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Anjani Sahu
Department of Plant Pathology, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

K.P. Verma,
Department of Plant Pathology, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Amrotin Teta
Department of Plant Pathology, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Lahari Karumuri
Department of Plant Pathology, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Correspondence
Anjani Sahu
Department of Plant Pathology, College of Agriculture, IGKV, Raipur, Chhattisgarh, India

Effect of compost derived from decomposed kitchen waste by microbial decomposers on plant growth parameters of crops

Anjani Sahu, K.P. Verma, Amrotin Teta and Lahari Karumuri

Abstract
In the present study, the plant growth promoting effect of compost derived from decomposed kitchen waste by microbial decomposers on plant growth parameters of crops *viz.* wheat, Chickpea, Safflower and cowpea discussed. *Pseudomonas sp*, *T. viride* 1, 2, 3 and *T. harzianum* were isolated from decomposed kitchen having high decomposing abililty which is used as decomposers. All the tested plant growth parameters *viz.* plant height, number of branches, root length, fresh weight and dry weight of crops were increased in compost treated plots**.** The maximum plant height was showed by T1 (41.86cm), of branches was showed by T1 (6.85) followed by T7 (6.83), root length was showed by T1 (15.27cm) followed by T5 (15.10cm), fresh weight was showed by T1 (13.00g) followed by T4 (12.88g), dry weight was showed by T1 (5.55g) followed by T4 (5.50g). The minimum plant height (29.56cm), number of branches (4.28), root length (11.22cm), fresh weight (10.00g) and dry weight (4.14g) was showed by T9.

Keywords: compost extracts, kitchen waste, microbial decomposers**,** plant growth parameters

Introduction
Farmers have adopted the strategy of increasing crop yields by applying large amounts of chemical fertilizers and pesticides. At present, however, the negative effects of heavy applications of chemical inputs, in terms of production, environment and quality deteriorations are becoming apparent [Piqueres *et al*. 2005] [9]. The ultimate goal of sustainable agriculture is to develop farming systems that are productive, energy conserving, environmentally sound conserving of natural resources such as soil and water and thus ensure food safety and quality. Organic agriculture has much in common with sustainable agriculture. The same stress is placed upon the use of renewable resources, conservation of resources and the maintenance of environmental quality without using chemical inputs.
Kitchen waste is defined as left-over organic matter from restaurants, hotels and households (Li *et al*., 2009) [7]. Kitchen waste forms a significant part of domestic waste. Tons of kitchen wastes are produced daily in highly populated areas. An Indian city produces about 0.8 to 1 kg solid wastes per capita per day (Sarkar *et al*., 2011) [11]. These wastes are collected and dumped into the landfills, causing major pollution (Bouallagui *et al*., 2005) [1]. There is a large variety of microorganisms present in waste such as bacteria, fungi, protozoa etc. Fungi have the ability to degrade organic materials and its potential as decomposer is now used in the production of organic fertilizer to hasten decomposition and improve quality of the product there of (Lou *et al*. 2014). Among the different organisms used for cellulolytic decomposition, *Trichoderma harzianum*, *T. viride* and *Pseudomonas sp.* have been studied for our work. Thus a study is formulated on the effect of compost derived from decomposed kitchen waste by microbial decomposers on plant growth parameters of crops.

Materials and Methods
The present experiment was conducted at the Department of Plant Pathology, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) and field studies were conducted in the Research Farm of the University in the year of 2015-16.

Microbial decomposers
For isolation of microbial decomposers, decomposed kitchen waste samples were collected from residential area of Professor Colony, Krishak Nagar Jora, Raipur (C.G.) and brought into the laboratory for isolation. Nutrient agar medium [0.5% Peptone; 0.3% beef extract/yeast extract; 1.5% agar; 0.5% NaCl in distilled water and pH adjusted to neutral (6.8)] and potato dextrose agar medium [200g Potato (peeled and sliced), 20g Dextrose and 20g Agar-Agar in

1000ml distilled water and pH adjusted to neutral (6.8)] were used for isolation of microbial decomposers. The isolation of microbial decomposers was made by soil dilution plate technique (Johnson and Curl, 1972).

