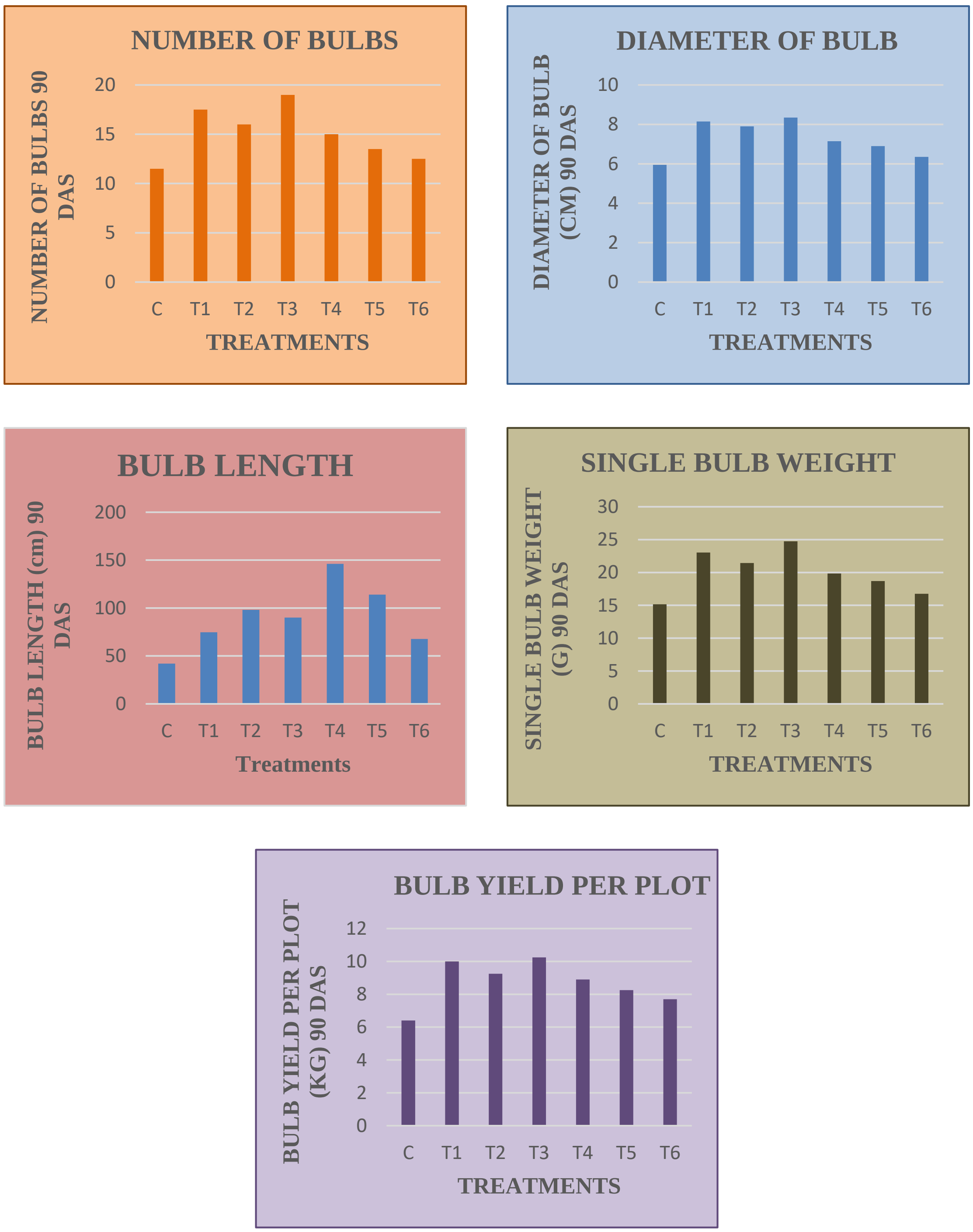


PLATE 18

YIELD PARAMETERS OF ONION (*ALLIUM CEPA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)

TABLE 14

YIELD PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90^{TH} DAY)

Treatment	Number of Fruits	Diameter of Fruit (cm)	Fruit Yield Per Plant (kg)	Fruit Yield Per Plot (kg)
	90 DAS	90 DAS	90 DAS	90 DAS
C	42.0	0.9	1.45	2.36
T_1	74.7	1.4	2.62	3.51
T_2	98.0	1.6	3.67	5.64
T_3	90.0	1.3	2.68	4.54
T_4	146.0	1.9	3.88	7.92
T_5	114. 0	1.7	3.75	6.75
T_6	67.7	1.1	3.55	3.45
SEd	4.8957	0.0982	0.5710	0.0429
CD (p<0.05)	10.5015	0.2107	1.2247	0.0920
CD (p<0.01)	14.5749**	0.2925**	1.6998**	0.1276**

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

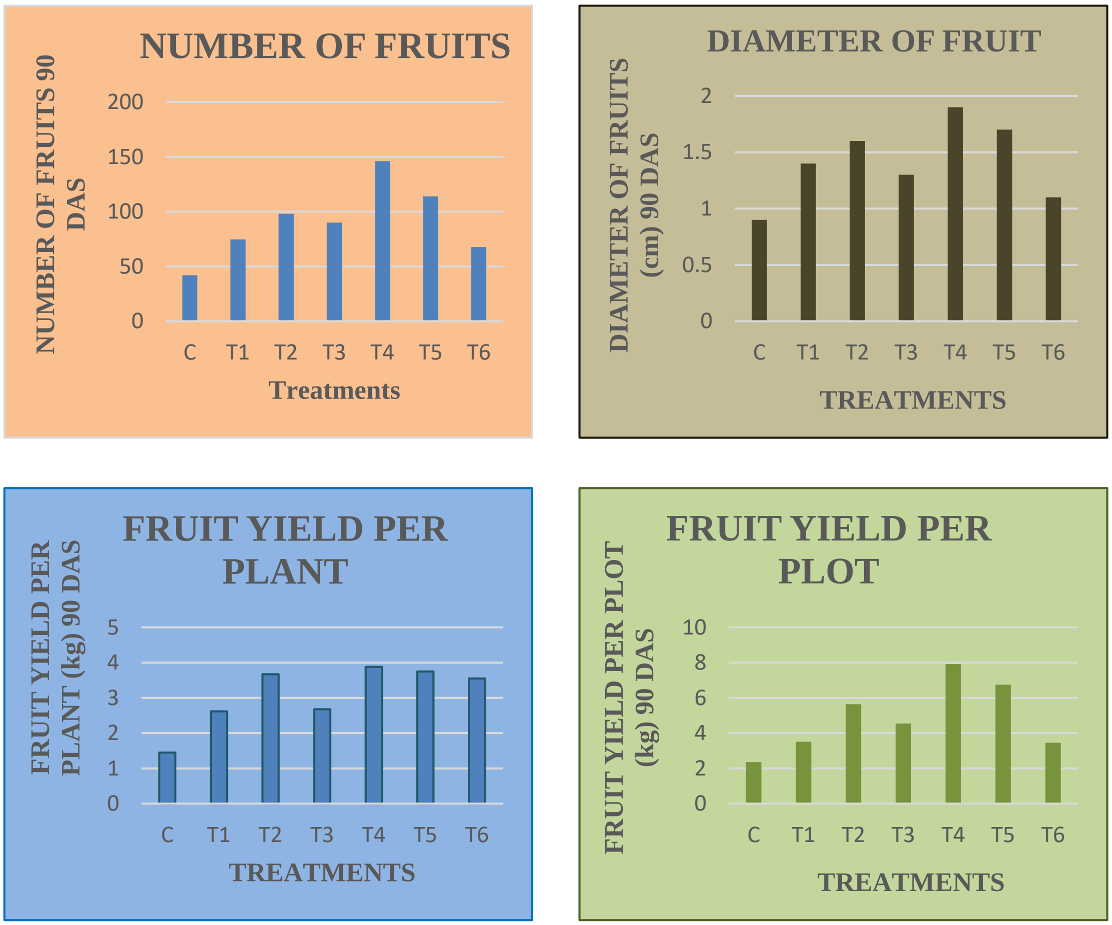
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

FIGURE IX

YIELD PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)



C – Control (Raw sugarcane trash and sugarcane bagasse)
T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

PLATE 19

YIELD PARAMETERS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)

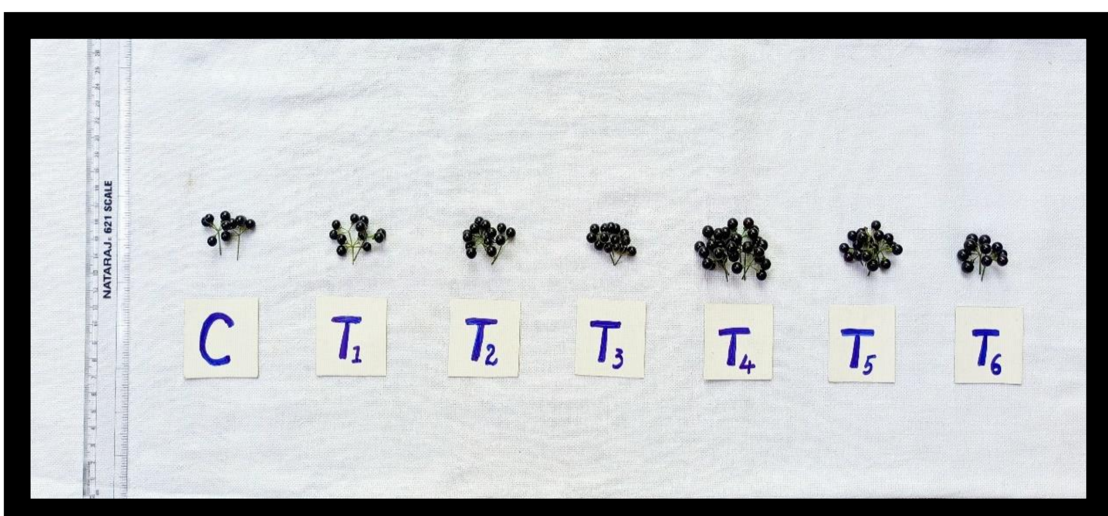


TABLE 15

YIELD PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90^{TH} DAY)

Treatment	Number of Fruits	Diameter of Fruit (cm)	Single Fruit Weight (g)	Fruit Yield per Plant (kg)	Fruit Yield Per Plot (kg)
	90 DAS	90 DAS	90 DAS	90 DAS	90 DAS
C	19.0	3.5	56.53	2.96	28.96
T_1	33.7	6.3	76.57	5.68	38.37
T_2	26.0	4.3	65.03	4.65	32.93
T_3	47.7	7.3	79.07	5.82	39.66
T_4	32.0	5.3	71.40	5.35	36.56
T_5	28.0	5.2	67.80	4.86	34.88
T_6	24.3	4.2	61.87	3.96	30.76
SEd	1.6330	0.0992	0.4907	0.0498	0.0382
CD (p<0.05)	3.5028	0.2128	0.1976	0.1068	0.0820
CD (p<0.01)	4.8615	0.2953**	2.4379**	0.5571**	0.5468**

** Significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

FIGURE X

YIELD PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)

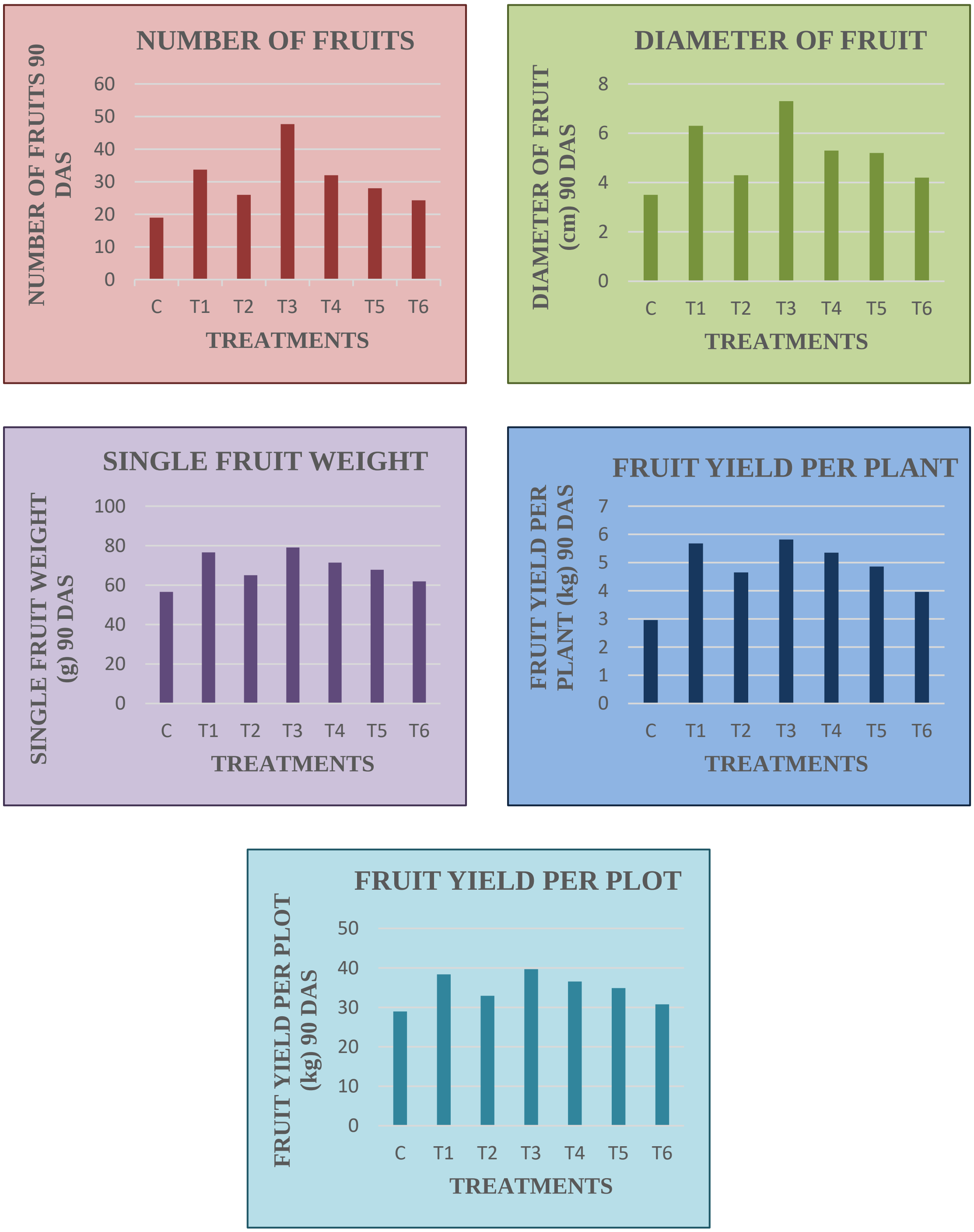


PLATE 20

YIELD PARAMETERS OF TOMATO (*SOLANUM LYCOPERSICUM* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)

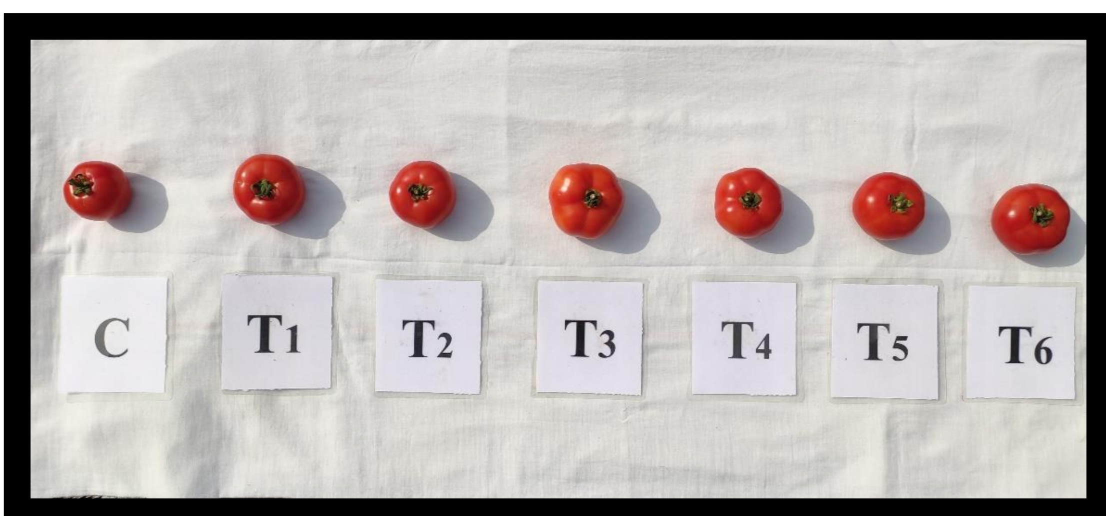


TABLE 16

YIELD PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90TH DAY)

