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RESEARCH ARTICLE

EFFECT OF VERMICOMPOST AND INORGANIC FERTILIZER ON THE GROWTH AND YIELD OF TOMATO, *Lycorpersium esculentum* L

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ABSTRACT

The study was conducted to evaluate the effect of vermicompost and inorganic fertilizers on growth and yield of tomato plants. Physico-chemical properties of the soil in both control and experimental plots were studied and interrupted with results. Plant growth (height), number leaves per plant, number of flower and fruits were also recorded. Vermicompost treated soil showed increased plant growth, number of leaves, flower and fruits compared to control soil. Significant yield was recorded on vermicompost soil. The present study suggested that vermicompost is more favorable for vigorous production of tomatoes. The vermicompost can be economically and environmentally suitable and also maintenance of soil environment.

INTRODUCTION

The agriculture development strategy for India in the 21st century must be through increasing productivity of the land under cultivation, with reduced costs of production and higher use efficiency of inputs with no harm to the environmental quality. The prime requisite is the promotion of health of the soil – plant – environment system to be free from economic exploitation under overuse and abuse of the input as if with impunity (Ayala and Rao, 2002). In today's era, heavy doses of chemical fertilizers and pesticides are being used by the farmers to get a better yield of various field crops. These chemical fertilizers and pesticides decreased soil fertility and caused health problems to the consumers. Due to adverse effects of chemical fertilizers, interest has been stimulated for the use of organic manures (Follet *et al*., 1981). The use of organic matter such as animal manures, human waste, food wastes, yard wastes, sewage sludge's and composts has long been recognized in agriculture as beneficial for plant growth and yield and the maintenance of soil fertility. The new approaches to the use of organic amendments in farming have proven to be effective means of improving soil structure, enhancing soil fertility and increasing crop yields. Organic matters are excellent source of plant-available nutrients and their addition to soil could maintain high microbial populations and activities (Joshi and Pal Vig, 2010). The main objectives of the present study were to access the effects of the application of vermicompost and inorganic fertilizers with soil on the growth and yield of tomato plants under field conditions.

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MATERIALS AND METHODS

Experiments were conducted at the wet laboratory, Department of Zoology, Arignar Anna Government Arts College, Musiri, Tamilnadu, India.

Preparation of Vermicompost (VC)

Farmyard manure was used as raw material to prepare vermicompost (VC). Beds of size 5 feet × 2 feet were prepared with the help of bricks under a shed open from all sides in the wet laboratory, Department of Zoology, Arignar Anna Government Arts College, Musiri for vermicomposting of farmyard manure and earthworms (*Eisenia foetida*) were added in each bed.

Experimental Design

Experimental plot was prepared by mixing 6 kg of farmyard manure and 6 kg of vermicompost. Tomato (*Lycopersium Esculentum. L)* was selected as an experimental plant. In each plot 50 number tomato plants were used in both control and experimental set up, plot I (25%:75%: 25kg vermicompost + 75kg inorganic fertilizer for 25%) experimental plot II (50 %:50%:50kg vermicompost + 50kg inorganic fertilizer for 50%) (Joshi and Pal Vig, 2010). During the whole growing season, growth parameters at every 30 days interval was measured and recorded. Growth parameters and yield (plant height, number of leaves per plants, flowering and fruiting) were counted both control and experimental plots.

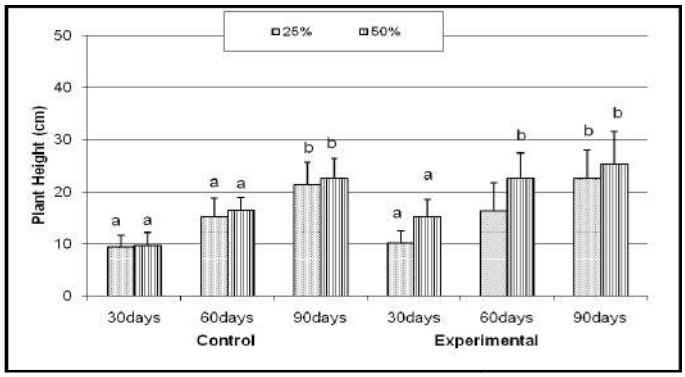
Statistical Analysis

analysis of variance (ANOVA) and Least Significant

of tomato plant

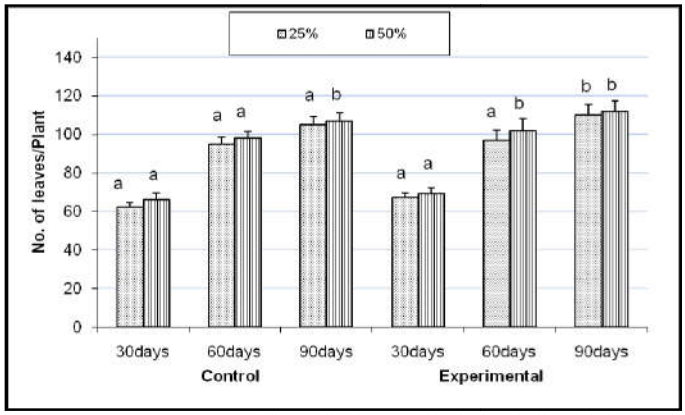
Table 1. Physico-chemical properties of the soil in both control and experimental plots