Kitchen waste decomposed by microbial decomposers

Sample collection: Kitchen wastes were collected from girls hostels, IGKV, Raipur in sterile polythene bag and the collected wastes were brought to laboratory immediately before indigenous decomposition.

Decomposition study: PP bags (13"x6" size) were used for compost preparation. kitchen wastes were cut into small pieces (1–1.5 cm), mixed thoroughly and used as a raw material. Each PP bags was 2/3 filled with 1 kg of kitchen wastes and was inoculated with 100 ml inoculums of microbial decomposers (8B, F4, F5, F8, F10 and TV) and added 200 ml water by evenly mixing the inoculums with the wastes. It was kept under natural condition to observe the visual rate of degradation by gradual decrease in the volume of the waste pile. Only water was added and without inoculums serve as control. After 24 hours, shaked the PP bags and required daily till the rotting. Each treatment was replicated three times. After 5-7 days kitchen waste was decomposed and after decomposition it was air dried for 24-48 hours then mixed with sand in 1:3 ratio (1 part KWC and 3 part sand) and left for 2-3 days for pulverized. Thus it was used as compost.

Evaluation of plant growth parameters: To evaluate the effect of kitchen waste compost on plant growth parameters of crops *in vivo* four crops *viz*. wheat (GW-366), Chickpea (Vaibhav), Safflower (Manjira) and cowpea (Arka Garima) were used as test crop. The treatments were: (T1) kitchen waste compost (KWC) decomposed by *Pseudomonas sp.*, (T2) kitchen waste compost (KWC) decomposed by *Trichoderma* viride 1, (T3) kitchen waste compost (KWC) decomposed by *T.* viride 2 (T4) kitchen waste compost (KWC) decomposed by *T. viride* 3, (T5) kitchen waste compost (KWC) decomposed by *T. harzianum* (T6) kitchen waste compost (KWC) decomposed by TV, (T7) Farm Yard Manure (FYM), (T8) control kitchen waste compost (decomposed naturally) and (T9) control (without compost). All KWC and farmyard manure (FYM) were separately incorporated into the soil at the rate of 7.5 ton ha-1 and uniformly mixed with a hand spade in 2×1 m plots size at the time of land preparation. The seeds of each crop were sown at alternate rows in plots for each treatment and all the recommended agronomic package and practices (no chemical fertilizers, no weedicides and no pesticides used) were followed and experiment was conducted in Randomized Block Design with 2x1 m size. Two replications were maintained for each treatment.

The observation was recorded for plant height, number of branches after 20 days after sowing (DAS), 35 DAS and 50 DAS. The plants were uprooted after 65 days of sowing and care was taken to avoid root damage. Plants were then washed with tap water, stretched on clean transparent surface and root length of the plants was measured for each treatment. The root length was measured from collar region to the end of longest tip. Fresh weight of plants was recorded separately. Then the samples were dried at 45 ºC for 24-48 hours and dry weight was recorded for each treatment.