Treatment	Number of fruits	Fruit length (cm)	Single fruit weight (g)	Fruit yield per plant (kg)	Fruit yield per plot (kg)
	90 DAS	90 DAS	90 DAS	90 DAS	90 DAS
C	14.50	11.30	57.45	7.30	25.10
T1	16.00	12.20	70.60	7.85	27.30
T2	20.50	15.40	91.80	10.00	35.35
T3	19.50	14.70	88.85	9.50	33.15
T4	18.00	13.95	80.65	9.30	30.85
T5	22.00	15.70	93.15	10.35	37.25
T6	17.00	13.05	75.50	8.20	29.10
SEd	0.5285	0.5454	1.4254	0.8153	0.6350
CD ($p<0.05$)	1.1338	1.1699	3.0575	1.7489	1.3620
CD ($p<0.01$)	1.5735**	1.6237**	4.2435**	2.0863**	1.5869**

** Significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

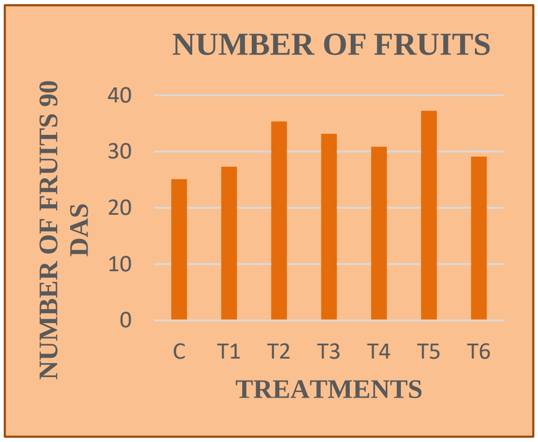
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

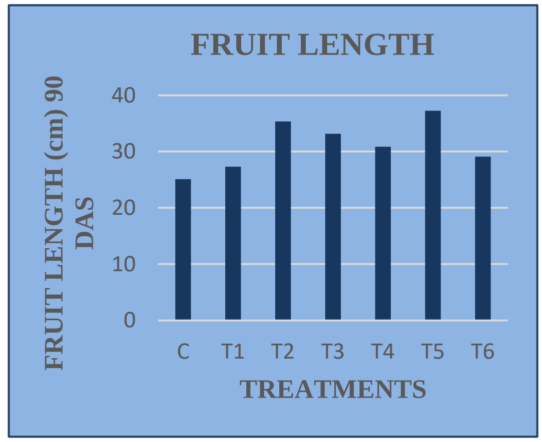
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

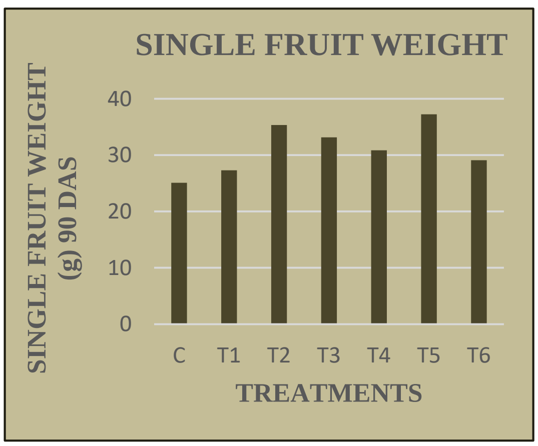
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium)

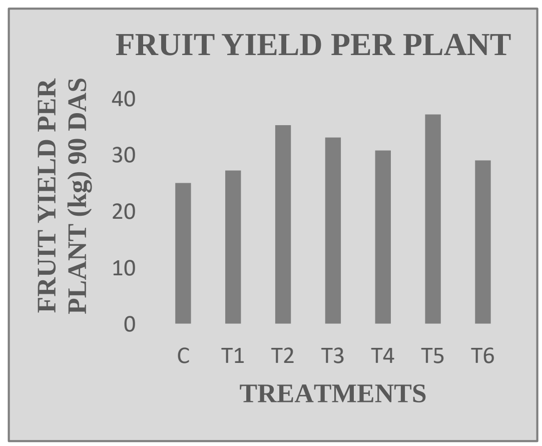
FIGURE XI

YIELD PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)









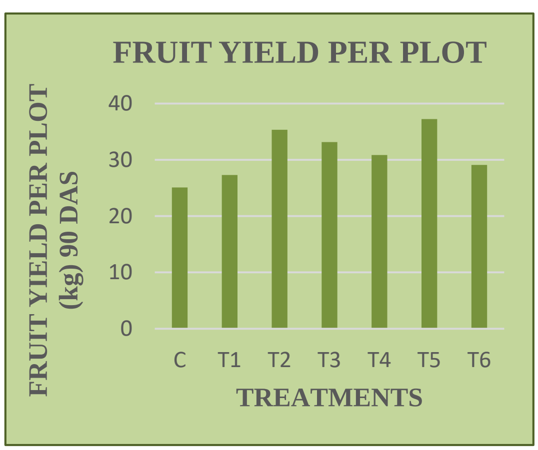
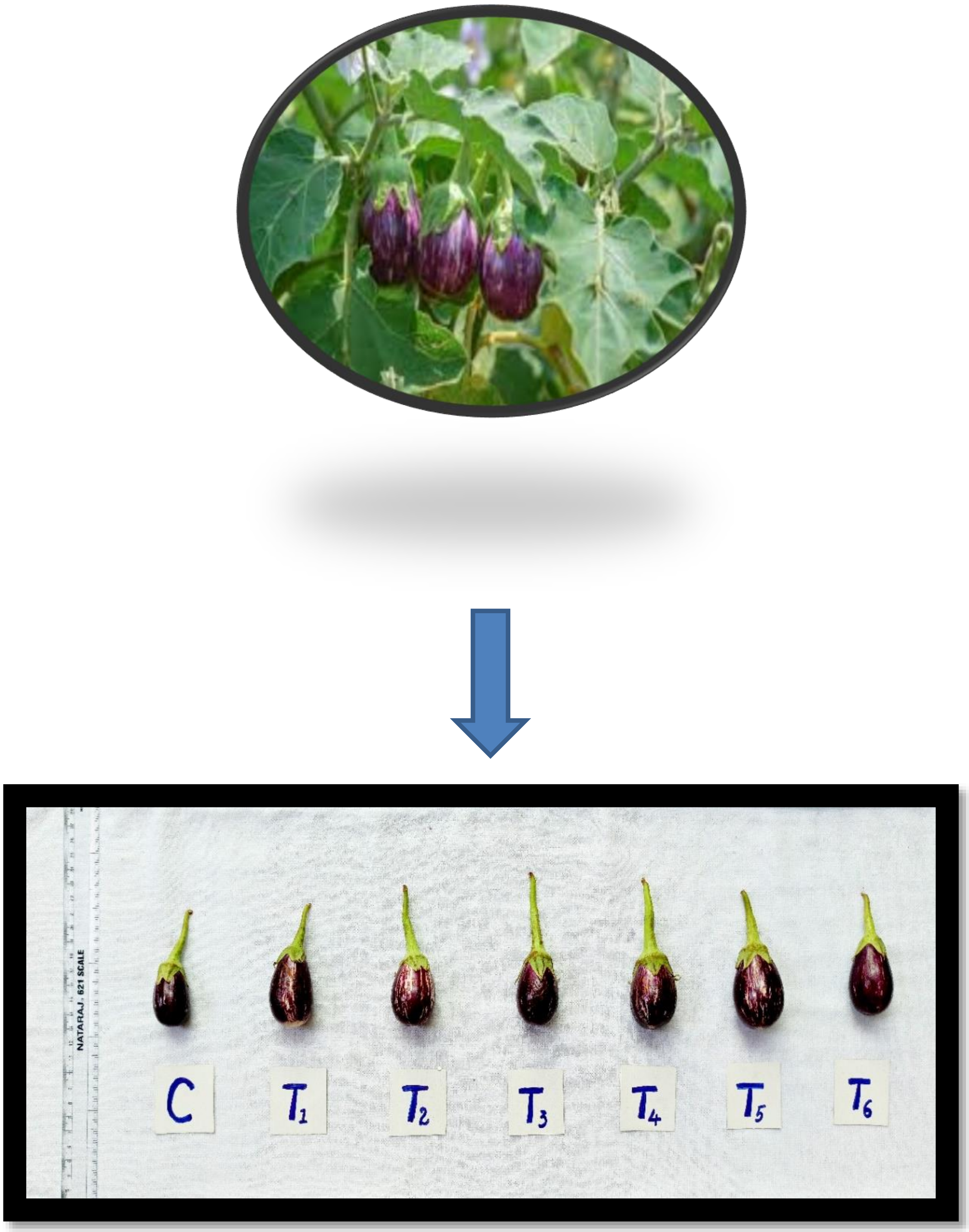


PLATE 21

YIELD PARAMETERS OF BRINJAL (*SOLANUM MELONGENA* L.) INFLUENCED BY SUGARCANE TRASH AND SUGARCANE BAGASSE COMPOST (90 DAS)



PHASE III

4.3 BIOCHEMICAL ANALYSIS

4.3.1 Effect of biocomposted sugarcane trash and sugarcane bagasse on protein, carbohydrates and chlorophyll content in the leaves of test crops

4.3.1.1a Onion (*Allium cepa* L.)

Protein

An increasing trend in protein content was noticed in the leaves of all the treatments from 30 to 60 DAS and after that there was a decrease in its content on 90 DAS. (Table 17). Among the treatments T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium registered maximum protein content of 86.55 mg/g tissue (30 DAS) and 98.72 mg/g tissue (60 DAS) followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} of 80.76 mg/g tissue (30 DAS) 93.63 mg/g tissue (60 DAS) protein content in the leaves declined gradually 88.65 mg/g tissue and 84.23 mg/g tissue on (90 DAS) T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 75.79 mg/g tissue (30 DAS) 87.53 mg/g tissue (60 DAS) 80.78 mg/g tissue (90 DAS) T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (71.32 mg/g tissue, 81.43 mg/g tissue and 78.54 mg/g tissue) over the control treatment (56.82, 70.65 and 68.57 mg/g tissue) on 30, 60 and 90 DAS.

Carbohydrate

An increasing trend in carbohydrate content was noticed in all the treatments from 30 to 60 DAS and after that a decrease in its content was noted on 90 DAS (Table 18). Among the treatments, carbohydrate content in leaf was increased significantly in T_3 –Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium which ranged from 75.19 to 95.78 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 71.23 to 91.76 mg/g tissue on 30 and 60 DAS declined to 89.57 and 84.16 mg/g tissue on 90 DAS T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (68.56, 88.43 and 78.36 mg/g tissue) T_5 – Predecomposted sugarcane bagasse +

Trichoderma asperelloides + *Eudrilus eugeniae* 5t/ha^{-1} (64.37, 84.73 and 73.21 mg/g tissue) T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (60.86, 81.87 and 69.43 mg/g tissue) against the control (53.85, 70.37 and 60.45 mg/g tissue) on 30, 60 and 90 DAS.

Chlorophyll

Chlorophyll a, chlorophyll b and total chlorophyll content of onion leaves increased significantly up to 30 to 60 DAS and then gradually declined after that in all the treatments (From T_1 to T_6) when compared with control (Figure XII). The treatment T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium, showed highest chlorophyll 'a' content from 30 to 60 DAS which ranged from 0.153to 0.278 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 0.147 to 0.271 mg/g tissue, chlorophyll 'b' which ranged from 0.214 to 0.267 mg/g tissue followed by 0.208 to 0.258 mg/g tissue on 30 and 60 DAS, 'total chlorophyll' which ranged from 0.312 to 1.360 mg/g tissue on 30 and 60 DAS and it was gradually decreased to 0.198 followed by 0.196 mg/g tissue (chlorophyll a), 0.242 followed by 0.181mg/g tissue (chlorophyll b), 0.701 followed by 0.698 mg/g tissue (total chlorophyll) on 90 days after sowing. T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (0.142, 0.265 and 0.186 mg/g tissue) chlorophyll 'a' (0.200, 0.255 and 0.250 mg/g tissue) chlorophyll 'b' (0.305, 0.918 and 0.692 mg/g tissue) total chlorophyll. The least chlorophyll content was registered in control chlorophyll 'a' (0.129, 0.247 and 0.183 mg/g tissue) chlorophyll 'b' (0.189, 0.248 and 0.230) total chlorophyll (0.290, 0.697 and 0.670 mg/g tissue) on 30, 60 and 90 DAS.

TABLE 17

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN CONTENT IN LEAVES OF ONION (*ALLIUM CEPA* L.)

Treatment	Protein (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	56.82	70.65	68.57
T_1	80.76	93.63	84.23
T_2	75.79	87.53	80.78
T_3	86.55	98.72	88.65
T_4	68.46	79.67	73.69
T_5	71.32	81.43	78.54
T_6	63.29	75.32	70.78
SEd	0.28468		
CD (p<0.05)	0.57465		
CD (p<0.01)**	0.76814**		

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 18

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CARBOHYDRATE CONTENT IN LEAVES OF ONION (*ALLIUM CEPA* L.)

Treatment	Carbohydrate (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	53.85	70.37	60.45
T_1	71.23	91.76	84.16
T_2	68.56	88.43	78.36
T_3	75.19	95.78	89.57
T_4	60.86	81.87	69.43
T_5	64.37	84.73	73.21
T_6	57.43	76.14	65.62
SEd CD (p<0.05) CD (p<0.01)**	0.01816 0.03666 0.04901**		

** significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha[1])

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

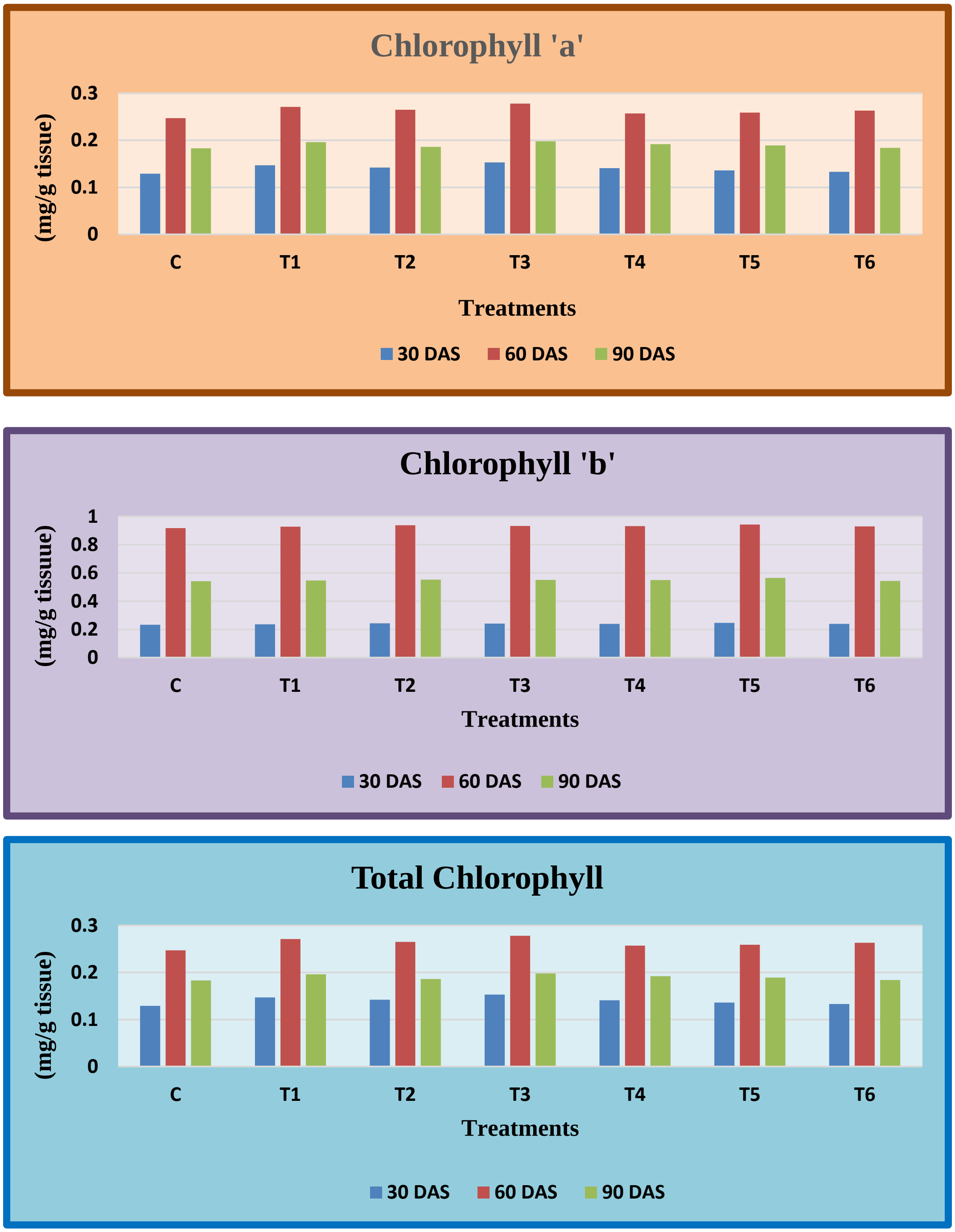
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

FIGURE XII

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CHLOROPHYLL CONTENT IN LEAVES OF ONION (*ALLIUM CEPA* L.)



4.3.1b Black Nightshade (*Solanum nigrum* L.)

