ABSTRACT

India is one of the countries with a large agricultural economy and plays a significant part in the whole socio-economic process. The growing need for safe and healthy food, long-term sustainability and environmental degradation have made organic farming a major global priority topic. One of the biggest food wastes generated in large cities is vegetable and fruit waste, which accounts for about 50% among all household garbage. However, it can be recycled and reused as manure. Composting is a biological decomposition process that breaks down organic material into a stable, humus-like substance. The aim of the present study is to recycle Vegetable and Fruit waste into compost as manure and analyse its microbial population, physico-chemical and FT-IR in raw and compost sample. The compost was incorporated into different treatments and evaluated its effect on vegetative growth, biochemical, yield, antioxidant and antibacterial activity of two leguminous plants i.e. Black gram [*Vigna mungo* (L.) Hepper] Var. Co 6 and Lablab [*Lablab purpureus* (L.) Sweet] Var. Co (Gb) 14. The study was carried out in four different phases.

In phase I, composting was carried out in pit using *Pleurotus eous*, *Trichoderma asperelloides*, cow dung and *Eudrilus eugeniae*. Microbial flora of both winter and summer composting revealed that treatment C8 noted highest bacterial, fungal and actinomycetes count on 30^{th} day with remarkable increase on 60^{th} day and the population was gradually declined on 90^{th} day respectively. A significant decrease in lignin, cellulose, EC, organic carbon and C:N ratio was noted in C8 treatment followed by C4 treatment when compared to raw wastes sample. The increasing trend was noted in C8 and C4 treatment for pH, N, P, K, Ca and Mg respectively. The FT-IR spectroscopic analysis showed that raw vegetable and fruit wastes sample has a deep peak when compared to a composted sample having a smaller or disappearing peak which may be due to the composting process.

The finding of phase II revealed that the biometric character such as shoot length, root length, number of leaves per plant was observed in T_8 treatment which is followed by other treatments when compared to Control on 15, 35 and 55 DAS. Fresh weight and dry weight of the plant were found to increase significantly in T_8- Fruit wastes + cow dung +

Pleurotus eous + *Trichoderma asperelloides* + *Eudrilus euginiae* (5 t/ha) followed by T_4- Vegetable wastes + cow dung + *Pleurotus eous* + *Trichoderma asperelloides* + *Eudrilus euginiae* (5 t/ha) treatment when compared to Control from 15 to 55 DAS. The increase in the number of nodules was noted in T_8 treatment on 25 and 50 DAS. Number of flowers/ plants was found to be maximum in T_8 treatment over Control on 55 DAS in test crops grown in winter and summer compost. In Black gram and Lablab grown in both winter and summer compost, maximum number of pods/plant, pod length, number of seeds/pod, weight of the seed/ pod, fresh and dry weight content of the pods was observed in T_8 treatment over Control on 75 DAS.

The phase III results revealed that biochemical parameters like protein, carbohydrates, chlorophyll 'a', chlorophyll 'b', and total chlorophyll contents in leaves was noted highest in T_8 treatment followed by T_4 treatment from 15 to 35 DAS and a decline in its content was noted on 55 DAS. Protein, carbohydrate and crude protein in the seed of the test crop increased significantly in T_8 treatment over Control on 75 DAS. Leghaemoglobin content in root nodules on 25 and 50 DAS was maximum in T_8 treatment which is followed by T_4 treatment when compared to the Control in crops grown in both winter and summer compost.

Phase IV results showed the initial soil pH, electrical conductivity, available nitrogen, available phosphorus, and available potassium were noted more in T_8 treatment on par with T_4 treatment over Control. The post-harvest soil of crops grown in both winter and summer compost was recorded maximum in T_8 treatment and T_4 treatment. Antioxidant and antibacterial activity of black gram and lablab seed (best treatment (T_8) and Control) showed remarkable antioxidant activity in methanol extract of black gram grown in summer compost followed by lablab grown in summer compost in the best treatment (T_8) while methanolic seed extracts of lablab plant grown in summer compost showed the highest zone of inhibition in best treatment followed by lablab grown in winter compost methanolic seed extracts and aqueous seed extracts. The study concluded that that the combined application of biocompost produced from Vegetable and Fruit waste was an eco-friendly and efficient compost for growth of the crops. The success of the study will be allowed to minimize the use of chemical fertilizer and pesticides to crop and encourage the farmer to use organic manure for healthy life and environment.