Results and Discussion

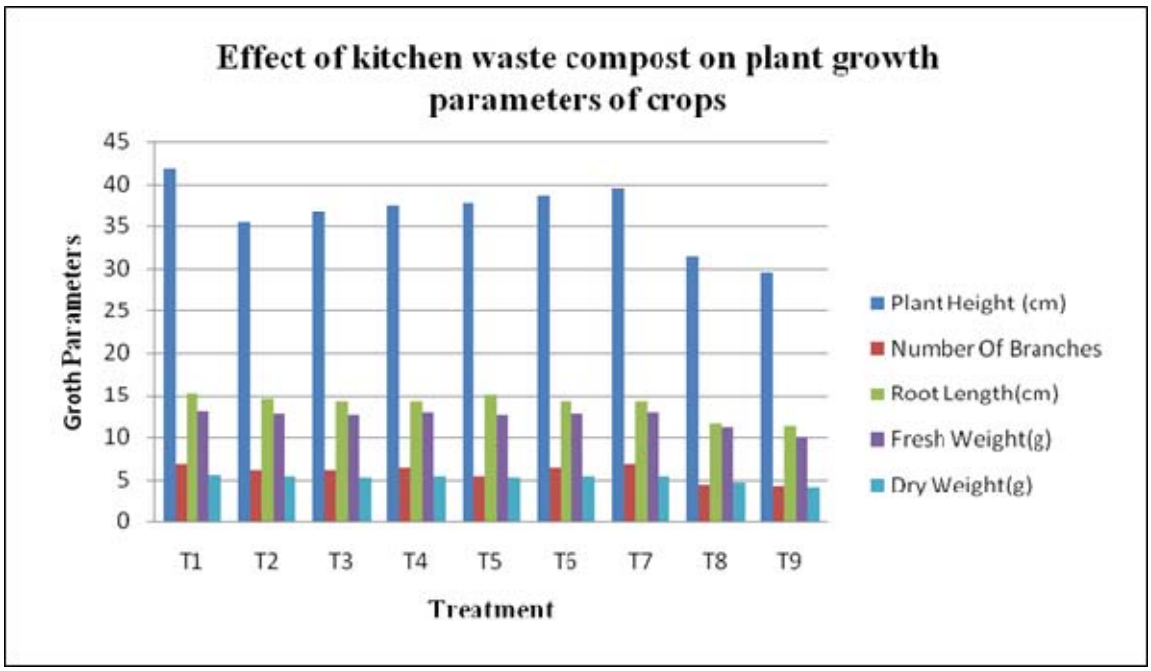
The effect of kitchen waste compost (KWC) decomposed by different isolates of microbial decomposers (*Pseudomonas sp, T. viride* 1, 2, 3 and *T. harzianum*), naturally decomposed KWC and FYM on plant height, number of branches, root length, fresh weight and dry weight of crops was studied. The mean of two replications and mean of four crops have been presented in table1and fig.1. Distinct differences in all the tested plant growth parameters were recorded in compost treated plots. This was a significant difference in plant height, number of branches, root length, fresh weight and dry weight.

We found that the maximum plant height was showed by T1 (41.86cm) followed by T7 (39.51cm), T6 (38.71cm) and all treatments showed significant difference with T1 on different crops. The maximum number of branches was showed by T1 (6.85) followed by T7 (6.83), T6 (6.43) and T1 (6.85), T7 (6.83), T6 (6.43), T4 (6.38) T2 (6.18) and T3 (6.13) were *at par* with each other on different crops. the maximum root length was showed by T1 (15.27cm) followed by T5 (15.10cm), T2 (14.41cm) and T1 (15.27cm), T5 (15.10cm), T2 (14.41cm), T6 (14.19cm), T3 (14.17cm), T4 (14.16cm) and T7 (14.15cm) were *at par* with each other. The maximum fresh weight was showed by T1 (13.00g) followed by T4 (12.88g), T7 (12.83g) and T1 (13.00g), T4 (12.88g), T7 (12.83g) and T6 (12.77g) were at par. the maximum dry weight was showed by T1 (5.55g) followed by T4 (5.50g), T6 (5.44g) and T1 (5.55g), T4 (5.50g) and T6 (5.44g) were *at par*. The minimum plant height (29.56cm), number of branches (4.28), root length (11.22cm), fresh weight (10.00g) and dry weight (4.14g) was showed by T9.

Present findings are supported by Haque *et al.* (2010) who found that household/kitchen wastes composted with *Trichoderma harzianum* T22 improved the growth, dry matter production, yield and yield attributes of mustard (*Brassica campestris*) grown under field condition. Similar results showed by Convertini *et al*. (1999) who reported that plant height, number of flowers and fruits produced per plant, plant dry matter and yield were all improved significantly by application of MSW compost alone. Raja Namasivayam and Bharani (2012) found that the plant growth parameters such as shoot length, leaf surface area, and total chlorophyll, height of the plant, total leaves and branches emerged in the plant, total foliage density/plant was increased in fruit waste compost treated plants and distinct reduction in pest infestation and disease spots. Dufa (2000) investigated the effect of urban domestic refuse compost on lettuce growth and found that the compost promoted the growth of lettuce. Guerrero *et al.* (1995) reported that plant fresh weight and dry weight of lettuce (*Lactuca sativa*) increased by the use of fruit waste.