Parameter	Control (%)		Experimental (%)			
			Before		After	
	Before	After	25	50	25	50
Nitrogen	1.16	1.17	2.33	6.13	2.36	6.39
Phosphorous	0.03	0.04	0.04	0.06	0.05	0.08
Potassium	2.32	2.33	3.93	7.43	4.63	8.46
Calcium	0.33	0.32	0.19	0.52	0.28	0.65
Magnesium	0.36	0.39	0.62	0.65	0.69	0.77
Sulphur	0.19	0.20	0.25	0.35	0.29	0.39
Electrical Conductivity	0.55	0.57	0.53	0.65	0.65	0.74
pH	7.32	7.43	7.0	7.12	7.23	7.24



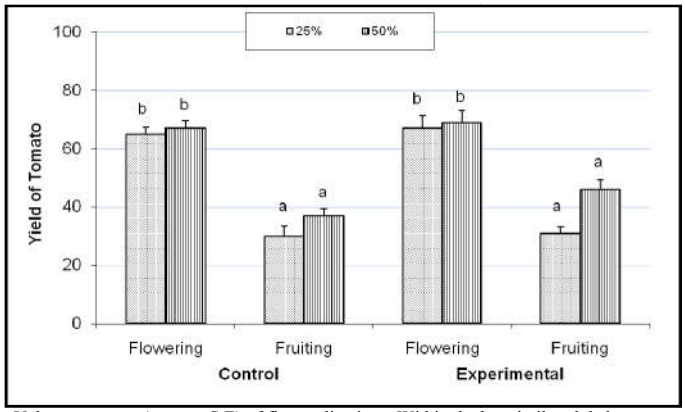
Values are mean (mean ± S.E) of five replications. Within the bar similar alphabets are statistically not significant (p>0.05 by LSD).

Figure 1. Effect of vermicompost and inorganic fertilizer on growth of tomato plant



Values are mean (mean ± S.E) of five replications. Within the bar similar alphabets are statistically not significant (p>0.05 by LSD).

Figure 2. Effect of vermicompost and inorganic fertilizer on growth of tomato plant



Values are mean (mean ± S.E) of five replications. Within the bar similar alphabets are statistically not significant (p>0.05 by LSD).

Difference (LSD) was carried out using MS Excel to determine difference from control and between the treatments ($P \leq 0.05$).

RESULT AND DISCUSSION

The result on effect of vermicompost on physico-chemical properties of the soil observed during the before and after harvesting stages of tomato cultivated plants both control and experimental set up is given in the Table 1. The following are the physical and chemical parameters observed in vermicompost applied during the tomato plot culture studies. The minimum pH of 7.0 was observed in vermicompost and maximum of 7.43 on control plot. The minimum electrical conductivity of 0.53 and maximum 0.74 were observed on vermicompost plots. The present results agreed with recent reports, reduction of pH and electrical conductivity of the soil were also observed in vermicompost manure (Wahid *et al*., 1998; Tharmaraj *et al*., 2011). electrical conductivity of vermicompost depends on the raw materials used for the vermicompost and their ion concentration (Atiyeh *et al*., 2002). Percentage of Nitrogen, Phosphorous, Potassium, Calcium, Magnesium and Sulphur content increased when the concentration of vermicompost increases. It possesses high nutrients content present in vermicompost soil and it enriches the soil fertility, plant growth and yield. Several researchers agreed with present investigation of chemical properties of vermicompost soil (Arancon *et al*., 2006; Slaton *et al.,* 2002; Chattopadhyay *et al*., 1992; Das *et al*., 2002; Bhaskar *et al*., 1992; Oro-Zco *et al.,* 1996; Deepa Devi, 1992).

Mean plant height (cm) in treatments 25% and 50% were found to be 22.60cm, 24.30cm, respectively, which were significantly greater than mean plant height of 21.40cm reported in soil (control) (Fig.1). Similarly, mean number of leaves was also observed to be significantly higher in two treatments (110, 112) than control (105) (Fig.2). It was also observed that number of flowering and fruits/plant increased significantly in two treatments, flowering for 25% and 50% was 67.4 and 69.5; fruits for 25% and 50% were 31.2 and 46.32, respectively, than those in control (67.2, 37.8) (Fig.3). Total yield/plant (kg) of tomatoes in soil (control) came out to be 0.86kg, 0.93kg while it came out to be 1.20kg, 1.40kg in treatments respectively (data not included). Increase in growth and yield of tomatoes due to the presence of rich organic matter present in the vermicompost to enhance the soil fertility. Earlier, vermicompost treated tomatoes plants to enhance the growth and yield (Joshi and Pal Vig, 2010). Arancon *et al*. (2004) reported the vermicompost in different concentrations enhanced the yields of strawberry fruits

and mean plant height of tomato plant was observed by the addition of different concentrations of sheep manure vermicompost in soil (Gutiérrez-Miceli et *al*., 2007). Vermicompost has high microbial activity due to presence of fungi, bacteria and actinomycetes. Micro-organisms like bacteria, fungi, yeast, actinomycetes and algae can produce plant growth regulators (PGRs) such as auxins, gibberellins, cytokinins, ethylene and abcisic acid. Vermicompost affected positively the growth of Beginias and Coleus (Tomati, 1988; Frankenberger and Arshad, 1995). In conclusion, it is clearly indicate that small proportion of vermicompost can effectively enhanced growth and yield of tomatoes by improving various physico-chemical properties of the soil.

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