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Influence of using kitchen waste compost (KWC) on tomato (*Lycopersicon esculentum* Mill.) physical growth parameters

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Abstract

Present study deals with the Influence of using kitchen waste compost (KWC) on tomato (*Lycopersicon esculentum* Mill.) physical growth parameters. Result showed that KWC has good potential to improve the physical growth of tomato plants. KWC 60% (T3) showed positive result followed by T(1), T(2) and C(1) may be due to the presence of optimum level of primary and secondary level of plant's vital nutrients.

Keywords: Tomato, physical growth and kitchen waste compost

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most accepted vegetables worldwide, and contains carbohydrates, amino acids, minerals, and vitamins. Yield and nutrient content of tomato are noticeably exaggerated by the application of inorganic fertilizer [2]. In fact, non-judicious use of inorganic fertilizer may lead to environmental pollution including contamination of groundwater, and soil acidification as well as increase denitrification resulting in higher the emission of nitrous oxide (N₂O) to the atmosphere which is accountable for global warming. Currents efforts include exploring the possibility of substitution of inorganic fertilizer with organic ones which are eco-friendly and cost effective. Taiwo *et al.* [4]. recommended that organic fertilizer can be combined with inorganic fertilizer at rates below those recommended for sustainable tomato production.

Compost used to enhance soil bodily and organic matter, water retention capability, drainage, pH, better availability of soil micro-organism and decreasing the negative impact of chemical based totally insecticides and fertilizers within the ecosystems [1].

The compost is fundamentally centered a-round nitrogen, phosphorous, potassium and different micronutrients that can be very much utilized as a soil conditioner.

Composting is the process by which complex organic materials are changed into a material with environmentally useful applications. The composting can transform huge quantities of organic material into compost in a relatively short period by properly organising moisture, air and nutrients. During composting, the microorganism consumes oxygen and nourish on organic matter. Active composting generates a significant amount of heat and large quantities of carbon dioxide and water vapour are released into the air.

Material and Method

A pot culture experiment was conducted at Babasaheb Bhimrao Ambedkar University (BBAU) using KWC with soil at different level of combination during *Kharif* 2018 to study the effect of the prepared KWC on growth of tomato (*Lycopersicon esculentum* Mill) plant

Greenhouse experimental details

- **Soil Condition**

The alluvial soil was collected from the horticultural farm. The collected soil having pH 7.1, electrical conductivity more than 4.0 and textured silty clay loam to clay loam.

- **Nursery bed preparation and transplantation**

For this coconut husk 250gm (soaked overnight in water) used to germinate of tomato seed into baby plant. The soaked coconut husk was partially filled in the seed germination tray with

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2-3 tomato seed in each provided area and again covered the sown seed by sprinkling soaked Coconut husk. The 24 days old seedlings were uprooted and transplanted @ one baby plant per pot. Here, the coconut husk is used for seedling preparation because it have several best feature which support seedling growth such as water retention and drainage, low compaction, requires low maintenance, eco- friendly, disease –resistance and nutrient balance property.

Treatment combination details

The experiment consisted of three treatments (with control and with KWC). The total 9 no. of pots was used, as the experiment was done in triplicates.

Treatments Combination

1.	Control (C1)	100% soil
2.	T1	20% KWC +80% soil
3.	T2	40% KWC +60%soil
4.	T3	60% KWC +40%soil

Crop details

Location : Greenhouse, BBAU, Lucknow
 Crop : Tomato
 Variety : S-22
 Season : *Kharif*
 Design : Completely Randomized Design
 Treatments : 03
 Replications : 03@ each treatment

Harvesting

The matured red colored tomato fruits were harvested and stored separately as per the treatments in the polythene bags to assess their nutritional content.

Collection of the experimental data

The observations on various parameters were recorded at 25, 50, 75, 110 and 135 days after transplantation.

7.2.2. Prameters analysis

a.) Physical parameters of plants

Plant height: The plant height was measured in centimeters from the lower end of the stem to the tip of main shoot. The mean height was recorded and expressed as plant height in centimeters.

Numbers of leaves: The no. of leaves were done by counting from bottom at fix point to the top (last leaf of plant) it was started from 25th day after transplantation.

