

## Effect of Organic Manure on Yield of Tomato (*Solanum lycopersicum* L.) cv. Pusa Ruby

PULKIT, PAVITRA DEV\*, JITENDRA KUMAR, VIJAI KUMAR<sup>1</sup>, KRISHNA MURARI AGNIHOTRI,  
KRISHAN CHOUDHARY AND AKSHYA KUMAR

### ABSTRACT

The present investigation entitled effect of organic manure on yield of tomato (*Solanum lycopersicum* L.) cv. Pusa Ruby was carried out during the year 2021-22 at Horticulture Research Farm, Department of Horticulture, Chaudhary Charan Singh University Campus, Meerut (U.P.). The experiment was laid out in randomized block design with three replications. The treatments involved in the study were seven in number, i.e., T<sub>1</sub> (Control), T<sub>2</sub> (FYM 24.0 t/ha), T<sub>3</sub> (Vermicompost 6.0 t/ha), T<sub>4</sub> (Poultry manure 2.0 t/ha), T<sub>5</sub> (FYM 12.0 t/ha + Vermicompost 3.0 t/ha), T<sub>6</sub> (FYM 12.0 t/ha + Poultry manure 1.0 t/ha), and T<sub>7</sub> (Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha). The perusal of data investigation clearly indicates that combined application of Vermicompost 3.0 t/ha with Poultry manure 1.0 t/ha (T<sub>7</sub>) gave significant positive effect on yield parameters viz. maximum number of flowers per cluster (12.3), number of fruits per plant (42.07), length of fruit (8.97 cm), diameter of fruit (10.4 cm), yield q/ha (323 q/ha) as compared to other treatments.

**Keywords:** Tomato, FYM, Vermicompost, Poultry manure and Yield.

### ARTICLE INFO

Received on	:	21/06/2024
Accepted on	:	23/07/2024
Published online	:	30/09/2024



### INTRODUCTION

Tomato (*Solanum lycopersicum* L.), belonging to the family Solanaceae, is one of the most popular and widely grown vegetable crops all over India. This is a self-pollinated crop with the 2n=24 chromosome number. Tomato is cultivated in subtropics to tropics of India and is cultivated in open fields, kitchen gardens, and it is also grown as a 'forced crop' under protected cultivation in green house and polyhouse conditions. It is rich in vitamins, minerals, and antioxidants, which are essential for human health. It can be considered a necessary part of the kitchen and consumed in various ways, viz., in salads and sandwiches, cooked or processed as dried powder.

Soil application of chemical fertilizers in faulty manure can reduce soil fertility, harden the soil, pollute water, air, and soil, and lessen important nutrients of soil and minerals, thereby bringing hazards to the environment. Excess use of chemical fertilizers in agriculture causes numerous environmental and health issues (Kumar and Dev, 2017). On the other hand, crop production through the use of organic manures is not only eco-friendly but also provides hygienic and safe food for the people with sustainable production. The soil application of organic manures enhances the water-holding capacity, improves aeration and drainage, reduces fertilizer leaching, and improves a soil's structure.

Organic manures like FYM, vermicompost, and poultry manure are very popular among the farmers to produce

quality products. The beneficial effects of FYM, vermicompost and poultry manure on crop yield and soil productivity are the result of their usefulness as a storehouse of plant nutrients. These sources of nutrients, besides improving soil physical and chemical properties, also increase microbial or biological activities in the rhizosphere. Organic manures supply micronutrients and macronutrients to the soil, which play an essential role in the plants' growth, development, and biosynthesis of the organic substances. Application of organic manures, which are made from animal excreta or other agricultural wastes, is usually used to improve the structure and stability of the soil in addition to enhancing the yield and quality of the crop plants (Chang *et al.*, 2010).

Farm yard manure (FYM) is a decomposed mixture of dung and urine of farm animals with other organic waste of the farm, like roughage leaves, etc. Several researchers reported that farmyard manure is the major source of nutrient supply to the plants on large and small farm holdings, so it is called 'complete fertilizer'. Farmyard manure has long been considered a desirable soil amendment, and reports of its effects on soil properties are numerous. Further, application of FYM might have accelerated the growth of tomato plants.