Table 1: Effect of kitchen waste compost on plant growth parameters of crops

Treatment	Plant Height (cm)	Number of Branches	Root Length(cm)	Fresh Weight(g)	Dry Weight (g)
T1	41.86	6.85	15.27	13.00	5.55
T2	35.44	6.18	14.41	12.71	5.38
T3	36.71	6.13	14.17	12.54	5.33
T4	37.57	6.38	14.16	12.88	5.50
T5	37.84	5.43	15.10	12.56	5.33
T6	38.71	6.43	14.19	12.77	5.44
T7	39.51	6.83	14.15	12.83	5.39
T8	31.49	4.49	11.62	11.15	4.69
T9	29.56	4.28	11.22	10.00	4.14
SEm±	**0.41**	**0.31**	**0.64**	**0.1**	**0.1**
CD at P(0.05)	**1.19**	**0.90**	**1.84**	**0.27**	**0.15**



Graph 1: Effect of kitchen waste compost on plant growth parameters of crops

Treated plot **Control plot**

Wheat

Chickpea

Safflower

Cowpea

Fig 1: Effect of kitchen waste compost on plant growth parameters of crops

References

1. Bouallagui H, Hamdi M, Cheikh RB, Touhami Y. Bioreactor performance in anaerobic digestion of fruit and vegetable wastes. Process Biochemistry, 2005; 40(3-4):989-995.
2. Convertini G, De Giorgio D, Ferri D, La Cava P, Giglio, L. Sugar beet and durum wheat quality characteristics as affected by composted urban waste. In: Anac, D., MartinPrével (Eds) Improved Crop Quality by Nutrient Management, Kluwer, Dordrecht, 1999, 241-244.
3. DuFa G. Principal component analysis for the effect of urban domestic refuse compost on lettuce growth. Chinese Journal of Applied and Environmental Biology, 2000; 6(6):520-525.
4. Guerrero CC, de Brito JC, Lapa N, Oliveira JS. Reuse of industrial orange wastes as organic fertilizers. Bioresource technology, 1995; 53(1):43-51.
5. Haque MM, Haque MA, Ilias GNM, Molla AH. *Trichoderma*-Enriched Biofertilizer: A Prospective Substitute of Inorganic Fertilizer for Mustard (*Brassica campestris*) Production. The Agriculturists, 2010; 8(2):66-73.
6. Johnson LF, Curl EH. Methods for research on the ecology of soil borne plant pathogens. Burgress Publ.

Co., Minneapolis., 1972.
7. Li R, Chen S, Li X, Lar JS, He Y, Zhu B. Anaerobic Codigestion of Kitchen Waste with Cattle Manure for Biogas Production. Energy and Fuels, 2009; 23:2225-2228.
8. Lou Mar Lani, Lopez A, Aganon CP, Juico Purisima P. Isolation of Trichoderma Species from Carabao Manure and Evaluation of Its Beneficial Uses. International Journal of Scientific & Technology Research, 2014; 3(8):190-197.
9. Piqueres PA, Edel-Hermann V, Alabouvette C, Steinberg C. Response of soil microbial communities to compost amendments. Soil Biol Biochem. 2005; 38:460-470.
10. Raja Namasivayam SK, Bharani RSA. Effect of Compost Derived from Decomposed Fruit Wastes by Effective Microorganism (EM) Technology on Plant Growth Parameters of *Vigna mungo*. J. Bioremed. Biodeg., 2012; 3(11):167.
11. Sarkar P, Meghvanshi M. Singh R. Microbial consortium: A new approach in effective degradation of organic kitchen wastes. International Journal of Environmental science and Development, 2011; 2(3):5.