

Effect of different combinations of organic manures on growth, yield and economics of tomato (*Solanum lycopersicum*) cv. Pusa Rohini

Ranvijay Singh, *Harpal Singh, Guru Dayal, Satyavir Singh and Santosh Pandey

Department of Horticulture,
Institute of Agricultural Sciences,
Bundelkhand University,
JHANSI -284128 (UP) INDIA

*Corresponding Author's
E-mail: harpalhorticulture@gmail.com

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ABSTRACT

A field experiment was carried out at the Organic Research Farm, Karguan ji, Jhansi, Department of Horticulture, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (U.P.) during *rabi* season 2020-21 to study the "Effect of different combinations of organic manures on growth, yield and economics of tomato cv. Pusa Rohini". Application of 33% each of FYM, Vermicompost and poultry manure (T₇) resulted in significantly maximum growth and yield attributing parameters and fruit yield of tomato. The plant height was up to 70.2 cm, total branches 16.62/plant, leaves 114.7/plant, plant spread 108.7 cm, stem diameter 2.27 cm, number of flower clusters 17.33/plant, number of fruits 32.67/plant, fruit length 4.57 cm, fruit diameter 5.37 cm, individual fruit weight 81.67 g, total fruit yield 534.0 q/ha, net return Rs. 32640/ha with 1.57 B:C ratio. The second best treatment was T₅ having 50% poultry manure + 50% Vermicompost which produced 438.8 q/ha tomato fruits ie. less than 95.2 q/ha as compared to T₇ treatment. The tomato yield in the control treatment was only 167.8 q/ha with net income Rs. 4166/ha.

Figure : 00

References : 10

Table : 01

KEY WORDS : Organic manures, Pusa Rohini, Tomato

Introduction

Tomato (*Solanum lycopersicum* L.) belongs to the Solanaceae family. It is one of the most popular vegetable grown in India as well as all over the world. In Uttar Pradesh, the area, production and productivity of tomato are 20880 ha, 826.32 million tones and 3.96 tones/ha, respectively.

Most of the soils in India are deficient in organic matter and nutrients. Therefore, application of nutrients are essential for increasing the yield of crops. With the advent of modern high-yielding varieties, emphasis has been given mainly on use of chemical fertilizers neglecting the organic manures resulting in the deficiency of several macro and micronutrients. Organic manures act as a store house of plant nutrients and play direct role in supplying macro and micronutrients and indirectly in improve the physical, chemical and biological properties of the soil. Farmyard manure is the most cheap and easily available qualified manure. Organic manures supply the trace of micronutrients, which is not supplied by the chemical fertilizers. Vermicompost on

soil physico-chemical properties evaluated in tomato significantly increased organic carbon and nutrients, decreased soil pH, improved bulk density, total porosity and electrical conductivity of soil¹. Hence proper blending of organic manures from various sources will improve the fertility and productivity of soil and help to maximize sustainable production.

Materials and Methods

The field experiment was carried out at the Organic Research farm Karguan ji, Department of Horticulture, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (U.P.) during *Rabi* season of 2020-21. The soil of the experimental field was red-loamy having pH 7.5, EC 0.45 dS/m, OC 0.64 %, available N, P₂O₅ and K₂O 198, 14.5 and 220 Kg/ha, respectively. The rainfall received during the cropping season was 3.0 mm. The experiment was laid out in a randomized block design with three replications. The treatment comprised 7 treatments having different combinations of organic manures with a control. Organic manures were applied as a basal dose according to the

TABLE-1 : Effect of different sources of organic manures on growth yield and economics of tomato