Vermicompost application to different field crops has been known to reduce the requirement of chemical fertilizers without any reduction in crop yield. Some scientists reported that soil supplemented with vermicompost shows better plant

Department of Horticulture, Chaudhary Charan Singh University, Meerut, Uttar Pradesh, India

<sup>1</sup> Department of Horticulture, CSSS (PG) College, Machhra, Meerut, Uttar Pradesh, India

\*Corresponding Author E-mail: [pavitrahort@gmail.com](mailto:pavitrahort@gmail.com)

growth as compared to soil treated with inorganic fertilizers or cattle manure. Poultry manure is the faeces of poultry birds, which is generally used as an organic fertilizer. Scientists also reported that, among all animal manures, poultry manure contains the highest amount of nitrogen, phosphorus, and potassium. In addition to being a soil supplement, poultry manure offers a slow-release supply of macro- and micronutrients.

#### MATERIAL AND METHODS

The investigation was conducted at the Horticulture Research Farm of Chaudhary Charan Singh University Campus, Meerut, during 2021–22. Geographically, Meerut city lies about 70 km. N.E. of the national capital, New Delhi. Meerut city is located between 29.90° N and 77.43° E longitudes at an elevation of 222 meters above the mean sea level. The climatic condition of this region is sub-tropical. On the basis of the experimental field soil testing, the soil was found to be slightly alkaline in p<sup>H</sup> reaction, low in organic carbon, and good in nitrogen, phosphorus, and potassium levels. The experimental field was laid out in a randomized block design with three replications, comprising of seven treatments in which FYM, vermicompost, and poultry manures were applied as sole and in combinations. The treatments applied for the research purpose were T<sub>1</sub> (Control), T<sub>2</sub> (FYM 24.0 t/ha), T<sub>3</sub> (Vermicompost 6.0 t/ha), T<sub>4</sub> (Poultry manure 2.0 t/ha), T<sub>5</sub> (FYM 12.0 t/ha + Vermicompost 3.0 t/ha), T<sub>6</sub> (FYM 12.0 t/ha + Poultry manure 1.0 t/ha), and T<sub>7</sub> (Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha). The seeds of 'Pusa Ruby' were sown in the nursery, and after 28 days, healthy and uniform seedlings were transplanted in the main field. To cultivate a good crop, all other recommended cultural practices were followed. The observations were recorded in randomly taken five plants per plot and tagged plants from each replication on morphological traits *viz.* number of flowers per cluster, number of fruits per plant, length and diameter of fruit (cm), and yield (q/ha). The data recorded during the course of the investigation were subjected to statistical analysis by the analysis of variance (ANOVA) technique (Fisher, 1958) for drawing conclusions.

#### RESULTS AND DISCUSSION

The data recorded on growth parameters of tomato (Table 1) clearly indicate that the number of flowers per cluster, number of fruits per plant, length of fruit, diameter of fruit, and yield q/ha were significantly influenced by the soil application of organic manures. The maximum number of flowers per cluster (12.3) was recorded under the treatment T<sub>7</sub> (Vermicompost 3.0 t/ha + poultry manure 1.0 t/ha), which was found statistically superior over all other treatments. While the minimum number of flowers per cluster (5.2) was noted under control plants. The findings concurred with the research conducted by Dixit *et al.* (2018) and Geetharani and Partibhan (2014). Vermicompost and poultry manure have a positive impact on the number of flowers per cluster, which may be because of the balanced supply of nutrients and some plant hormones through vermicompost and poultry manure, which enhance photosynthetic activity and physiological processes. Easley availability of nutrients and growth-regulating substances present in the vermicompost may reduce the time taken to transform bud into flower. Pritam *et al.* (2010) also reported that application of vermicompost stimulates flowering and increases the number and biomass of flowers.