Protein

An increasing trend in protein content was observed in the leaves of all the treatments from 30 to 60 DAS after that there was decrease in its content on 90 DAS. The results were depicted in the Table 19. Among the treatment T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} registered maximum protein content of 85.29 mg/g tissue (30 DAS) and 95.52 mg/g tissue (60 DAS) followed by T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5 t/ha^{-1} of 80.32 mg/g tissue (30 DAS), 90.43 mg/g tissue (60 DAS) and after that the protein content in the leaves declined gradually on 88.68 mg/g tissue and 83.39 mg/g tissue on (90 DAS) T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (78.46, 87.74 and 80.32 mg/g tissue) T3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (73.55, 84.57 and 77.82 mg/g tissue) T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5 t/ha^{-1} (68.43, 80.43 and 74.13 mg/g tissue) over the control treatment (59.78, 67.43 and 64.53 mg/g tissue) on 30, 60 and 90 DAS.

Carbohydrate

It can be inferred from Table 20 that the total carbohydrate content in black nightshade leaves showed a gradual increase up to 60 DAS and declined gradually thereafter in all the treatment. Among the treatments T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} registered maximum carbohydrate content of 78.65 mg/g tissue and 95.53 mg/ g tissue followed by T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5 t/ha^{-1} of 73.37 mg/g tissue and 91.62 mg/g tissue on 30 and 60 DAS and after that the carbohydrate content declined gradually to 89.62 mg/g tissue and 85.34 mg/g tissue on 90 DAS T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (69.45, 88.43 and 81.21 mg/g tissue) T_3 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (65.87, 85.73 and 75.20 mg/g tissue) T_2 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae*

5 t/ha^{-1} (60.19, 80.57 and 69.25 mg/g tissue) as compared to the control 51.43 to 73.34 mg/g tissue on 30 and 60 DAS and declined to 58.38 mg/g tissue on 90 DAS.

Chlorophyll

Chlorophyll a, chlorophyll b and total chlorophyll content of black nightshade leaves increased significantly up to 60 DAS and then gradually declined after that in all the treatment (from T_1 to T_6) when compared with control (Figure XIII). Among the treatment T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} registered maximum chlorophyll content from 30 to 60 DAS which ranged from 0.175 to 0.272 mg/g tissue followed by T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 0.173 to 0.261 mg/g tissue (chlorophyll a), 0.208 to 0.345 mg/g tissue followed by 0.204 to 0.341 mg/g tissue (chlorophyll b), 0.285 to 0.940 mg/g tissue followed by 0.272 to 0.934 mg/g tissue (total chlorophyll) and it decreased gradually to 0.242 followed by 0.241 mg/g tissue (chlorophyll a), 0.269 followed by 0.258 mg/g tissue (chlorophyll b), 0.669 followed by 0.664 mg/g tissue (total chlorophyll) on 90 DAS T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (chlorophyll ‘a’) 0.170, 0.260 and 0.237 mg/g tissue (chlorophyll ‘b’) 0.199, 0.333 and 0.256 mg/g tissue (total chlorophyll) 0.270, 0.929 and 0.613 mg/g tissue. The least amount of chlorophyll was recorded in control treatment (chlorophyll ‘a’) 0.160, 0.205 and 0.185 mg/g tissue (chlorophyll ‘b’) 0.175, 0.303 and 0.237 mg/g tissue (total chlorophyll) 0.250, 0.438 and 0.370 mg/g tissue.

TABLE 19

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN CONTENT IN LEAVES OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Protein (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	59.78	67.43	64.53
T_1	64.79	75.47	68.57
T_2	68.43	80.43	74.13
T_3	73.55	84.57	77.82
T_4	85.29	95.52	88.68
T_5	80.32	90.43	83.39
T_6	78.46	87.74	80.32
SEd	0.01817		
CD (p<0.05)	0.03667		
CD (p<0.01)**	0.04902**		

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 20

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CARBOHYDRATE CONTENT IN LEAVES OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Carbohydrayes (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	51.43	73.34	58.38
T_1	57.23	78.18	64.41
T_2	60.19	80.57	69.25
T_3	65.87	85.73	75.20
T_4	78.65	95.53	89.62
T_5	73.37	91.62	85.34
T_6	69.45	88.43	81.21
SEd	0.01764		
CD (p<0.05)	0.03561		
CD (p<0.01)**	0.04760**		

** significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

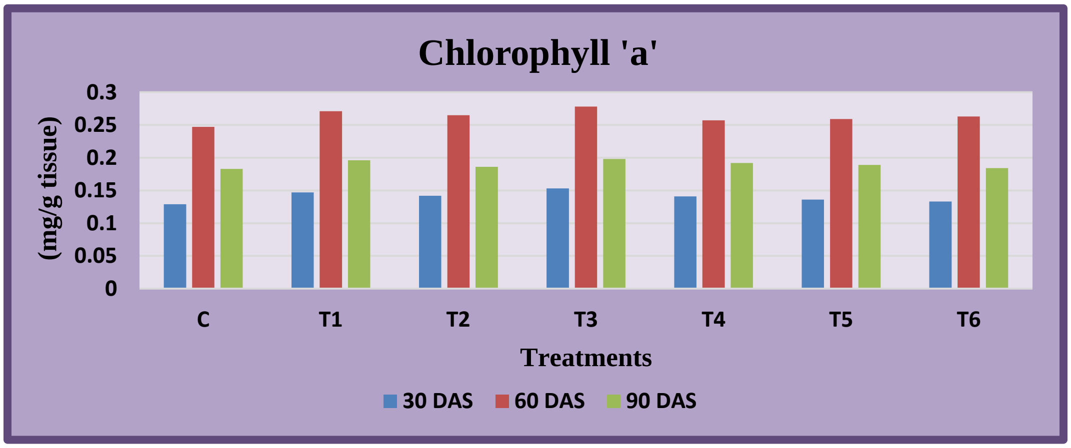
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

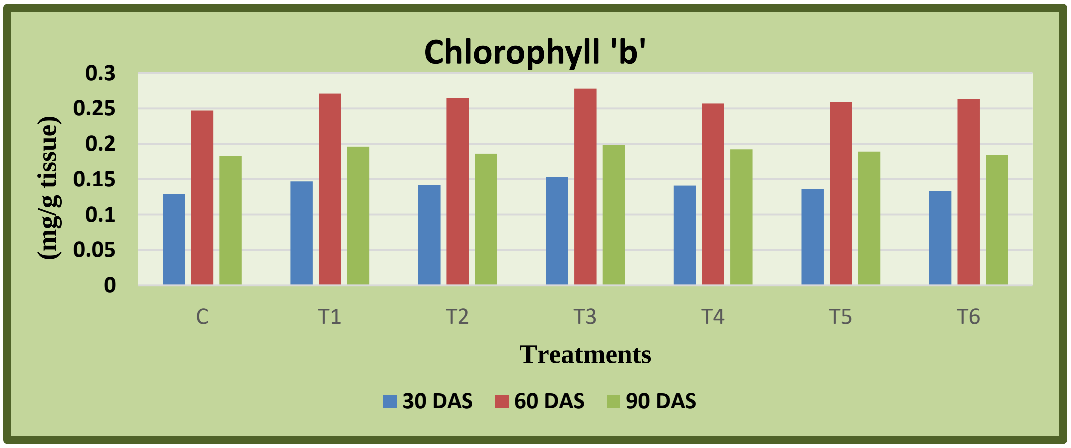
T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

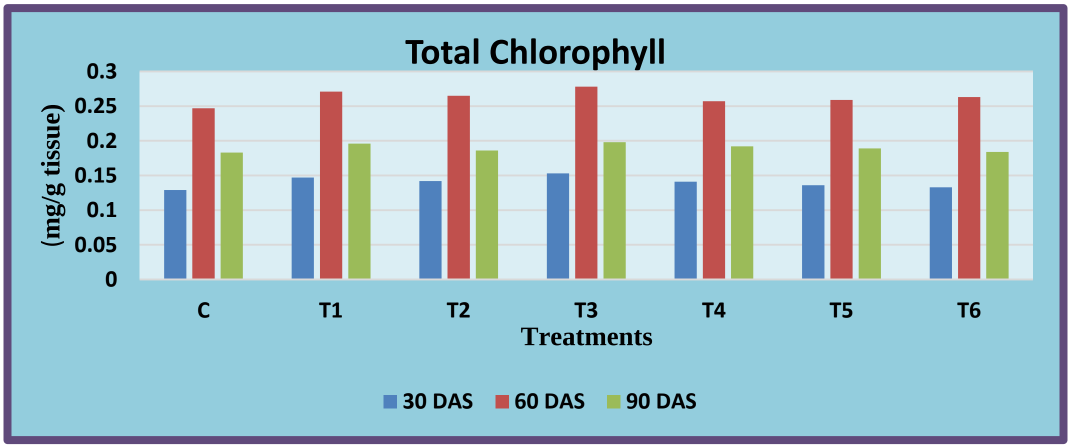
T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

FIGURE XIII

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CHLOROPHYLL CONTENT IN LEAVES OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)







4.3.1c Tomato (*Solanum lycopersicum* L.)

Protein

The results were shown in the Table 21. Predicts among the treatments T_3 is the best treatment followed by other treatments. T_3 – (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium) and T_1 – (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) followed by T_4 – (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1}) on 30 DAS (78.65, 73.74 and 68.23 mg/g tissue), on 60 DAS (95.42, 90.23 and 87.13 mg/g tissue) and on 90 DAS (89.65, 85.43 and 80.53 mg/g tissue), T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (64.76, 83.47 and 77.39 mg/g tissue) T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (60.52, 78.53 and 74.21 mg/g tissue), T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (58.74, 73.43 and 69.65 mg/g tissue) over the control (52.65, 69.76 and 55.69 mg/g tissue) on 30, 60 and 90 days after sowing.

Carbohydrate

From the Table 22 it is evident that the total carbohydrate content increased significantly in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium which ranged from 73.42 to 93.26 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 70.18 to 90.45 mg/g tissue on 30 and 60 DAS respectively and declined to 85.32 to 81.75 mg/g tissue on 90 DAS, T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} (68.31, 88.37 and 77.43 mg/g tissue), T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (62.29, 84.42 and 73.65 mg/g tissue) against the control 48.47 to 70.71 mg/g tissue and declined to 60.25 mg/g tissue on 30, 60 and 90 DAS.

TABLE 21

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN CONTENT IN LEAVES OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	Protein (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	52.65	69.76	55.69
T_1	73.74	90.23	85.43
T_2	60.52	78.53	74.21
T_3	78.65	95.42	89.65
T_4	68.23	87.13	80.53
T_5	64.76	83.47	77.39
T_6	58.74	73.43	69.65
SEd	0.01423		
CD (p<0.05)	0.02873		
CD (p<0.01)**	0.03840**		

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 22

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CARBOHYDARTE CONTENT IN LEAVES OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

treatment	Carbohydrate (mg/g tissue)		
	30 DAS	**60 DAS**	**90 DAS**
C	48.47	70.71	60.25
T_1	70.18	90.45	81.75
T_2	57.35	79.67	69.28
T_3	73.42	93.26	85.32
T_4	68.31	88.37	77.43
T_5	62.29	84.42	73.65
T_6	51.43	75.32	65.43
SEd CD (p<0.05) CD (p<0.01)**	0.15395 0.31076 0.41539**		

** significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

Chlorophyll

Chlorophyll a, chlorophyll b and total chlorophyll content of tomato leaves increased significantly up to 60 DAS and then gradually declined after that in all the treatments (from T_1 to T_6) when compared with the control (Figure XIV). The treatment T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium showed a remarkable significant increase in chlorophyll content from 30 to 60 DAS which ranged from 0.193 to 0.279 mg/g tissue followed by T_1 - Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^1 which ranged from 0.188 to 0.274 mg/g tissue (chlorophyll a), 0.240 to 0.332 mg/g tissue followed by 0.223 to 0.316 mg/g tissue (chlorophyll b), 0.349 to 0.992 mg/g tissue followed by 0.342 to 0.974 mg/g tissue (total chlorophyll) and it was gradually decreased 0.233 followed by 0.232 mg/g tissue (chlorophyll a), 0.249 followed by 0.245 mg/g tissue (chlorophyll b), 0.720 followed by 0.712 mg/g tissue (total chlorophyll) on 90 days after sowing. The least amount of chlorophyll content was observed in control (chlorophyll 'a') 0.153, 0.250, 0.177 (chlorophyll 'b') 0.186, 0.291, 0.224 (total chlorophyll) 0.324, 0.934, 0.666 mg/g tissue on 30, 60 and 90 DAS.

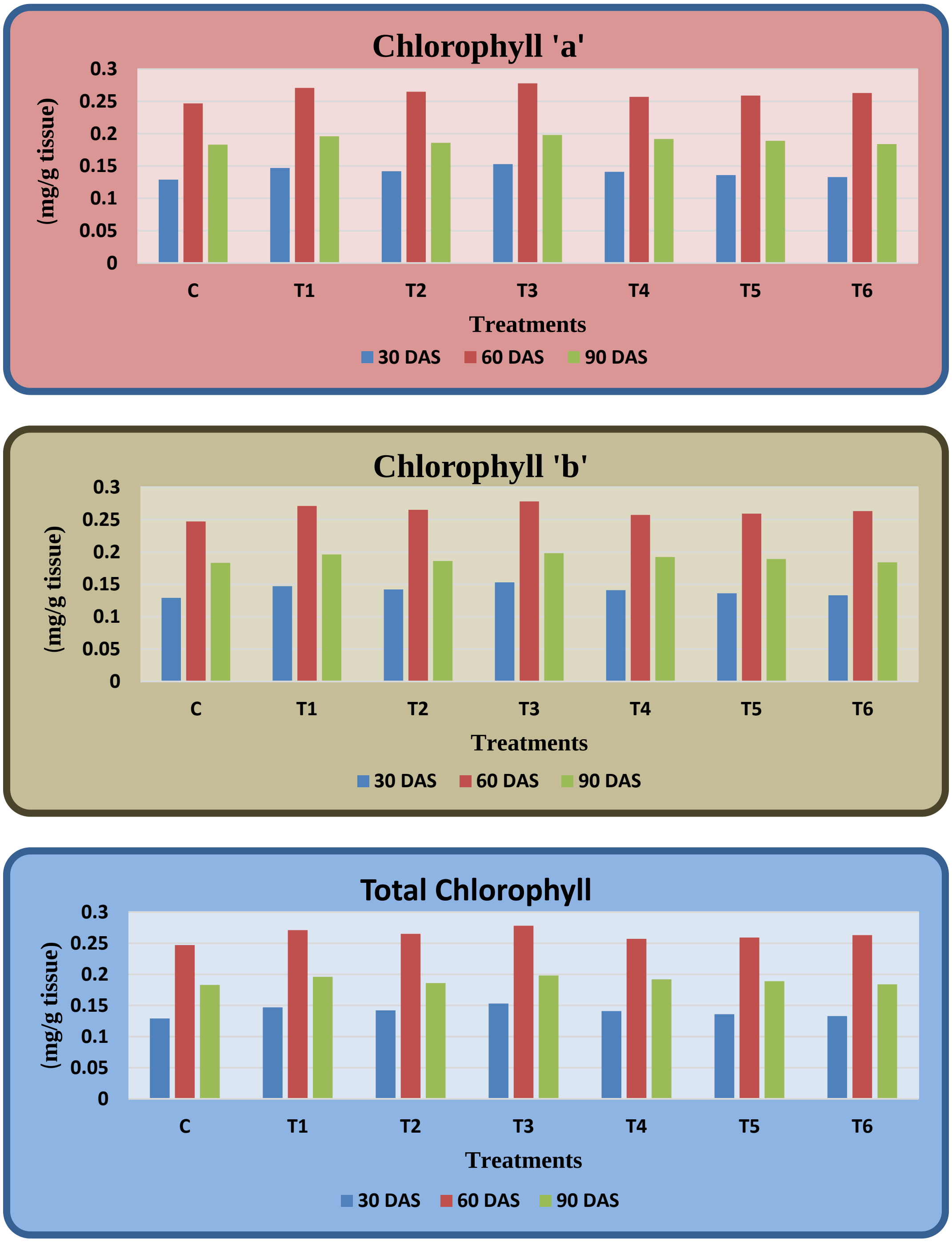
4.3.1d Brinjal (*Solanum melongena* L.)

Protein

An increasing trend in protein content was observed in the leaves of all the treatments from 30 to 60 DAS and after that there was decrease in its content on 90 DAS. The results were shown in the Table 23. Among the treatment T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} registered maximum protein content 73.23 and 98.23 mg/g tissue followed by T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} registered maximum in 70.68 and 94.47 mg/g tissue on 30 and 60 DAS and after that the protein content of the leaves declined gradually to 89.32 mg/g tissue 85.39 mg/g tissue on 90 DAS as compared to the control (45.42, 70.52 and 62.35 mg/g tissue).

FIGURE XIV

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CHLOROPHYLL CONTENT IN LEAVES OF TOMATO (*SOLANUM LYCOPERSICUM* L.)



Carbohydrate

It can be inferred from Table 24 that the total carbohydrate content in brinjal leaves showed a gradual increase up to 60 DAS and declined gradually there after in all the treatments. Maximum carbohydrate content was observed in T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 72.43 mg/g tissue to 89.72 mg/g tissue followed by T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 69.32 mg/g tissue to 84.43 mg/g tissue on 30 and 60 DAS and declined to 79.26 mg/g tissue and 75.32 mg/g tissue on 90 DAS against the control 45.20 mg/g tissue to 68.42 mg/g tissue declined to 55.47 mg/g tissue on 30, 60 and 90 DAS.