Treatments	Plant height (cm) 90 DAT	Stem diameter (cm)	Number of leaves/plant	Plant spread (cm)	Bran-ches /plant	Number of flower clusters/plant	Number of fruits/plant	Fruits length (cm)	Fruit dia-meter (cm)	Indivi-dual fruit weight (g)	Total fruit yield (q/ha)	Net return (Rs/ha)	B.C. ratio
T ₀ 0% Control	54.3	0.37	70.3	66.67	10.50	9.33	14.98	3.10	4.17	66.66	167.85	4166	0.20
T ₁ 100% FYM	61.8	1.17	78.0	76.67	11.97	10.33	15.72	4.17	4.63	72.46	249.67	9029	0.48
T ₂ 100 % Poultry manure (PM)	62.7	1.30	82.7	79.67	11.78	11.67	15.58	4.43	4.50	74.18	278.28	7874	0.33
T ₃ 100 % Vermi-compost (VC)	63.1	1.27	84.7	85.67	11.60	14.17	16.39	3.97	4.50	76.48	311.75	13528	0.50
T ₄ 50 % FYM+50% PM	64.5	1.50	96.3	98.67	15.28	14.77	21.99	4.40	4.93	78.67	405.28	-	-
T ₅ 50 % PM+50% VC	65.4	1.67	106.7	99.67	15.77	15.87	29.67	4.47	5.13	79.67	438.78	22828	1.08
T ₆ 50 % VC+50% FYM	63.5	1.30	90.7	90.33	14.12	14.20	17.95	3.93	4.83	77.31	344.33	12383	0.56
T ₇ 33% + FYM +33%+ VC+33%+PM	70.28	2.27	114.7	108.67	16.62	17.33	32.67	4.57	5.37	81.67	534.05	32640	1.57
S.E.m_±	0.40	0.11	0.43	-	0.01	0.35	0.27	0.07	0.07	0.64	0.48	-	-
C.D. (P=0.05)	1.21	0.34	1.33	-	0.03	10.08	0.82	0.23	0.22	1.96	1.47	-	-

treatments. The tomato *var.* Pusa Rohni was transplanted on 2 November, 2020 at the planting density of 45 x 45 cm. The crop was grown as per recommended package of practices. The picking of fruits done as and when matured. The periodical observations were recorded as per recommended procedures.

Results and Discussion

Growth parameters :- The results in Table 1 indicated that the application of nutrients through organic manures (33 % each of FYM + VC + PM) in T₇ recorded significantly higher growth characters of tomato (plant height 70.2 cm, total branches 16.62/plant, leaves 114.7/plant, plant spread 108.7 cm and stem diameter 2.27 cm). The second best treatment was T₅ having 50 % PM + 50 % Vermicompost. The remarkable increase in plant growth parameters under T₇ and T₅ treatments may be as the result of acceleration of cell elongation and cell division. The increased plant height, branches/plant and stem diameter exhibit the vigor of the plant and bears leaves at each node. Therefore, the boosted vegetative growth and plant spread due to increased multi-nutrients along with best physico-chemical and biological properties of soil by different organics may be due to increased photosynthesis and partitioning of photosynthates towards the sink. The similar results have been reported^{2,3,7,8}.

Yield attributes and yield:- The significantly highest

flower clusters 17.33 /plant, fruits 32.67 /plant, fruits length 4.57 cm. fruit diameters 5.37 cm and fruit weight 81.67 g thereby tomato yield 534 q/ha were recorded from T₇ treatment having 33 % each of the FYM + VC + PM. This was followed by T₅ having 50 % PM + 50 % VC where the flower clusters were 15.87/plant, 29.67 fruits /plant, 4.47 cm fruit length, 5.13 cm fruit diameter, 79.67 g fruit weight and 438.8 q/ha fruit yield. The highest yield attributes and yield under T₇ and T₅ treatments may be attributed to maximum growth parameters, increased photosynthesis and partitioning efficiency of these treatments towards the sink. The results corroborate with those of^{4,5,9,10}.

Economics: The maximum net income (32,640 Rs/ha with B:C ratio 1.57) was secured from T₇ treatment was T₅ (Rs 22,828 /ha with C.B. ratio 1.08). On the other hand, the minimum economics gain (net income of Rs 4,166 /ha with C:B ratio 0.20) was obtained from the control treatment (T₁). This was eventual because the net income is directly positively correlated with the quantum of tomato yield from these treatments. The second important factor is the cost of cultivation of treatments which is negatively correlated with the net income. The findings conclude that the most beneficial treatment was T₇ having 33 % each of FYM + VC + PM which produced maximum tomato yield up to 534 q/ha with net income Rs. 32640/ha.

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