In case of number of fruits per plant, the maximum number of fruits per plant (42.07) was noted under soil application of Vermicompost 3.0 t/ha + poultry manure 1.0 t/ha (T<sub>7</sub>) which was found statistically higher over all other treatments, while the minimum number of fruits per plant (20.36) was recorded under control plants during the experimental study. The results are in the same line as investigated by Wan *et al.* (2017) and Dixit *et al.* (2018). The number of fruits per plant is directly related to the number of flowers and fruit set percent. Vermicompost contains a good amount of nutrients, amino acids, enzymes, and hormones that are helpful in increasing the number of flowers and fruit set percent in plants. Goel and Kaur (2012) recorded more number of fruits per plant under vermicompost-treated tomato plants.

This might be due to the vermicompost and poultry manure have a positive impact on the number of flowers per cluster, which may be because of the balanced supply of nutrients and

**Table 1:** Effect of organic manures on yield of tomato (*Solanum lycopersicum* L.) cv. Pusa Ruby

Treatments	Number of flowers per cluster	Number of fruits per plant	Length of fruit (cm)	Fruit diameter (cm)	Yield (q/ha)
Control (no manure) (T <sub>1</sub> )	5.2	20.36	4.29	5.2	160
FYM 24.0 t/ha (T <sub>2</sub> )	6.4	22.51	5.41	5.5	195
Vermicompost 6.0 t/ha (T <sub>3</sub> )	6.3	22.63	5.47	4.4	213
Poultry manure 2.0 t/ha (T <sub>4</sub> )	7.6	27.53	4.84	5.8	248
FYM 12.0 t/ha + Vermicompost 3.0 t/ha (T <sub>5</sub> )	7.2	29.42	6.11	6.3	231
FYM 12.0 t/ha + Poultry manure 1.0 t/ha (T <sub>6</sub> )	8.5	35.83	6.29	8.2	289
Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha (T <sub>7</sub> )	12.3	42.07	8.97	10.4	323
CD (P=0.05)	1.613	2.417	2.162	1.376	12.995
SEm(±)	0.518	0.776	0.694	0.442	4.171

some plant hormones through vermicompost and poultry manure, which enhance photosynthetic activity and physiological processes. Easley availability of nutrients and growth-regulating substances present in the vermicompost may reduce the time taken to transform bud into flower. Pritam *et al.* (2010) also reported that application of vermicompost stimulates flowering and increases the number and biomass of flowers.

The maximum length of fruits (8.97 cm) was recorded under the soil application of Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha, followed by FYM 12.0 t/ha + Poultry manure 1.0 t/h (6.29 cm). The results obtained concur with earlier findings reported by Taiwo *et al.* (2007). Organic manures added a higher amount of organic matter to soil, which is usually responsible for microbial activity enhancement (Sreenivasa *et al.*, 2010). These lead to nutrient mineralization and supply to plants as well as improvement in the physico-chemical properties of soil, as using organic manure improves soil texture and helps plants to have good root proliferation, which leads to improvement in plant growth. Similarly, the maximum diameter of fruit (10.4 cm) was recorded from T<sub>7</sub> (Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha), followed by FYM 12.0 t/ha + Poultry manure 1.0 t/ha (8.2 cm) as compared to all other treatments. Similar results were obtained by Chumyani *et al.* (2010). The pronounced size (length and width) of the tomato might be due to the stimulated activities, likewise cell elongation, cell division, quick multiplication, and synthesized more food materials in the plant by the organic manures. Several researchers

reported that vermicompost is the most important organic manure, which contains growth regulators like hormones that increase the growth and yield of crops. On the other hand, soil application of organic manures helps to improve nitrogen use efficiency through increased nutrient concentrations, soil organic matter content, water-holding capacity, bulk density, and soil temperature. An increase in nitrogen use efficiency promotes root and shoot growth, resulting in an increase in crop yield.