Chlorophyll

Among the treatments T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} registered maximum chlorophyll content from 30 to 60 DAS which ranged 0.209 mg/g tissue to 0.261 mg/g tissue followed by T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} which ranged from 0.204 mg/g tissue to 0.258 mg/g tissue (chlorophyll a), 0.228 mg/g tissue to 0.310 mg/g tissue followed by 0.223 mg/g tissue to 0.309 mg/g tissue (chlorophyll b), 0.246 mg/g tissue to 0.943 mg/g tissue followed by 0.243 mg/g tissue to 0.938 mg/g tissue (total chlorophyll) and it decreased gradually to 0.215 mg/g tissue followed by 0.210 mg/g tissue (chlorophyll a), 0.291 mg/g tissue followed by 0.284 mg/g tissue (chlorophyll b), 0.565 mg/g tissue followed by 0.553 mg/g tissue (total chlorophyll) on 90 DAS. The least amount of chlorophyll was recorded in control (Figure XV).

TABLE 23

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN CONTENT IN LEAVES OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Protein (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	45.42	70.52	62.35
T_1	50.68	74.65	65.56
T_2	70.68	94.47	85.39
T_3	68.21	88.13	79.53
T_4	63.47	83.68	74.23
T_5	73.23	98.23	89.32
T_6	58.39	77.42	70.68
SEd CD (p<0.05) CD (p<0.01)**	1.08154 2.18314 2.91825**		

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 24

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CARBOHYDRATE CONTENT IN LEAVES OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Carbohydrate (mg/g tissue)		
	30 DAS	60 DAS	90 DAS
C	45.20	68.42	55.47
T_1	50.19	71.25	62.72
T_2	69.32	84.43	75.32
T_3	65.75	81.75	70.10
T_4	58.28	78.32	68.35
T_5	72.43	89.72	79.26
T_6	54.32	75.29	65.30
SEd Cd(p<0.05) Cd(p<0.01)	0.01332 0.02688		

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

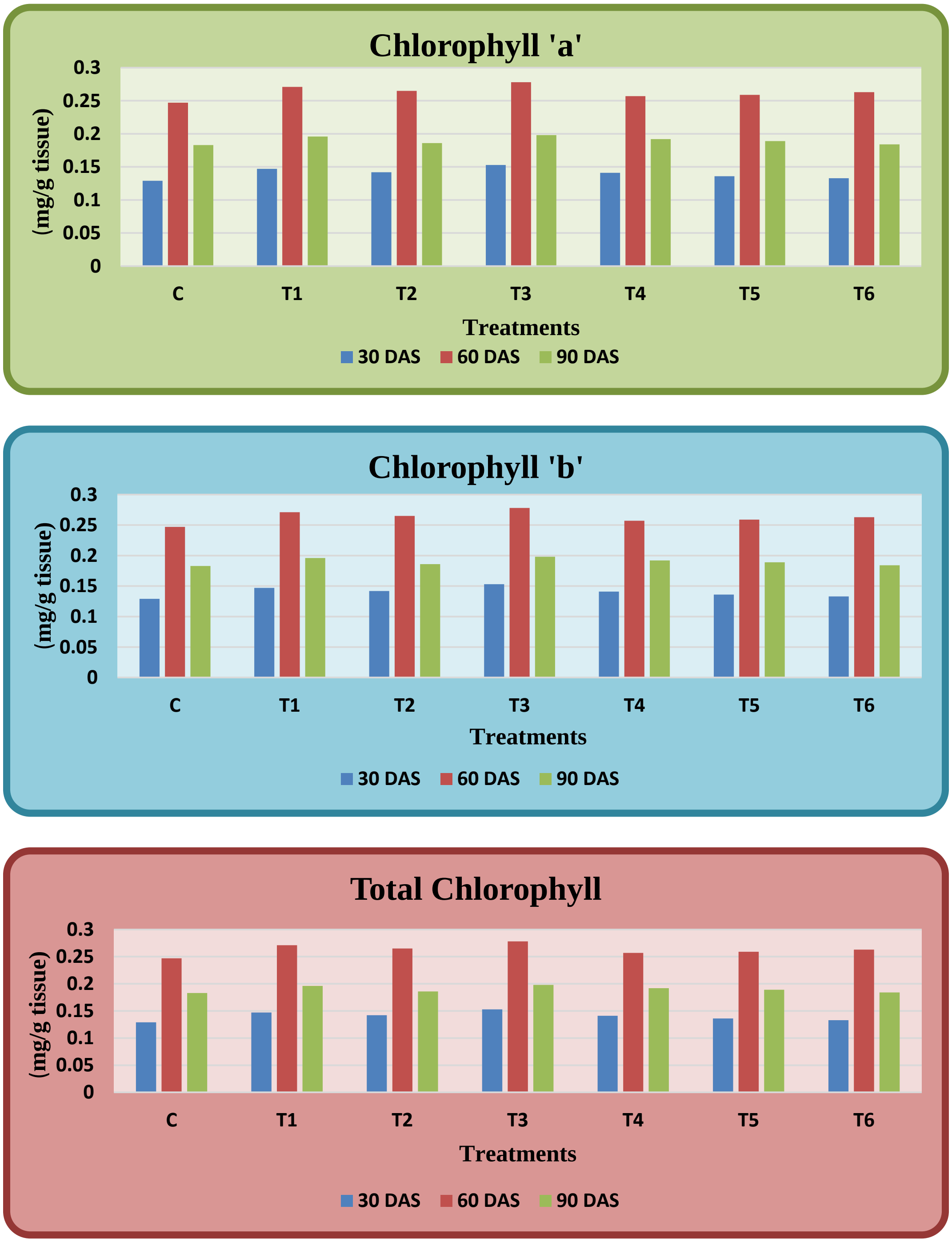
T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

FIGURE XV

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON CHLOROPHYLL CONTENT IN LEAVES OF BRINJAL (*SOLANUM MELONGENA* L.)



The present findings are in accordance with the observation of Densilin *et al*., (2010) who found that the combined application of biofertilizers + inorganic fertilizer + vermicompost increase in T_6 treatment of protein, carbohydrate and chlorophyll in chilli (NS-1701) plant. Similar result was obtained by Lallawmsanga *et al*., (2012) who reported that the application of vermicompost and cowdung increased the chlorophyll a, chlorophyll b and total chlorophyll in *Solanum melongena* L. The present findings coincide with the results of Kavitha *et al*., (2013) who observed that the combined application of biofertilizer + chemical fertilizer + vermicompost increased the protein 61.17 mg/g, total carbohydrate 48.mg/g and chlorophyll 2.80 mg/g on 40 DAS in *Amaranthus tristis*.

Our findings are in line with the work of Bindhu *et al*., (2013) who found that the application of biodynamic farming (3.5 kg) significantly increased the protein, carbohydrate and chlorophyll content from 30 to 75 DAS of soybean (*Glycine max* L.var.co.soy). The present finding is in accordance with the observation of Reghuvaran and Ravindranath, (2014) who found that the application of composted coirpith increased the protein content of ornamental plants in the range of 8.81mg gm^{-1} tissue (*Bauhinia purpurea*), 6.90 mg gm^{-1} tissue (*Hydechium coronarium*) as compared to the plants cultivated in soil (4.51 and 4.48 mg gm^{-1} tissue). The present study are also in accordance with the findings of Vijayalakshmi and Gayathri, (2017) who observed maximum protein, carbohydrate, chlorophyll a, chlorophyll b and total chlorophyll due to the application of vermicompost in chilli (*capsicum annum* L.).

The present findings are positively correlated with Tensingh Baliah and Muthulakshmi, (2017) who recorded highest total chlorophyll content (4.86 mg/g) and protein (15.28 mg/g) in okra. Similar results was obtained by Hassan *et al*., (2022) who found an increase in total chlorophyll in leaf tissue of banana plant up to 24 weeks due to the application of vermicompost.

The increase in the protein content up to 60 DAS might be due to the elevated density of microbes present in compost which enhanced faster decomposition of organic matter there by enabling increased availability of nutrients especially nitrogen, amino acids, enzymes and vitamins. They were responsible for enhancing physiological and metabolic activities in the plant as a consequence of this, there was an increase in nitrogen uptake from the soil and its further assimilation for protein biosynthesis. The decrease in protein content at 90 DAS might be attributed to its utilization for flower and fruit formation.

Among the four-plant maximum carbohydrate content was observed in all the biocompost treatments from 30 to 60 DAS. This might be due to the addition of organic substances to soil resulted in substantial increase in carbohydrate content. After 50 DAS the total carbohydrate content of the leaf was significantly reduced. The reduction in the leaf total carbohydrate content in plants could be either due to reduced photosynthetic activity or due to utilization of synthesized carbohydrates for biological purposes in the plant.

The increase in chlorophyll content up to 60 DAS in the leaves might be due to the incorporation of composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides, Eudrilus euginae* and microbial consortium which enhanced the nitrogen content of the soil, which is a constituent of important compounds like amino acids, ATP, ADP, chlorophyll and enzymes. The decline in chlorophyll content after 60 DAS might be due to the breakdown of protein, ageing of the leaves and microbial cell lysis. Combined application of composted sugarcane trash, sugarcane bagasse, *Pleurotus florida*, *Trichoderma asperelloides, Eudrilus euginae* and microbial consortium might have produced maximum photosynthate accumulation towards the leaf biomass.

4.3.2 Effect of composted sugarcane trash and sugarcane bagasse on protein and carbohydrate in the seeds of test crops.

4.3.2a Onion (*Allium cepa* L.)

The protein content was found to be maximum in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 71.06 mg/g tissue followed by T_1 –Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} of 69.90 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 65.07 mg/g tissue T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 63.18 mg/g tissue T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 60.36 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 56.16 mg/g tissue as compared to the control 45.18 mg/g tissue. (Table 25)

The carbohydrate content was found to be maximum in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium of 82.25 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae*

5t/ha^{-1} 76.32 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 73.54 mg/g tissue T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 69.72 mg/g tissue T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 64.19 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 59.15mg/g tissue as compared to the control 48.96 mg/g tissue.

4.3.2b Black Nightshade (*Solanum nigrum* L.)

The protein content was found to be maximum in T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} of 59.13 mg/g tissue followed by T_5 –Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 55.74 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 50.11 mg/g tissue T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 47.66 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 43.23 mg/g tissue T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 39.72 mg/g tissue as compared to the control 34.66 mg/g tissue.

The carbohydrate content was found to be more in T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} of 69.90 mg/g tissue followed by T_5 –Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 65.00 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 60.15 mg/g tissue T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 56.65 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 52.55 mg/g tissue T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 48.09 mg/g tissue as compared to the control 42.29 mg/g tissue. (Table 26)

TABLE 25

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN AND CARBOHYDRATE CONTENT IN SEEDS OF ONION (*ALLIUM CEPA* L.)

Treatment	Protein (mg/g tissue)	Carbohydrate (mg/g tissue)
C	45.18	48.96
T_1	69.90	76.32
T_2	65.07	73.54
T_3	71.06	82.25
T_4	60.36	64.19
T_5	63.18	69.72
T_6	56.16	59.15
SEd CD ($p<0.05$) CD ($p<0.01$)**	3.4218 7.3399 10.1869**	3.7258 7.9920 11.0920**

** significant at 1% ($p<0.01$), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

4.2.3c Tomato (*Solanum lycopersicum* L.)

There was an appreciable increase in protein in the seeds of tomato shown in Table 27. The protein content was found to be maximum in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium of 72.09 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} of

69.74 mg/g tissue T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} 65.66 mg/g tissue T_5 –Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 60.32 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 58.02 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 55.15 mg/g tissue as compared to the control 49.25 mg/g tissue.

TABLE 26

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN AND CARBOHYDRATE CONTENT IN SEEDS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	Protein (mg/g tissue)	Carbohydrate (mg/g tissue)
C	34.66	42.29
T_1	39.72	48.09
T_2	43.23	52.55
T_3	47.66	56.65
T_4	59.13	69.90
T_5	55.74	65.00
T_6	50.11	60.15
SEd CD (p<0.05) CD (p<0.01)**	4.2926 9.2076 12.7792**	2.1306 4.5702 6.3429**

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

The carbohydrate content was found to be maximum in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium of 69.90 mg/g tissue followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} of 64.60 mg/g tissue T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} 50.20 mg/g tissue T_5 –Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrillus eugeniae* 5t/ha^{-1} 47.65 mg/g tissue T_2 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} 44.55 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 41.12 mg/g tissue as compared to the control 36.20 mg/g tissue.

4.3.2d Brinjal (*Solanum melongena* L.)

The protein content was found to be maximum in T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 69.00 mg/g tissue followed by T_2 –Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 66.33 mg/g tissue T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 62.09 mg/g tissue T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} 58.16 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 55.74 mg/g tissue T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 49.60 mg/g tissue as compared to the control 44.55 mg/g tissue. (Table 28)

The carbohydrate content was found to be more in T_5 Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 66.12 mg/g tissue followed by T_2 Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} of 61.25 mg/g tissue T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium 58.32 mg/g tissue T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5 t/ha^{-1} 54.72 mg/g tissue T_6 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium 50.01 mg/g tissue T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} 45.36 mg/g tissue as compared to the control 40.45 mg/g tissue.

TABLE 27

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN AND CARBOHYDRATE CONTENT IN SEEDS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	Protein (mg/g tissue)	Carbohydrate (mg/g tissue)
C	49.25	36.20
T_1	69.74	64.60
T_2	58.02	44.55
T_3	72.09	69.90
T_4	65.66	50.20
T_5	60.32	47.65
T_6	55.15	41.12
SEd CD (p<0.05) CD (p<0.01)**	2.9761 6.3839 8.8601**	2.9032 6.2275 8.6431**

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 28

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON PROTEIN AND CARBOHYDRATE CONTENT IN SEEDS OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	Protein (mg/g tissue)	Carbohydrate (mg/g tissue)
C	44.55	40.45
T_1	49.60	45.36
T_2	66.33	61.25
T_3	62.09	58.32
T_4	58.16	54.72
T_5	69.00	66.12
T_6	55.74	50.01
SEd CD (p<0.05) CD (p<0.01)**	3.3194 7.1203 9.8821**	3.6534 7.8366 10.8764**

** significant at 1% (p<0.01), DAS – Days after sowing

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

Similar results was observed by Zodape *et al*., (2010) who observed that the application of seaweed (*Kappaphycus alvarezii*) extract showed maximum protein (19.43 mg/g tissue) and carbohydrate (61.99 mg/g tissue) in green gram. The present finding is in accordance with the observation of Senthilkumar and Sivagurunathan, (2012) who reported that the application of bacterial fertilizers (*Rhizobium* + *Phosphobacteria* + *Azospirillum*) showed highest in protein and carbohydrate content of cowpea (1.44 and 15.54 mg/g tissue) and green gram (1.17 and 15.57 mg/g tissue). Baviskar *et al*., (2012) who found that the application of biocompost (5t/ha^{-1}) increased the protein content (20.30%) of cluster bean that the control. The present finding was positively correlated with Kavitha *et al*., (2013) who recorded highest protein content (61.17 mg/g) was recorded in *Amaranthus tristis* due to the application of *Azospirillum* + chemical fertilizer + vermicompost as compared to the control (29.10 mg/g) on 40 days.

Banik and Sengupta, (2014) reported application of farm compost at 4 – 8 t ha^{-1} increased the seed protein content of mung bean over the fertilizer control treatment. According to Reghuvaran and Ravindranath, (2014) a remarkable increase in protein and carbohydrate content was noted in *Ocimus kiliandscharium* (6.95 mg/gm) grown in coirpith compost and *Bacopa monnieri* (0.36 mg/gm) recorded the highest amount of carbohydrate when grown in coirpith compost. The present finding was positively correlated with the Ravimycin, (2016) who recorded that the application of vermicompost (VC) and farmyard manure (FYM) showed highest protein content in coriander (23.32 mg) compared to the control (16.48 mg) on 90 DAS.

Hussain *et al*., (2017) reported that vermicompost application increases the carbohydrates content in *Abelmoschus esculentus*. The present study was in agreement with the results of Ashwini *et al*., (2018) who found that significant increase of seed protein in pigeon pea. Similar results was observed by Vijayalakshmi and Karthiyayini, (2018) in treatment consisting of vermicompost-15gm + Asospirillum significant increase in protein and carbohydrates content and also in 20gm of vermicompost treated seedlings of *Solanum nigrum* L. and *Trigonella foenum graecum* L. The present findings was positively correlated with Balmori *et al*., (2019) who recorded that application of vermicompost showed highest protein and carbohydrate in *Allium sativum* L.

The present findings was positively correlated with Hussain *et al*., (2020) who recorded that the application of vermicompost showed significant protein and carbohydrate content in ladies finger. The present study was in agreement with the results of Youssef *et al*., (2022) who found observed significant higher protein and carbohydrate in chia plant due to microalgae supplementation by foliar spray and soil drench. Similar results were obtained by Sabourifard *et al*., (2023) that application of organic fertilizers increase the final seed yield under late sowing conditions through increasing the moisture retention capacity and increasing nutrients availability.