Days to flowering: The data of flower initiation on each tagged plant was recorded again no. of days from date of transplanting were counted and recorded.

Numbers of fruits: The data of flower initiation on each tagged plant was recorded. The no. of days from date of flower initiation to fruit setting was counted and recorded.

Statistical evaluation

Continuous variables were expressed as means± standard deviation (SD) for KWC 3 treatment dilutions has been given in which C1 (control means 100% soil), T1 (20% KWC + 80% soil), T2 (40% KWC+ 60% Soil) and T3 (60% KWC + 40% Soil) values were documented on 25 days, 50 days, 75 days, 110 days, 135 days. The statistical evaluation was done with SPSS ver. 20.0 to relate physical parameters of T1, T2, T3 with control (C1).

Result and Discussion

Plant growth

Treatment comprising KWC and organic content of soil showed significant effects on vegetative growth such as Plant height, Number of leaf's, flowers and fruits and tomato yield. In comparing plant height of treated plants with control, all three treatments T1, T2, and T3 offered statistically significantly higher plant height on 1st and 2nd interval (i. e, 25th day and 50th day), but only T3 remained significant till last interval (135th Day) of this study (Mention in Table.1) Number of leaves were significantly higher in T2 and T3 ($P<0.001$). 20% KWC shows no enhanced growth in terms of leaves, while treating plants with 60% KWC induces growth in plants efficiently. On the 3rd interval of this study (50Th day), number of flowers were significantly higher in T2 ($P<0.001$) and T3 ($P<0.001$), while number of fruits were greater in all three treatments. The maximum number of leaves per plant achieved by the treated dose of KWC (T2 and T3) Use of compost as a fertilizer has enhanced the physical structure of the soil that incorporates gardening soil mixture. Moreover there was an expanded concealment of plant maladies brought about by soil-borne nematodes, growths and microorganisms because of the expansion of compost to the soil in different cropping pattern. Kostov *et al.* [3]. Directed a test by treating the soil with compost, mineral composts and manure to study the yield efficiency and quality of vegetables and fruits. From the above study, it is concluded that KWC has good potential to enhance the physical parameters of plants.

Table 1: Changes in growth parameters using KWC on tomato plants.

Plant Height	Control	T1	p value	T2	p value	T3	p value	CV%
25 days	4.40+0.20	4.63+0.06	0.03	4.87+0.06	<0.001	5.13+0.06	<0.001	7
50 days	11.20+0.20	11.73+0.12	0.02	12.57+0.35	<0.001	13.40+0.17	<0.001	8
75 days	16.60+0.20	16.73+0.06	0.18	17.17+0.06	<0.001	18.17+0.06	<0.001	4
110 days	26.67+1.53	26.30+0.10	0.58	26.77+0.15	0.88	28.67+0.06	0.01	4
135 days	32.33+2.52	31.33+0.23	0.36	33.53+0.32	0.28	35.13+0.06	0.03	5
No. of Leaf's								
25 days	4.00+1.00	5.33+0.58	0.05	7.33+0.58	<0.001	8.67+0.58	<0.001	33
50 days	8.33+1.53	9.00+1.00	0.44	12.33+0.58	<0.001	14.67+0.58	<0.001	27
75 days	18.00+2.00	18.67+0.58	0.49	20.67+0.58	0.02	22.33+0.58	<0.001	10
110 days	24.67+3.06	25.00+1.00	0.82	27.00+1.00	0.13	28.67+0.58	0.02	7
135 days	31.00+1.00	30.33+0.58	0.52	31.67+1.53	0.52	34.33+1.53	0.01	6
No. of Flowers								
50 days	7.00+2.00	8.00+0	0.27	11.00+0.01	<0.001	13.67+0.58	<0.001	30
75 days	8.00+2.00	8.67+0.58	0.49	12.33+0.58	<0.001	13.67+0.58	<0.001	26
110 days	9.00+0	9.67+0.58	0.14	10.33+0.58	0.01	12.67+0.58	<0.001	15
No. of Fruits								
135 days	24+4	84+1	0.05	32+1	<0.001	38.33+0.58	<0.001	20

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