Statistically, maximum fruit yield (323 q/ha) was recorded under soil application of Vermicompost 3.0 t/ha + Poultry manure 1.0 t/ha, followed by FYM 12.0 t/ha + Poultry manure 1.0 t/ha (289 q/ha). This result is supported by the findings of Ujjwal *et al.* (2022) in brinjal. Vikas *et al.* (2017) also reported that soil application of vermicompost with *Azospirillum* enhanced yield of okra.

## CONCLUSIONS

The application of major nutrients, through different organic manures in various levels, increased the photosynthetic activity, chlorophyll formation, and nitrogen metabolism in the plants, ultimately improving the weight and yield of the plant. Vermicompost increases crop yield by releasing soil compactness and improving aeration in soil. Organic manures also facilitate better survival of beneficial microorganisms to increase the availability of nutrients and increase the nitrification process for maximum biomass or yield production.

## REFERENCES

- Chang K H, Wu R Y, Chuang K C, Hsieh T F and Chung R S. 2010. Effects of chemical and organic fertilizers on the growth, flower quality and nutrient uptake of *Anthurium andreanum*, cultivated for cut flower production. *Scientia Horticulturae* **125**:434-441.
- Chumyani S P, Kanaujia S, Singh V B and Singh A K. 2010. Effect of integrated nutrient management on growth, yield and quality of tomato. *Journal of Soils and Crops* **22**(1):67-71.
- Dixit P S, Prasad V M, Kasera S and Singh S. 2018. Effect of various inputs on growth and its attributes of tomato (*Solanum lycopersicum* L.) cv. GS-600 under polyhouse condition. *International Journal of Chemical Studies* **6**:2537-2539.
- Fisher R A. 1958. *Statistical Methods for Research Workers* (13th ed.) Edinburgh: Oliver and Boyd.
- Geetharani P and Partibhan S. 2014. Effect of organic manures on growth and yield of tomato. *The Asian General of Horticulture* **9**:281-282.
- Goel S and Kaur K. 2012. Impact of vermicompost on growth, yield and quality of tomato plant (*Lycopersicon esculentum*). *Journal of Advanced Laboratory Research in Biology* **3**(4):281-284.
- Kumar R and Dev K. 2017. Effects of chemical fertilizers on human health and environment. *International Advanced Research Journal in Science, Engineering and Technology* **4**(6):203-205.
- Pritam S, Garg V K and Kaushik C P. 2010. Growth and yield response of marigold to potting media containing vermicompost produced from different wastes. *Environmentalist* **30**:123-130.
- Sreenivasa M N, Nagaraj M N and Bhat S N. 2010. *Beejamruth*: A source for beneficial bacteria. *Karnataka Journal of Agricultural Sciences* **17**:72-77.
- Taiwo L B, Adediran J A and Sonubi O A. 2007. Yield and quality of tomato grown with organic and synthetic fertilizers. *International Journal of Vegetable Science* **13**(2):5-19.
- Ujjwal V, Dev P, Kumar S, Malik A and Kumar R. 2022. Effect of organic manures and bio-fertilizers on vegetative and yield parameters of brinjal (*Solanum melongena*) cv. Pant Rituraj. *Flora and Fauna* **28**(1):27-30.
- Vikas K J and Dev P. 2017. Effect of organic manures and bio-fertilizers on vegetative growth and yield parameters of okra (*Abelmoschus esculentus* L. Moench.) cv. Arka Anamika. *HortFlora Research Spectrum* **6**(3):209-211.
- Wang X-X, Zhao F, Zhang G, Zhang Y and Yang L. 2017. Vermicompost improves tomato yield and quality and the biochemical properties of soils with different tomato planting history in a greenhouse study. *Frontiers in Plant Science* **8**:1978.

## Citation:

Pulkit, Dev P, Kumar J, Kumar V, Agnihotri K M, Choudhary K and Kumar A. 2024. Effect of organic manure on yield of tomato (*Solanum lycopersicum* L.) cv. Pusa Ruby. *Journal of AgriSearch* **11**(3): 176-178