The highest protein and carbohydrate content due to the application of *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium may be due to the increased availability of phosphorus which might have favorably influenced the nitrogen uptake by plants and ultimately accumulated in seeds as protein and carbohydrate.

PHASE IV

4.4 SOIL ANALYSIS

4.4.1 Pre-harvest (Initial) soil analysis

The initial and experimental soil samples of all the treatments were assessed for their characteristics. The changes in soil pH, electrical conductivity, available nitrogen, available phosphorus, available potassium of the initial soil due to treatments and combinations are depicted in Table 29.

The present research reveals that initial soil pH, electrical conductivity, available nitrogen, available phosphorus, available potassium was more in T_5 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 7.2, 4.56 (Millimhos cm^{-1}), 176 (kg/ha), 14.6 (kg/ha), 125 (kg/ha) followed by T_2 – (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 7.0, 3.90 (Millimhos cm^{-1}), 173 (kg/ha), 13.9 (kg/ha), 120 (kg/ha), T_4 – (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.6, 3.64 (Millimhos cm^{-1}), 160 (kg/ha), 13.1 (kg/ha), 116 (kg/ha), T_6 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium) 6.6, 3.20 (Millimhos cm^{-1}), 152 (kg/ha), 12.4 (kg/ha), 112 (kg/ha), T_3 – (Predecomposted sugarcane trash +

Trichoderma asperelloides + Microbial consortium) 6.4, 3.42 (Millimhos cm^{-1}), 157 (kg/ha), 13.0 (kg/ha), 114 (kg/ha) as compared to the control (6.1, 3.19, 146 (kg/ha), 12.1 (kg/ha) and 110 (kg/ha)) respectively.

4.4.2 Post – harvest soil analysis

4.4.2a Onion (*Allium cepa* L.)

The data from the Table 30 revealed that significant increase in pH (7.1 and 7.0), EC (2.70 and 2.65 millimhos cm^{-1}), available nitrogen (210 kg/ha and 204 kg/ha), available phosphorus (15.6 kg/ha and 15.2 kg/ha) and available potassium (120 kg/ha and 118 kg/ha) was noted in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}, T_2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.9, 2.60 (Millimhos cm^{-1}), 196 (kg/ha), 14.8 (kg/ha), 115 (kg/ha) T_4 – (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.8, 2.57 (Millimhos cm^{-1}), 189 (kg/ha), 14.2 (kg/ha), 110 (kg/ha), T_5 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.8, 1.98 (Millimhos cm^{-1}), 164 (kg/ha), 13.9 (kg/ha), 107 (kg/ha), T_6 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium) 6.5, 1.78 (Millimhos cm^{-1}), 153 (kg/ha), 13.5 (kg/ha), 103 (kg/ha) as compared to the control (6.2, 1.65 millimhos cm^{-1}, 147 kg/ha, 12.7 kg/ha, 97 kg/ha) respectively.

TABLE 29

EVALUATION OF PRE-HARVEST SOIL STATUS

Treatment	pH	EC (Millimhos cm-1)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
C	6.1	3.19	146	12.1	110
T_1	6.8	3.85	165	13.5	118
T_2	7.0	3.90	173	13.9	120
T_3	6.4	3.42	157	13.0	114
T_4	6.6	3.64	160	13.1	116
T_5	7.2	4.56	176	14.6	125
T_6	6.6	3.20	152	12.4	112

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

4.4.2b Black Nightshade (*Solanum nigrum* L.)

The data from the Table 31 revealed that highest pH (7.3 and 7.1), EC (1.76 and 1.72 millimhos cm^{-1}), available nitrogen (183 kg/ha and 178 kg/ha), available phosphorus (13.5 kg/ha and 12.9 kg/ha) and available potassium (90.7 kg/ha and 88.4 kg/ha) in T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} followed by T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} T_6 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium) 6.8, 1.67 (millimhos cm^{-1}), 173 (kg/ha), 11.8 (kg/ha), 86.8 (kg/ha) T_3 – (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium) 6.7, 1.62 (millimhos cm^{-1}), 170 (kg/ha), 11.7 (kg/ha), 84.9 (kg/ha) T_2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.5, 1.54 (millimhos cm^{-1}), 166 (kg/ha), 11.4 (kg/ha), 82.1 (kg/ha) T_1 – (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.3, 1.35 (millimhos cm^{-1}), 150 (kg/ha), 11.2 (kg/ha), 81.5 (kg/ha) as compared to the control (6.2, 1.15 millimhos cm^{-1}, 148 kg/ha, 11.0 kg/ha and 80.2 kg/ha) respectively.

TABLE 30

IMPACT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST-HARVEST SOIL ANALYSIS OF ONION (*ALLIUM CEPA* L.)

Treatment	pH	EC (Millimhos cm-1)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
C	6.2	1.65	147	12.7	97
T_1	7.0	2.65	204	15.2	118
T_2	6.9	2.60	196	14.8	115
T_3	7.1	2.70	210	15.6	120
T_4	6.8	2.57	189	14.2	110
T_5	6.8	1.98	164	13.9	107
T_6	6.5	1.78	153	13.5	103

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

TABLE 31

IMPACT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST-HARVEST SOIL ANALYSIS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Treatment	pH	EC (Millimhos cm-1)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
C	6.2	1.15	148	11.0	80.2
T_1	6.3	1.35	150	11.2	81.5
T_2	6.5	1.54	166	11.4	82.1
T_3	6.7	1.62	170	11.7	84.9
T_4	7.3	1.76	183	13.5	90.7
T_5	7.1	1.72	178	12.9	88.4
T_6	6.8	1.67	173	11.8	86.8

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

4.4.2c Tomato (*Solanum lycopersicum* L.)

The data from the Table 32 showed that highest pH (7.4 and 7.2), EC (2.6 and 2.3 millimhos cm^{-1}), available nitrogen (195 kg/ha and 190 kg/ha), available phosphorus (20.5 kg/ha and 19.8 kg/ha) and available potassium (125 kg/ha and 120 kg/ha) in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium followed by T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus* *eugeniae* 5t/ha^{-1} (7.0, 2.0 millimhos cm^{-1}, 183 kg/ha, 19.5 kg/ha, 119 kg/ha) T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.9, 1.9 millimhos cm^{-1}, 182 kg/ha, 19.0 kg/ha, 115 kg/ha) T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.4, 1.5 millimhos cm^{-1}, 174 kg/ha, 18.6 kg/ha, 113 kg/ha) T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (6.4, 1.3 millimhos cm^{-1}, 173 kg/ha, 18.3 kg/ha, 110 kg/ha) as compared to the control (6.1, 1.2 millimhos cm^{-1}, 169 kg/ha, 17.9 kg/ha and 100 kg/ha) respectively.

TABLE 32

IMPACT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST-HARVEST SOIL ANALYSIS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Treatment	pH	EC (Millimhos cm-1)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
C	6.1	1.2	169	17.9	100
T_1	7.2	2.3	190	19.8	120
T_2	7.0	2.0	183	19.5	119
T_3	7.4	2.6	195	20.5	125
T_4	6.9	1.9	182	19.0	115
T_5	6.4	1.5	174	18.6	113
T_6	6.4	1.3	173	18.3	110

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

4.4.2d Brinjal (*Solanum melongena* L.)

The data from the Table 33 clearly predict that there was an increase in pH (7.3 and 7.1), EC (3.7 and 3.4 millimhos cm^{-1}), available nitrogen (194 kg/ha and 190 kg/ha), available phosphorus (21.9 kg/ha and 21.5 kg/ha) and available potassium (130 kg/ha and 128 kg/ha) was registered in T_5 – (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) followed by T_2 – (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (6.8, 3.0 millimhos cm^{-1}, 187 kg/ha, 19.4 kg/ha, 125 kg/ha) T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.5, 2.8 millimhos cm^{-1}, 184 kg/ha, 19.2 kg/ha, 120 kg/ha) T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (6.3, 2.5 millimhos cm^{-1}, 181 kg/ha, 18.6 kg/ha, 118 kg/ha) T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.2, 2.2 millimhos cm^{-1}, 175 kg/ha, 18.2 kg/ha, 115 kg/ha) as compared to the control (6.1, 2.2 millimhos cm^{-1}, 163 kg/ha, 17.4 kg/ha and 110 kg/ha) respectively.

The present study coincides with the result of Guerini *et al*., (2006) who observed that the combined application of solid waste compost + cattle manure showed maximum pH, EC, available nitrogen, phosphorus and potassium in the post – harvest soil of maize. The investigation is on par with the result of Karmegam and Daniel, (2007) who also confirmed that the application of vermicompost increase the nitrogen content.

The present results were positively correlated with the findings of Sarwar *et al*., (2008) who reported that the combined application of 31.11 mg/kg in compost 24 t/ha + fertilizers increase available phosphorus 27.55 in soil after harvest of rice and wheat crop. The present finding is in conformity with the finding of Manivanan *et al*., (2009) who confirmed maximum electrical conductivity (0.49 dsm^{-1}), nitrogen (200 kg/ha), phosphorus (14.1 kg/ha) and potassium (290 kg/ha) in post – harvest soil of beans due to the application of recommended dose of vermicompost (5 t/ha).

TABLE 33

IMPACT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST-HARVEST SOIL ANALYSIS OF BRINJAL (*SOLANUM MELONGENA* L.)

Treatment	pH	EC (Millimhos cm-1)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
C	6.1	2.2	163	17.4	110
T_1	6.2	2.2	175	18.2	115
T_2	7.1	3.4	190	21.5	128
T_3	6.8	3.0	187	19.4	125
T_4	6.5	2.8	184	19.2	120
T_5	7.3	3.7	194	21.9	130
T_6	6.3	2.5	181	18.6	118

C – Control (Raw sugarcane trash and sugarcane bagasse)

T_1 - Compost 1 - (Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{1})

T_2 - Compost 2 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_3 - Compost 3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

T_4 - Compost 4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

T_5 - Compost 5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})

T_6 - Compost 6 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium).

The result was also supported by Ghulam *et al*., (2010) who observed that application of pressmud (10 t/ha) showed highest electrical conductivity content of 0.55 millimhos cm^{-1}. The present finding is in accordance with the result of Densilin *et al*., (2010) who also observed highest nitrogen content (261.90 kg/ha) with the application of triple – 17 complex + vermicompost treatment in the soil after harvest of chilli.

The results are also in line with the observations of Macci *et al*., (2012) who found that the application of organic fertilizer significant in all the physico – chemical properties of almond tree plantation soil. Similar results were obtained by Selvamurugan *et al*., (2013) who reported that nutrient content of the soil improved tremendously by the application of biocompost @ 5 t/ha integrated with balance phosphorus fertilization through inorganic fertilizers.

The result coincides with the result of Meena *et al*., (2013) who found maximum available soil nitrogen (214.67 kg/ha) due to the application of vermicompost 10 t/ha in soil after the harvest of green gram. The results are also supported by the work of El – mohamedy *et al*., (2015) who reported that the application of biocompost showed maximum nitrogen (1.54%), phosphorus (0.37%) and potassium (2.59%) content in potato cultivated soil. Jaybhaye and Satish, (2016) found that the application of vermicompost increased pH, electrical conductivity, nitrogen, phosphorus and potassium in paddy straw. The present finding is in accordance with the result of Kunguma Kannika *et al*., (2019) who found significant higher pH, electrical conductivity, nitrogen, phosphorous and potassium in *Andrographis paniculata* and *Euphorbia hirta*, due to application of vermicompost on soil fertility. The present study coincides with the results of Demir and Kiran, (2020) who observed that the application of vermicompost showed highest pH (7.75) and electrical conductivity (1.59 dsm^{-1}) in Lettuce (*Lactuca sativa* var. crispa).

The present findings was also supported by the work of Kumari *et al*., (2020) who reported maximum pH, electrical conductivity, total nitrogen, total phosphorus and total potassium due to the application of vermicompost crop residue and cow dung. The present findings was also positively correlated with Hoque *et al*., (2022) who found that application of vermicompost showed significant pH, nitrogen, phosphorus and potassium content in rice crop. The present findings was also correlated with Narang *et al*., (2023), Bharadwaj *et al*., (2023) and Pottipati *et al*., (2023).

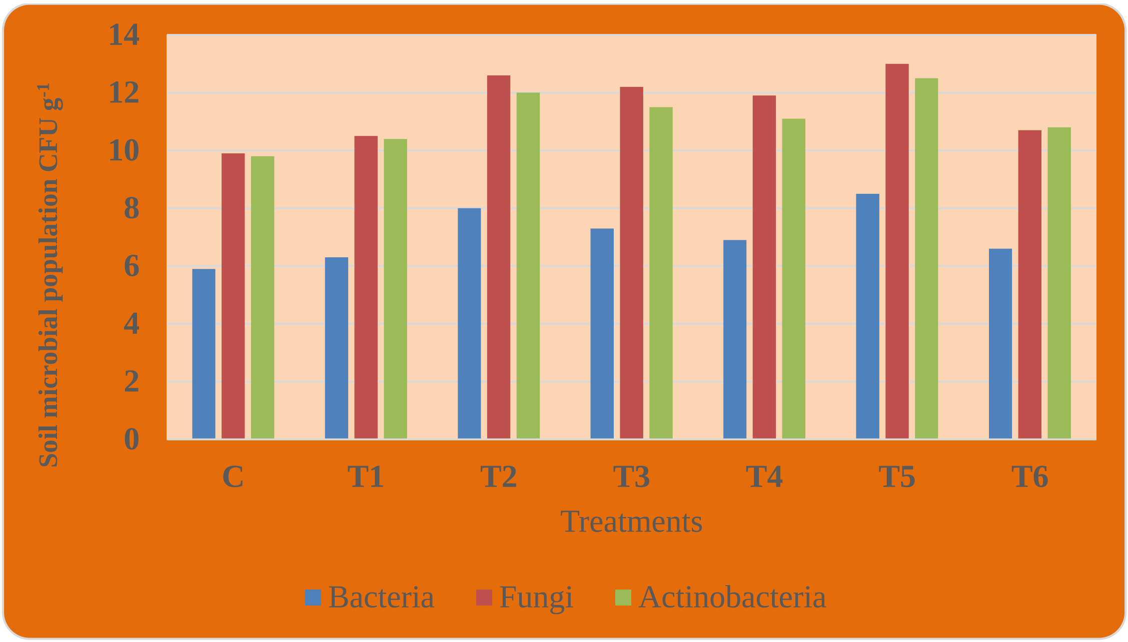
The combination of earthworms and microbes decreases the particle and bulk densities of soil which increases the porosity and aggregate formation of the soil. Application of biocompost to soil gives a tremendous boost to soil physical health by improving water-holding capacity, structure formation and also by enhancing fertility. Increases in pH might be due to the presence of higher salts and metal concentration in the biocompost. The increase in nitrogen status due to the application of organic manure might be increased because of available nitrogen production through microbial activity and nitrogenous excreta present in the biocompost and thus it would have been made available to the crops. The increase in phosphorus availability could be due to the fact that the organic anions compete with phosphate ions for the binding sites on the biocompost treated soil particles. The increase in available potassium might be due to the solubilization of certain organic acids produced during decomposition of organic manures and its greater capacity to hold potassium in available form in soil and also due to the interaction of organic matter with clay and direct addition of potassium to available pool of soil.

4.4.3 Pre- harvest (Initial) soil microbial population

Higher microbial population *viz*., bacteria, fungi and actinobacteria in soil was observed with application of T_5 treatment (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 7.4 $\times 10^4$ CFU g^{-1}, 11.1 $\times 10^5$ CFU g^{-1} and 11.0 $\times 10^4$ CFU g^{-1}, followed by the T_2 treatment (Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1}) 6.8 $\times 10^4$ CFU g^{-1}, 11.0 $\times 10^5$ CFU g^{-1} and 10.6 $\times 10^4$ CFU g^{-1}. T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (6.6 $\times 10^4$ CFU g^{-1}, 10.5 $\times 10^5$ CFU g^{-1} and 10.0 $\times 10^4$ CFU g^{-1}). T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.4 $\times 10^4$ CFU g^{-1}, 10.1 $\times 10^5$ CFU g^{-1} and 9.4 $\times 10^4$ CFU g^{-1}). T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (6.2 $\times 10^4$ CFU g^{-1}, 8.5 $\times 10^5$ CFU g^{-1} and 9.0 $\times 10^4$ CFU g^{-1}). T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (5.6 $\times 10^4$ CFU g^{-1}, 7.7 $\times 10^5$ CFU g^{-1} and 8.6 $\times 10^4$ CFU g^{-1}). Lower soil microbial population was recorded in control (4.8 $\times 10^4$ CFU g^{-1}, 6.2 $\times 10^5$ CFU g^{-1} and 8.0 $\times 10^4$ CFU g^{-1}). Pre-harvest soil microbial population was shown in Figure XVI.

FIGURE XVI

EVALUATION OF PRE-HARVEST SOIL MICROBIAL POPULATION



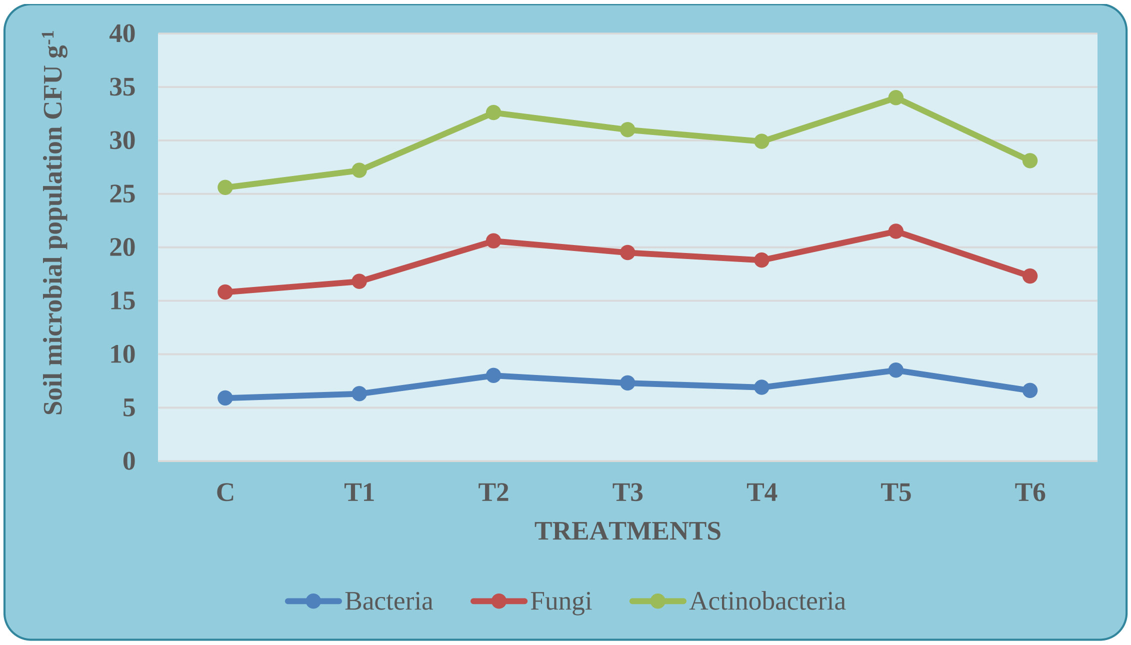
4.4.4 Post – harvest soil microbial population

4.4.4a Onion (*Allium cepa* L.)

The research findings indicated that the soil microbial population bacteria, fungi and actinobacteria increased T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (8.4 ×10^4 CFU g^{-1}, 13.6 ×10^5 CFU g^{-1} and 12.0 ×10^4 CFU g^{-1}), T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (8.1 ×10^4 CFU g^{-1}, 13.0 ×10^5 CFU g^{-1} and 11.6 ×10^4 CFU g^{-1}), T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (7.6 ×10^4 CFU g^{-1}, 11.5 ×10^5 CFU g^{-1} and 10.4 ×10^4 CFU g^{-1}),T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (7.4 ×10^4 CFU g^{-1}, 11.1 ×10^5 CFU g^{-1} and 11.0×10^4 CFU g^{-1}), T_5 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (7.2 ×10^4 CFU g^{-1}, 9.5 ×10^5 CFU g^{-1} and 10.0 ×10^4 CFU g^{-1}), T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (6.6 ×10^4 CFU g^{-1}, 8.7 ×10^5 CFU g^{-1} and 7.6 ×10^4 CFU g^{-1}). Lower soil microbial population was recorded in control (5.8 ×10^4 CFU g^{-1}, 7.2 ×10^5 CFU g^{-1} and 9.0 ×10^4 CFU g^{-1}), as shown in Figure XVII.

FIGURE XVII

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST SOIL MICROBIAL POPULATION OF ONION (*ALLIUM CEPA* L.)

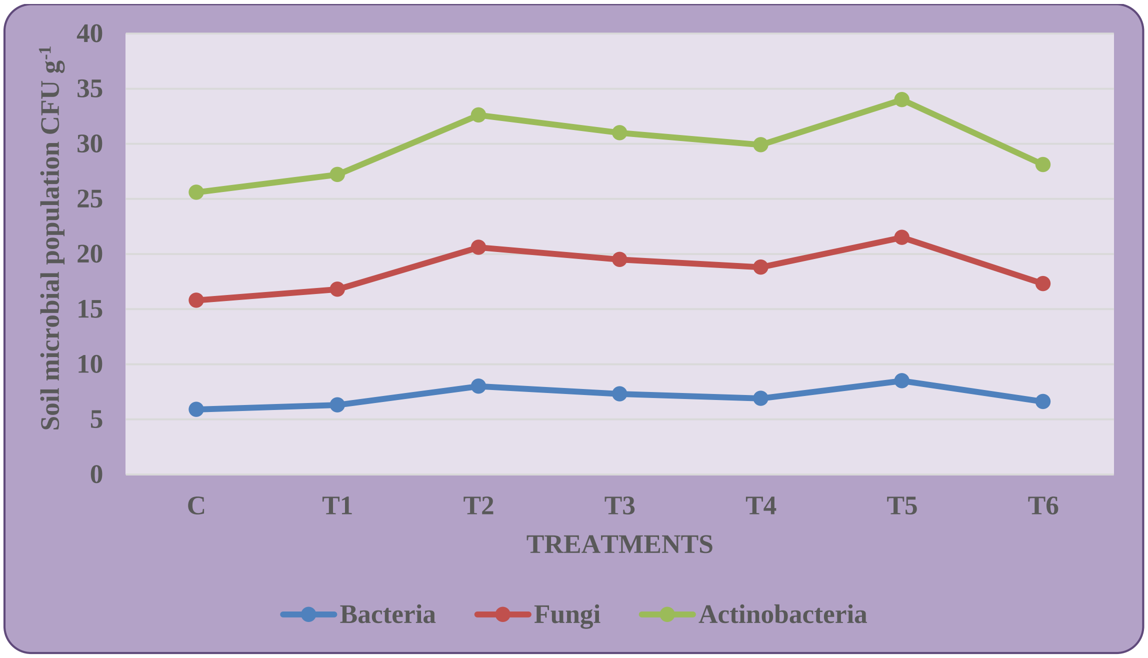


4.4.4b Black Nightshade (*Solanum nigrum* L.)

The soil microbial population of bacteria, fungi and actinobacteria was maximum in T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (8.9 ×10^4 CFU g^{-1}, 13.3 ×10^5 CFU g^{-1} and 12.9 ×10^4 CFU g^{-1}), T_5 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (8.5 ×10^4 CFU g^{-1}, 12.5 ×10^5 CFU g^{-1} and 12.6 ×10^4 CFU g^{-1}), T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (7.4 ×10^4 CFU g^{-1}, 12.2 ×10^5 CFU g^{-1} and 11.4 ×10^4 CFU g^{-1}), T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (7.0 ×10^4 CFU g^{-1}, 12.0 ×10^5 CFU g^{-1} and 11.0 ×10^4 CFU g^{-1}), T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (6.5 ×10^4 CFU g^{-1}, 8.5 ×10^5 CFU g^{-1} and 10.5 ×10^4 CFU g^{-1}), T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.2 ×10^4 CFU g^{-1}, 8.7 ×10^{45}CFU g^{-1} and 9.6 ×10^4 CFU g^{-1}). Lower soil microbial population was recorded in control (5.3 ×10^4 CFU g^{-1}, 7.9 ×10^5 CFU g^{-1} and 9.1 ×10^4 CFU g^{-1}), as shown in Figure XVIII.

FIGURE XVIII

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST SOIL MICROBIAL POPULATION OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

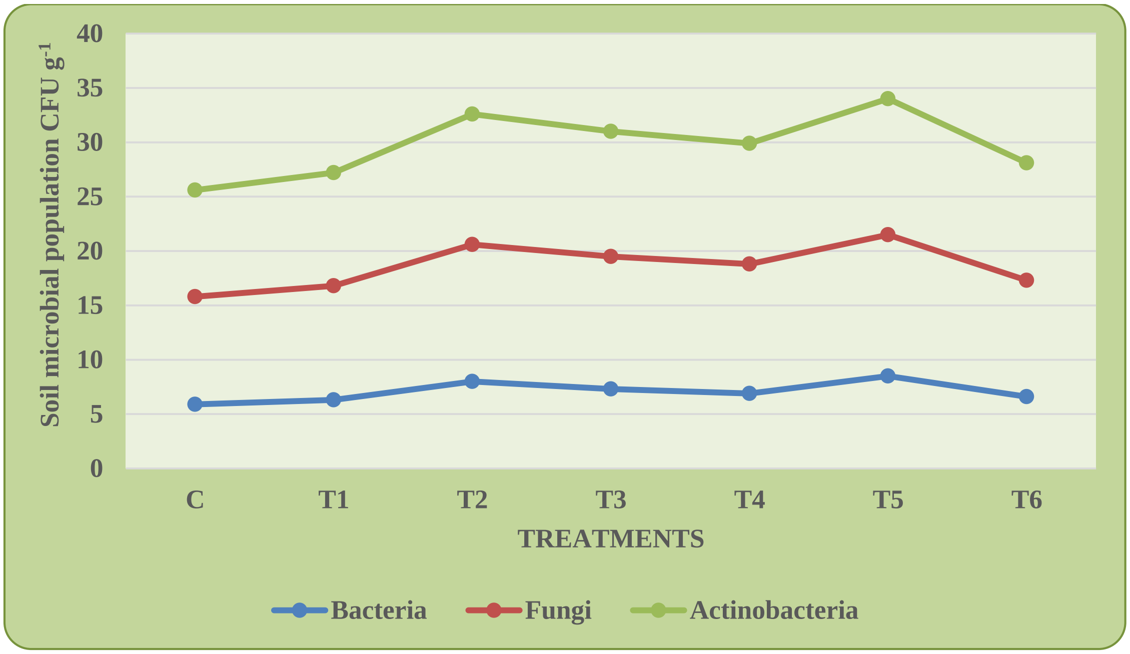


4.4.4c Tomato (*Solanum lycopersicum* L.)

The present research reveals that soil microbial population of bacteria, fungi and actinobacteria was more in T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (9.9 $\times 10^4$ CFU g^{-1}, 14.3 $\times 10^5$ CFU g^{-1} and 13.9 $\times 10^4$ CFU g^{-1}), T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (9.5 $\times 10^4$ CFU g^{-1}, 12.5 $\times 10^5$ CFU g^{-1} and 13.6 $\times 10^4$ CFU g^{-1}), T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (8.4 $\times 10^4$ CFU g^{-1}, 12.1 $\times 10^5$ CFU g^{-1} and 12.4 $\times 10^4$ CFU g^{-1}), T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (8.0 $\times 10^4$ CFU g^{-1}, 12.0 $\times 10^5$ CFU g^{-1} and 11.9 $\times 10^4$ CFU g^{-1}), T_5 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (7.5 $\times 10^4$ CFU g^{-1}, 10.7 $\times 10^5$ CFU g^{-1} and 11.5 $\times 10^4$ CFU g^{-1}), T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (7.2 $\times 10^4$ CFU g^{-1}, 10.5 $\times 10^5$ CFU g^{-1} and 10.6 $\times 10^4$ CFU g^{-1}). Lower soil microbial population was recorded in control (6.3 $\times 10^4$ CFU g^{-1}, 8.9 $\times 10^5$ CFU g^{-1} and 10.1 $\times 10^4$ CFU g^{-1}), as shown in Figure XIX.

FIGURE XIX

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST SOIL MICROBIAL POPULATION OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

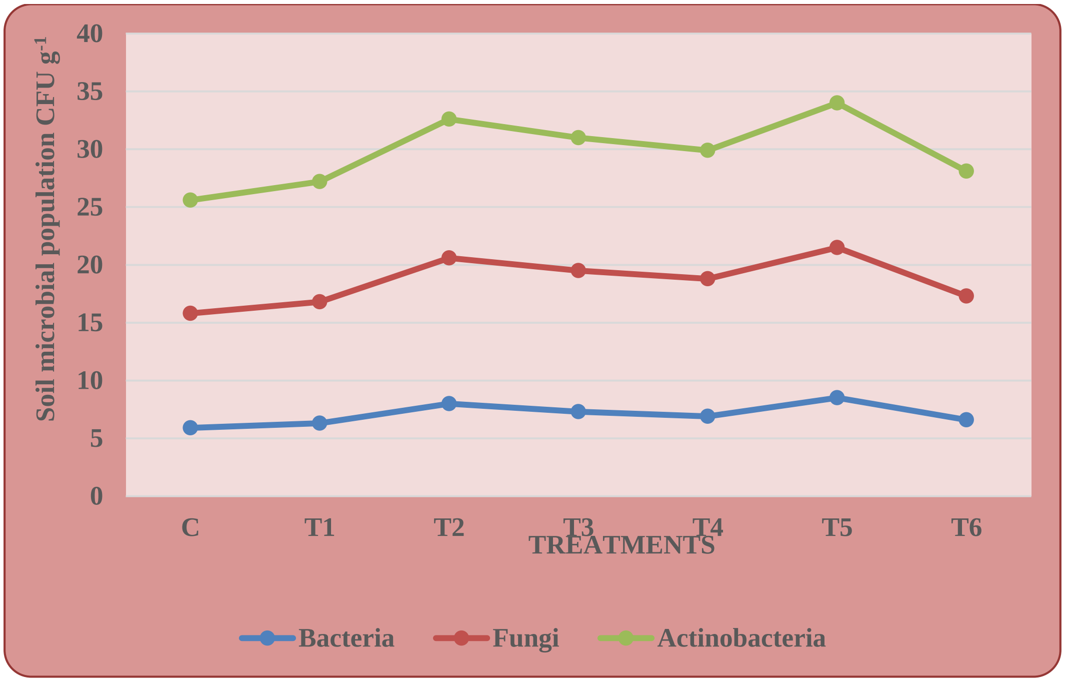


4.4.4d Brinjal (*Solanum melongena* L.)

The soil microbial population of bacteria, fungi and actinobacteria increased in T_5 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (8.5 ×10^4 CFU g^{-1}, 13.0 ×10^5 CFU g^{-1} and 12.5 ×10^4 CFU g^{-1}), T_2 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (8.0 ×10^4 CFU g^{-1}, 12.6 ×10^5 CFU g^{-1}and 12.0 ×10^4 CFU g^{-1}), T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (7.3 ×10^4 CFU g^{-1}, 12.2 ×10^5 CFU g^{-1} and 11.5 ×10^4 CFU g^{-1}), T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.9 ×10^4 CFU g^{-1}, 11.9 ×10^5 CFU g^{-1} and 11.1 ×10^4 CFU g^{-1}), T_6 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + Microbial consortium (6.6 ×10^4 CFU g^{-1}, 10.7 ×10^5 CFU g^{-1} and 10.8 ×10^4 CFU g^{-1}), T_1 – Predecomposted sugarcane trash + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1} (6.3 ×10^4 CFU g^{-1}, 10.5 ×10^5 CFU g^{-1} and 10.4 ×10^4 CFU g^{-1}). Lower soil microbial population was recorded in control (5.9 ×10^4 CFU g^{-1}, 9.9 ×10^5 CFU g^{-1} and 9.8 ×10^4 CFU g^{-1}), as shown in Figure XX.

FIGURE XX

EFFECT OF COMPOSTED SUGARCANE TRASH AND SUGARCANE BAGASSE ON POST SOIL MICROBIAL POPULATION OF BRINJAL (*SOLANUM MELONGENA* L.)



The results was supported by Islam and wright, (2004) suggested that the microbial communities of soil organisms ranging in size from 0.5 to 5.0 µm consists predominantly of bacteria, fungus and actinomycetes. The present study coincides with the result of Kang *et al*., (2005) who stated that the application of farmyard manure and green manure increased bacterial count (2.88) when compared to the control (1.45).

The present findings is in conformity with the finding of Bhattarai *et al*., (2015) who reported that the application of organic manure increased soil microbial population bacteria, actinomycetes and fungi in different soil horizons. Our results also supported by the work of Meena *et al*., (2015) who observed that the application of organic manure increased soil bacteria (28.60 cfu 10^5 g^{-1} soil), fungi (23.96 cfu 10^2 g^{-1}) and actinomycetes (14.16 cfu 10^2 g^{-1}) in popcorn (*Zeamays* L. var. everta).

The present study coincides with the results of Akande and Adekayode, (2019) who stated that soil bacteria was increased in the surface layer of (30-75cm) with (6.80×10^4 cfu g^{-1}).

The fungi population was significantly high at the surface layer of (30-75 cm) with (5.72×10^4 cfu g^{-1}) and compared to the other land use type.

The present results were positively correlated with the findings of Umadevi *et al*., (2019) that application of organic and inorganic manure increased bacteria, fungi and actinomycetes in soil with poultry manure in cowpea.

The present finding is in accordance with the result of Zhao *et al*., (2021) who observed that the application of soil microbial community increased bacteria, fungi and actinomycetes in Eurasian Steppe (Inner Mongolia, China). The present study coincides with the results of Bastida *et al*., (2021) who confirmed that bacteria and fungi due to the application of soil microbial diversity-biomass relationships are driven by soil carbon content across global biomes.

The soil properties and microbial diversity, and the microbial community in turn manipulates nutrient cycling processes and alters soil fertility, plant productivity and environmental sustainability. The results of this study will provide a foundation for further studies on the regulation of soil fertility and microorganism community structure and provide guidance for selecting the best cropping model to protect soil ecology. The soil is

a complex and dynamic component of the terrestrial ecosystem with a diverse community of microbes with dominance of bacteria, fungi and actinomycetes. The microbial community is vital to the cycle of life on earth.

4.4.5 Antioxidant activity of test crops

The above-mentioned experimental findings were determined to be statistically significant in all the biocompost T_1 - T_6 as compared to the control treatment. Among the six different combinations of biocompost treatment T_3 – Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium, T_4 – Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae,* T_5 – Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* was found to be an efficient organic manure compared to other treatments. The Phase I, Phase II and Phase III experimental results confirmed that T_3, T_4, T_5 is the best treatment. According to these results, antibacterial activity, antioxidant activity was carried out in bulb of *Allium cepa* L., leaves extracts of *Solanum nigrum* L., and fruits extracts of *Solanum lycopersicum* L., *Solanum melongena* L. which were grown under best treatment and control.

For strengthening the above result, antioxidant and antibacterial activity was conducted with bulb, leaves and fruits extracts of the selected plants grown under best treatments and control.

4.4.5.1a DPPH

The antioxidant activity was assessed in the selected test crops bulb, leaves and fruits of onion, black nightshade, tomato and brinjal grown under control and best treatments. The samples were evaluated according to the ability for scavenging free radicals using DPPH assay and are indicated in Table 34, 35, 36 & 37.

In the DPPH assay, the antioxidants were able to reduce the stable DPPH radical to the yellow-colored diphenyl picrylhydrazine. From the above results, it was found that all the selected plant bulbs, leaves and fruits.

The maximum scavenging activity was observed in the bulbs of plants grown in best treatment grown plant bulbs. The best treatment grown Onion is T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (72.90 %) followed by control (70.39 %) respectively. Black Nightshade leaves are T_4 - Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) (69.96 %) followed by control (67.92 %) respectively. Tomato fruits is T_3 - Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium (74.75 %) followed by control (72.51 %) respectively. Brinjal fruits are T_5 - Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1} (91.98 %) followed by control (90.16 %) respectively. It was also observed that all the extracts are likely to have DPPH scavenging activity in the order *Solanum melongena* L. > *Solanum lycopersicum* L. > *Allium cepa* L. > *Solanum nigrum* L.

TABLE 34

DPPH FREE RADICAL SCAVENGING ACTIVITY OF BULB EXTRACTS OF ONION (*ALLIUM CEPA* L.)

Concentration	Standard	Best Treatment	Control
50	60.69	64	61.26
100	77.82	68	65.39
150	78.88	71.10	67.71
200	84.99	71.08	68.49
250	94.69	72.90	70.39
SEd CD (p<0.05) CD (p<0.01)**	3.68268 7.68195 10.47891**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 35

DPPH FREE RADICAL SCAVENGING ACTIVITY OF LEAVES EXTRACTS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Concentration	Standard	Best Treatment	Control
50	60.69	52.97	51.76
100	77.82	58.74	57.66
150	78.88	63.58	61.20
200	84.99	65.90	64.93
250	94.69	69.96	67.92
SEd CD (p<0.05) CD (p<0.01)**	3.42359 7.14149 9.74167**		

C - Control

T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

TABLE 36

DPPH FREE RADICAL SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Concentration	Standard	Best Treatment	Control
50	60.69	67.56	66.88
100	77.82	68.82	67.45
150	78.88	69.27	67.47
200	84.99	71.56	69.67
250	94.69	74.75	72.50
SEd CD ($p<0.05$) CD ($p<0.01$)**	3.68922 7.69559 10.49751**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 37

DPPH FREE RADICAL SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF BRINJAL (*SOLANUM MELONGENA* L.)

Concentration	Standard	Best Treatment	Control
50	60.69	74.70	72.91
100	77.82	83.02	81.64
150	78.88	85.77	83.23
200	84.99	88.15	85.96
250	94.69	91.97	90.16
SEd CD ($p<0.05$) CD ($p<0.01$)**	3.60797 7.52611 10.26633**		

C - Control

T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelliodes* + *Eudrilus eugeniae* 5t/ha^{-1})

4.4.5.2b Hydrogen peroxide scavenging activity

The hydrogen peroxide scavenging activity of onion bulb, black nightshade leaves, tomato and brinjal fruits were carried out. The results were depicted in the Table 38, 39, 40 & 41.

The ability of bulb, leaf and fruit extracts to scavenge the non – radical oxidant hydrogen peroxide in vitro was assessed in the present study. Among the selected four plants, it was observed that the scavenging percentage of hydrogen peroxide was more in bulb extract of onion (91.29 %) than control (88.79 %), leaf extract of black nightshade showed (91.39 %) than control (89.39 %), fruits extract of tomato showed (78.86 %) than control (77.73 %) and fruit extracts of brinjal has (98.88 %) whereas control showed (96.77 %) respectively.

TABLE 38

HYDROGEN PEROXIDE SCAVENGING ACTIVITY OF BULB EXTRACTS OF ONION (*ALLIUM CEPA* L.)

Concentration	Standard	Best treatment	Control
50	85.42	68.66	66.36
100	91.53	78.54	77.14
150	94.60	83.80	81.46
200	96.70	85.14	83.16
250	98.60	91.28	88.79
SEd CD (p<0.05) CD (p<0.01)**	3.69920 7.71641 10.52591**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 39

HYDROGEN PEROXIDE SCAVENGING ACTIVITY OF LEAVES EXTRACTS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Concentration	Standard	Best treatment	Control
50	85.42	53.90	51.60
100	91.53	69.99	67.61
150	94.60	75.51	72.59
200	96.70	83.56	81.94
250	98.60	91.39	89.38
SEd CD (p<0.05) CD (p<0.01)**	3.56853 7.44385 10.15412**		

C - Control

T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

TABLE 40

HYDROGEN PEROXIDE SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Concentration	Standard	Best treatment	Control
50	85.42	67.77	66.09
100	91.53	69.17	69.94
150	94.60	71.46	70.07
200	96.70	74.76	72.34
250	98.60	78.85	77.73
SEd CD (p<0.05) CD (p<0.01)**	3.95967 8.25975 11.26709**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 41

HYDROGEN PEROXIDE SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF BRINJAL (*SOLANUM MELONGENA* L.)

Concentration	Standard	Best treatment	Control
50	85.42	76.07	74.62
100	91.53	78.68	76.29
150	94.60	86.84	85.78
200	96.70	95.93	94.65
250	98.60	98.88	96.77
SEd	3.93491		
CD (p<0.05)	8.20810		
CD (p<0.01)**	11.19663**		

C - Control

T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelliodes* + *Eudrilus eugeniae* 5t/ha^{-1})

4.4.5.3c Reducing power assay

The ability of reducing power was assessed in the best treatment of onion T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium) 0.69 whereas control showed (0.68), black nightshade T_4 - compost 4 (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}) 0.54 followed by control (0.47), tomato T_3 - compost 3 (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium) 1.12 followed by control (0.99) and brinjal T_5 - compost 5 (Predecomposted sugarcane bagasse + *Trichoderma asperelliodes* + *Eudrilus eugeniae* 5t/ha^{-1}) 0.98 followed by control (0.97) respectively. It was also been observed that all the extracts are likely to have reducing power assay in the order *Solanum lycopersicum* L. > *Solanum melongena* L. > *Allium cepa* L. > *Solanum nigrum* L. (Table 42, 43, 44 & 45). Reducing power of a compound may serve as a significant indicator of its potential antioxidant activity.

TABLE 42

REDUCING POWER ASSAY ACTIVITY OF BULB EXTRACTS OF ONOIN (*ALLIUM CEPA* L.)

Concentration	Standard	Best treatment	Control
50	0.934	0.27	0.26
100	1.308	0.31	0.30
150	1.523	0.41	0.40
200	2.425	0.57	0.56
250	2.893	0.68	0.67
SEd CD ($p<0.05$) CD ($p<0.01$)**	0.00383 0.00799 0.01090**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 43

REDUCING POWER ASSAY ACTIVITY OF LEAVES EXTRACTS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Concentration	Standard	Best treatment	Control
50	0.934	0.16	0.15
100	1.308	0.19	0.18
150	1.523	0.35	0.34
200	2.425	0.37	0.37
250	2.893	0.54	0.46
SEd CD ($p<0.05$) CD ($p<0.01$)**	0.02902 0.06054 0.08258**		

C - Control

T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

TABLE 44

REDUCING POWER ASSAY ACTIVITY OF FRUIT EXTRACTS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Concentration	Standard	Best treatment	Control
50	0.934	0.36	0.35
100	1.308	0.45	0.45
150	1.523	0.54	0.54
200	2.425	0.87	0.87
250	2.893	1.12	0.98
SEd CD (p<0.05) CD (p<0.01)**	0.0037 0.0078 0.0106**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 45

REDUCING POWER ASSAY ACTIVITY OF FRUIT EXTRACTS OF BRINJAL (*SOLANUM MELONGENA* L.)

Concentration	Standard	Best treatment	Control
50	0.934	0.24	0.24
100	1.308	0.32	0.31
150	1.523	0.45	0.44
200	2.425	0.54	0.54
250	2.893	0.98	0.97
SEd CD (p<0.05) CD (p<0.01)**	0.00363 0.00757 0.01033**		

C - Control

T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelliodes* + *Eudrilus eugeniae* 5t/ha^{-1})

4.4.5.4d Nitric oxide radical scavenging activity

The nitric oxide radical scavenging activity was found in all the selected plants, which grown under best treatments and minimum activity was observed in control bulb, leaves and fruits. Among the four plants, significant nitric oxide radical scavenging activity (70.73 %) was recorded in onion followed by control bulb extracts (67.01 %) respectively. It was concluded that all the plant extracts are likely to have nitric oxide scavenging activity which is shown in Table 46, 47, 48 & 49. The activity was in the order *Solanum lycopersicum* L. > *Solanum melongena* L. > *Solanum nigrum* L. > *Allium cepa* L. So, it can be interrupted that all the plants have the property to counteract the harmful effects of nitric oxide and other reactive nitrogen species (RNS). This could be due to the antioxidant principles in the extract that compete with oxygen to react with nitric oxide, there by inhibiting the generation of nitrite.

TABLE 46

NITRIC OXIDE RADICAL SCAVENGING ACTIVITY OF BULB EXTRACTS OF ONION (*ALLIUM CEPA* L.)

Concentration	Standard	Best treatment	Control
50	74.77	14.75	11.83
100	79.42	26.61	21.92
150	84.93	53.89	50.14
200	89.59	65.14	60.48
250	95.99	70.72	67.00
SEd CD (p<0.05) CD (p<0.01)**	3.58476 7.47769 10.20028**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 47

NITRIC OXIDE RADICAL SCAVENGING ACTIVITY OF LEAVES EXTRACTS OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.)

Concentration	Standard	Best treatment	Control
50	74.77	61.59	57.16
100	79.42	68.63	65.92
150	84.93	71.16	68.91
200	89.59	80.84	76.15
250	95.99	82.61	79.64
SEd CD (p<0.05) CD (p<0.01)**	3.58888 7.48628 10.21200**		

C - Control

T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})

TABLE 48

NITRIC OXIDE RADICAL SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF TOMATO (*SOLANUM LYCOPERSICUM* L.)

Concentration	Standard	Best treatment	Control
50	74.77	67.37	62.49
100	79.42	69.89	65.46
150	84.93	79.61	74.48
200	89.59	84.05	80.38
250	95.99	87.92	82.53
SEd CD (p<0.05) CD (p<0.01)**	3.40017 7.09265 9.67504**		

C - Control

T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

TABLE 49

NITRIC OXIDE RADICAL SCAVENGING ACTIVITY OF FRUIT EXTRACTS OF BRINJAL (*SOLANUM MELONGENA* L.)

Concentration	Standard	Best treatment	Control
50	74.77	52.86	49.08
100	79.42	63.30	61.23
150	84.93	69.26	65.43
200	89.59	74.67	70.34
250	95.99	87.07	86.08
SEd CD ($p<0.05$) CD ($p<0.01$)**	3.98679 8.31633 11.34426**		

C - Control

T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelliodes* + *Eudrilus eugeniae* 5t/ha^{-1})

The present findings are in accordance with the result of Umamaheswari and Chatterjee, (2000) who found that fractions significantly enhanced the level of DPPH, hydrogen peroxide scavenging assay, reducing power assay and nitric radical scavenging assay in leaf extract of *coccinia grandis* L. Similar results were positively correlated with the findings of Wang and Lin, (2003) who observed that the application of 50 % soil + 50 % compost enhanced the level of hydrogen peroxide and hydrogen radical scavenging activity in fruits of strawberries.

The present result coincides with the results of Siddhuraju and Manian, (2007) They confirmed that highest free radical scavenging activity was recorded in the dietary phenolic extracts of horse gram (*Macrotyloma uniflorum* (Lam.) verdc.) seeds. The present results coincide with the results of Parthasarathy *et al.*, (2009) who observed maximum antioxidant activity in aqueous, alkaloid and methanol extracts (213.4, 104.81 and 37.08) µg ml in *Mitragyna Speciosa* (Rubiaceae family) leaves.

Similar results were positively correlated with the findings of Arulpriya *et al.*, (2010) who found that the application of DPPH radical scavenging assay and reducing power assay, higher antioxidant potential of the extracts was observed in both DPPH scavenging assay and reducing power assay in *Samanea saman* (Jacq.) merr. Similar results were obtained by Gopalakrishnan *et al*., (2011) who confirmed that highest nitric oxide DPPH radical scavenging activity was recorded in methanolic extract of root in *Coleous vettiveroides* (Jacob) at 250 µg ml and 800 µg/ml.

The result is in par with the results of Jayachitra and Krithiga, (2012) who reported that the application of antioxidant activity highest in the DPPH free radical scavenging in medicinal plants extracts of *clitoria ternatea*, *solanum nigrum* and *aloe vera*. The present investigation is also in agreement with the results of Yadav *et al*., (2014) who found that DPPH radical scavenging activity of different plant parts like leaves, stem and fruit of *Solanum surratense* showed highest radical scavenging activity in leaves (22.936 ± 2.685 µg/ml) followed by fruit and stem.

Similar results were reported by Mary and Nithiya, (2015) who observed that *Solanum nigrum* L. extract showed highest DPPH free radical scavenging activity (64.21 ± 15.81) and reducing power activity (42.12 ± 14.72) due to the application of organic fertilizer compared to inorganic fertilizer application. The result is on par with the result of Sereme *et al*., (2016) who investigated that antioxidants activity (84.49) in combination of different compost mixture and soil (75 %) in tomato fruits. The present investigation is also in agreement with the results of Mahmud *et al*., (2019) who found that application of vermicompost increase DPPH radical scavenging activity in pineapple fruits.

The present findings was positively correlated with Arslan *et al*., (2022) who observed higher DPPH free radical scavenging activity in vermicomposting leachate. Similar results were obtained by Ghaghelestany *et al*., (2022) who obtained a DPPH revealed that the extracts of A. *retroflexus* in more appropriated compared to other extracts of weeds, application due to the high ratio of apoptosis and antioxidant activity. Similar results were obtained by Barbosa *et al*., (2023) that application of antioxidant activity of phenolic compounds and flavonoids increase the DPPH and reducing power assay in Hipidulin (*Baccharis erioclada* DC). Increase in antioxidant activity might be due to the positive impact of biocompost which may be adopted as an ecofriendly strategy for production of high-quality edible products.

It can be concluded that the application of *Pleurotus florida*, *Trichoderma asperelloides*, *Eudrilus eugeniae* and Microbial consortium to selected plants produced bulb, leaves and fruits of good quality with a high content of bioactive compounds and excellent antioxidant properties, compared to control. This additional supplement enhances current fertilization practice, reduce environmental pollution and ensure agricultural sustainability.

4.4.5 Antibacterial activity of test crops against *Escherichia coli* and *Staphylococcus aureus*

In this study, evaluation of antibacterial activity of bulb extracts of *Allium cepa* L. leaf extract of *Solanum nigrum* L. and fruit extracts of *Solanum lycopersicum* L. *Solanum melongena* L. in the best treatment and control were tested against *Staphylococcus aureus* and *Escherichia coli* and inhibition zone of Kanamycin (antibiotics) is used as standard.

4.4.5.1a Onion (*Allium cepa* L.)

Control

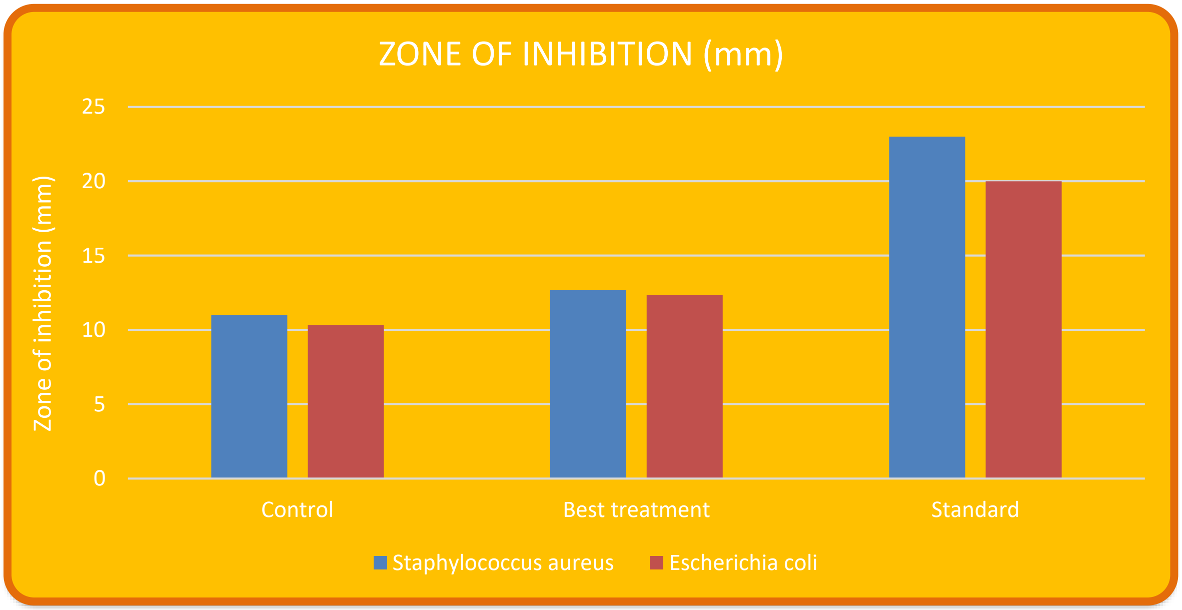
As per the findings, the bulb extract showed inhibition zone of 11mm and 10mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The highest zone of inhibition 11mm in *Escherichia coli* followed by *Staphylococcus aureus*.

Best treatment [T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)].

As per the findings, the bulb extract showed the inhibition zone 12mm and 13mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The highest zone of inhibition 13mm was found against *Escherichia coli* followed by *Staphylococcus aureus.* The zone of inhibition was moderately differed from each other as compared to the standard antibiotics. The standard antibiotics Kanamycin showed the zone of inhibition of 23mm and 20mm *Staphylococcus aureus* and *Escherichia coli* results were elucidated in the Figure XXI & Plate 22

FIGURE XXI

ANTIBACTERIAL ACTIVITY IN THE BULB EXTRACT OF ONION (*ALLIUM CEPA* L.) AT 20 µL CONCENTRATION

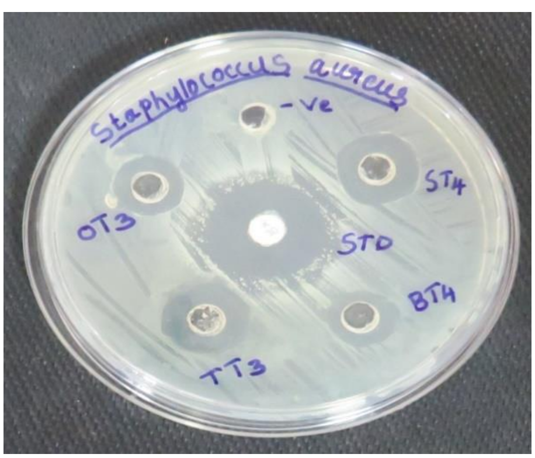


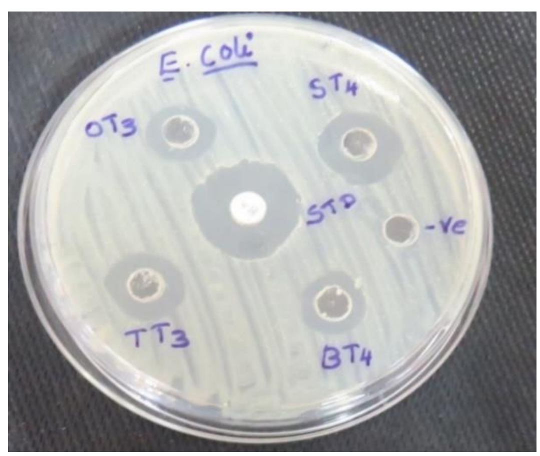
C - Control treatment

Best treatment - T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)

PLATE 22

EFFECT OF BULB, LEAVES AND FRUITS EXTRACTS ON THE ANTIBACTERIAL ACTIVITY AGAINST DIFFERENT MICROORGANISMS FOR *ALLIUM CEPA* L., *SOLANUM NIGRUM* L., *SOLANUM LYCOPERSICUM* L. AND *SOLANUM MELONGENA* L.





Staphylococcus aureus ***Escherichia coli***

4.4.5.2b Black Nightshade (*Solanum nigrum* L.)

Control

As per findings, the leaf extract showed the inhibition zone of 11mm and 13mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The highest zone of inhibition 13mm was found against *Escherichia coli* followed by *Staphylococcus aureus*.

Best treatment [T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1})].

The leaves extract showed the inhibition zone of 15mm and 16mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The zone of inhibition was in between the standard (Kanamycin) and the control.

The standard antibiotic Kanamycin showed the zone of inhibition of 23mm and 20mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The results were depicted in Figure XXII

4.4.5.3c Tomato (*Solanum lycopersicum* L.)

Control

As per the result, the fruit extract showed the inhibition zone of 12mm and 11mm for *Staphylococcus aureus* and *Escherichia coli* at 20 µ ml concentration respectively. The highest zone of inhibition 12mm against *Staphylococcus aureus* followed by *Escherichia coli*.

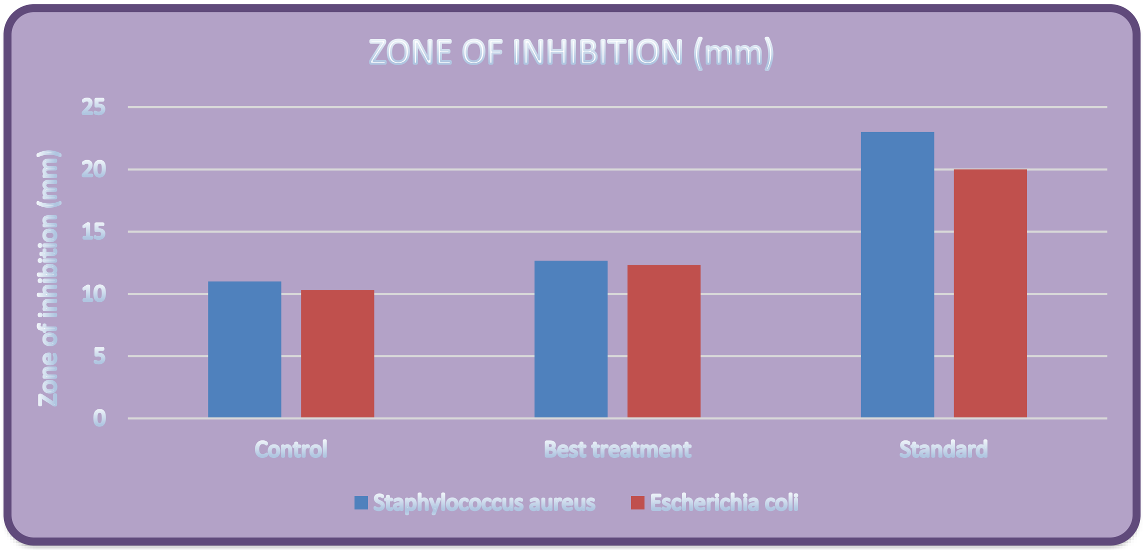
Best treatment [T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium)].

The fruits extract showed the zone of inhibition 16mm and 14mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The highest zone of inhibition 16mm was found against *Staphylococcus aureus* followed by *Escherichia coli*. The zone of inhibitions was moderately different from each other as compared to the standard antibiotic.

The standard antibiotic Kanamycin showed the zone of inhibition of 23mm and 20mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The results were presented in Figure XXIII

FIGURE XXII

ANTIBACTERIAL ACTIVITY IN THE LEAVES EXTRACT OF BLACK NIGHTSHADE (*SOLANUM NIGRUM* L.) AT 20 µL CONCENTRATION

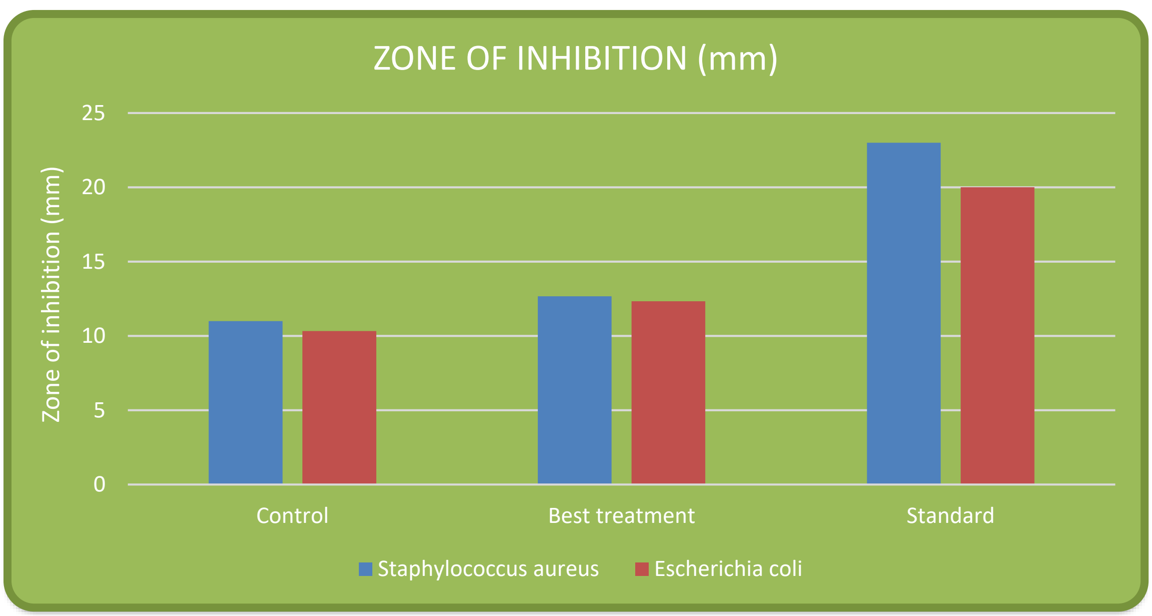


C - Control treatment

Best treatment - T_4 - (Predecomposted sugarcane bagasse + *Pleurotus florida* + *Eudrilus eugeniae* 5t/ha^{-1}).

FIGURE XXIII

ANTIBACTERIAL ACTIVITY IN THE FRUIT EXTRACT OF TOMATO (*SOLANUM LYCOPERSICUM* L.) AT 20 µL CONCENTRATION



C - Control treatment

Best treatment - T_3 - (Predecomposted sugarcane trash + *Trichoderma asperelloides* + Microbial consortium).

4.4.5.4d Brinjal (*Solanum melongena* L.)

Control

As per the result, fruit extract showed the inhibition zone of 11mm and 10mm for *Staphylococcus aureus* and *Escherichia coli* respectively. The highest zone of inhibition 11mm was found against *Staphylococcus aureus* followed by *Escherichia coli.*

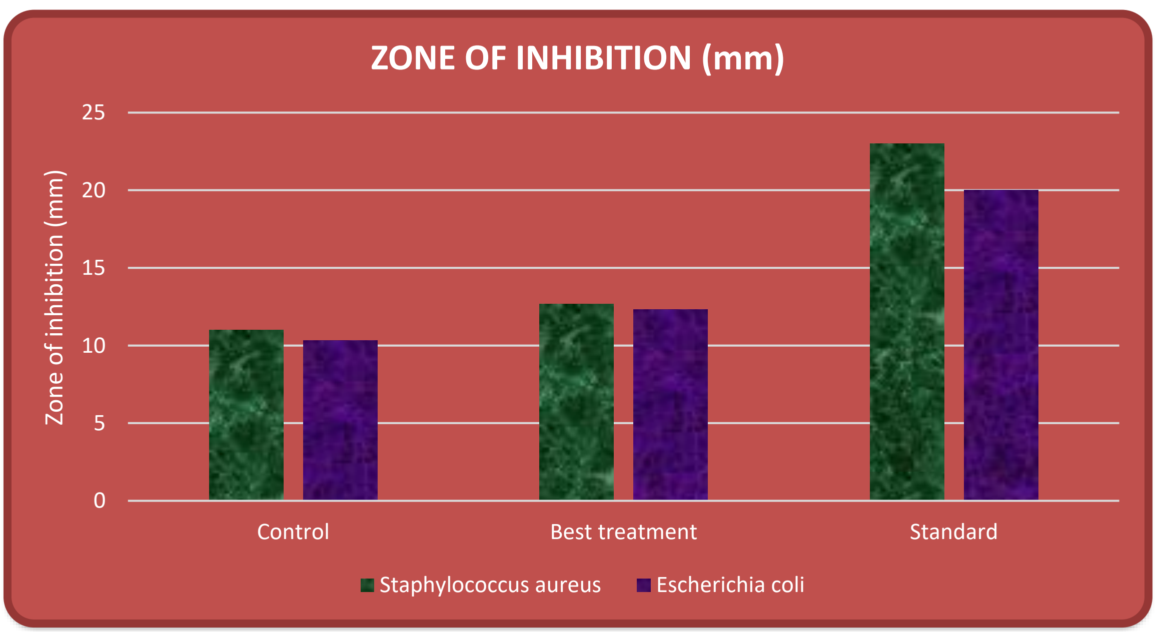
Best treatment [T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrilus eugeniae* 5t/ha^{-1})].

The fruit extract showed the inhibition zone of 12mm and 12mm for *Staphylococcus aureus* and *Escherichia coli* at 20 µ ml respectively. The fruit extract showed equal zone of inhibition for *Staphylococcus aureus* and *Escherichia coli.*

The standard antibiotic Kanamycin showed zone of inhibition of 23mm and 20mm for *Staphylococcus aureus* and *Escherichia coli* respectively. But when compared to control in the best treatment the zone of inhibition in more. The results were presented in Figure XXIV.

FIGURE XXIV

ANTIBACTERIAL ACTIVITY IN THE FRUIT EXTRACT OF BRINJAL (*SOLANUM MELONGENA* L.) AT 20 µL CONCENTRATION



C - Control treatment

Best treatment - T_5 - (Predecomposted sugarcane bagasse + *Trichoderma asperelloides* + *Eudrillus eugeniae* 5t/ha^{-1}).

A study by Leena and Bohra, (2003) on the aqueous and acetone extracts of *Amommum aromaticum* (peel and seeds) and *Cinnamomum zeylanicum* showed total inhibition against *Staphylococcus aureus*. Kannabiran *et al*., (2009) reported that aqueous extracts of *centella asiatica* and *solanum xanthocarpum* have higher activity in solvent extracts against gram positive bacteria *Klebsiella pneumoniae* (20mm and 11mm) and *Escherichia coli* (17mm and 11mm). Similar work was supported by Sheeba, (2010) who detected the antibacterial activity against *Staphylococcus aureus, Streptococcus spp, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi, Shigella dysentenriae* and *vibrio cholera* in ethanol leaf extracts of *Solanum surattense*.

The present study was positively correlated with findings of Shahat *et al*., (2011) who confirmed that organically grown fennel cultivar possesses highest zone of inhibition against gram negative (*Escherichia coli, Pseudomonas aeruginosa*) and gram positive (*Staphylococcus aureus, Bacillus subtilis*) bacteria. Similar results were observed by John de Britto *et al*., (2011) who revealed the highest zone in methanol extracts of *Solanum nigrum, solanum torvum* and *Solanum surratense* against *Xanthomonas campestris* and *Aeromonas hydrophilla*. Among the selected plants *Solanum nigrum* plant possess highest zone of inhibition followed by other plants.

The present study was supported by Ahmad *et al*., (2012) that ethanolic, methanolic and aqueous extracts showed maximum antibacterial activity against *Escherichia coli, Klebsiella pneumoniae, proteus vulgaris, Pseudomonas aeruginosa, Staphylococcus aureus, Shigella sonnei, Salmonella typhi and Salmonella paratyphi* with a zone of inhibition ranges from 12 – 21mm in the *Raphanus sativus* seeds. Similar results were obtained by Thangaraj *et al*., (2012) who confirmed that maximum zone of inhibition (13.3mm) in the hydro alcoholic extracts of *solanum nigrum* stem against *Staphylococcus aureus.*

The present results was on par with on Barari *et al*., (2015) who obtained the antibacterial activity against gram – positive strains and (*Staphylococcus aureus, Bacillus subtilis*) and gram – negative (*Escherichia coli, Pseudomonas aeruginosa* and *Klebsiella pneumoniae*). Among this gram – positive strains were more active than gram – negative strains in the aqueous seed extracts of chick pea. The present study was positively correlated with findings of Hassan *et al*., (2023), Yatsenko *et al*., (2023), Alrasheed *et al*., (2023) and Abdel-Shafi *et al*., (2023).

The selected four plants showed significant antibacterial activity in *Escherichia coli* followed by *Staphylococcus aureus.* This activity is probably due to the ability to complex with extra cellular and soluble protein and to complex with bacterial cell walls. The antibacterial activity also be standardized and optimized to ensure the accuracy of reports and the appropriate select on of the most desirable fractions. Due to this problem of resistance against antibiotics, attention is now being shifted towards biologically active compounds isolated from plant species communing used as herbal medicines as they may produce a new potent source of antibacterial activity.