

Effect of organic manures with biofertilizer on yield contributing characters of tomato

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ABSTRACT

The present investigation was carried out at Mahatma phule Kristi Vidyapeeth, Rahuri during *Kharif* 2004 to study the effect of some organic manures with biofertilizers on yield of tomato fruits and find out an organic manure dose for tomato. The experiment consisted of eleven treatments with three replications in randomized block design. FYM, cotton seed cake and poultry manure were applied in combination at 25,50 and 75 per cent level of N source. Vermiphos and sulphate of potash were used as source of phosphorus and potassium, respectively. The quantity of P_2O_5 and K_2O from organic manures was considered as bonus application in respective treatments. Number of fruits/ plant, average weight of fruit, yield / plant and yield / ha were obtained with organic manures over inorganic fertilizer and absolute control. The maximum yield and yield attributing character could be obtained by the application of FYM (50%N)+cotton seed cake (50%N) + vermiphos + sulphate of potash + package @ 200 kg/ha + *Trichoderma viride* @ 4g/ha + *Azospirillum* @ 299g/10 lit + PSB (200g/ 10 lit. water + NSKE 4%(spray) + other organic spray). Thus it could be concluded that organic farming with use of biofertilizers had a beneficial effect in tomato production and can be practiced for more yield and better quality fruits.

Gosavi, P.U., Kamble, A.B. and Pandure, B.S. (2011). Effect of organic manures with biofertilizer on yield contributing characters of tomato. *Internat. J. agric. Sci.*, 7(1): 51-53.

Key words : Organic manures, Biofertilizer, Cotton seed cake, Vermiphos, Yield

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is an annual vegetable crop of wide spread culture and popularity. It is the most popular vegetable all over the world and ranks second. Tomato is mostly grown for vegetable purpose, yet it is widely consumed as salad or in processed form, in fact it ranks first in processing. It is used in preparation of products like puree, ketch-up, etc nutritionally it is equally important food owing to the appreciable contents of vitamins A, B and C (Arora *et al.*, 1993).

In India, tomato is mostly grown in the plains over an area of 5.35 lakh ha with annual production of 93.62 lakh metric tones. (Anonymous, 2008) In Maharashtra the area under tomato is about 0.36 lakh ha with an estimated production of about 11.83 lakh tones (Anonymous, 2003). The prices of chemical fertilizer have gone up tremendously and the marginal farmers can not afford such costly fertilizers. About 50 per cent of applied inorganic fertilizers are lost through leaching. Under this situation use of organic manures and biofertilizers could be the key to sustain soil fertility and to obtain the desired level of yield and quality. Organic fertilizers positively affected and also improve keeping quality at room temperature and in storage of vegetable (Vogtmann *et al.*, 1993)

The nutrient management in organic farming is done through materials like farmyard manure, neem cake, organic manure, poultry manure, vermicompost, green manures and crop residues. These can substitute for inorganic fertilizer to maintain the environmental quality and safety. Biofertilizers are natural fertilizers containing carried based micro-organisms which help to enhance productivity by biological nitrogen fixation or solubilization of phosphate or producing hormones, vitamins and other growth factors required for plant growth.

MATERIALS AND METHODS

The present investigation was carried out at Mahatma Phule Kristi Vidyapeeth, Rahuri during *Kharif* 2004 to study the effects of organic manures and biofertilizers on growth and yield of tomato hybrid RTH-2. The experiment consisted of 11 treatment *viz.*, T₁ FYM (75%N) + cotton seed cake(25%N)+ vermiphos + sulphate of potash + package, T₂ FYM (75%N) + poultry manure(25%N) + vermiphos + sulphate of potash + package, T₃ -FYM (50%N) + cotton seed cake(50%N) + vermiphos + sulphate of potash + package, T₄ -FYM (50%N) + poultry manure (50%N) + vermiphos + sulphate of potash + package, T₅ -FYM (25%N)+ cotton seed cake (75%N) + vermiphos + sulphate of potash + package, T₆ - FYM (25%N) + poultry manure(75%N) + vermiphos

+ sulphate of potash + package. T₇-Cotton seed cake (75%N) + poultry manure(25%N) + vermiphos + sulphate of potash + package, T₈-Cotton seed cake (50%N)+ poultry manure(50%N) + vermiphos + sulphate of potash + package, T₉-Cotton seed cake (25%N)+ poultry manure (75%N) + vermiphos + sulphate of potash + package, T₁₀-Inorganic fertilizer (N:P:K, 300:150:150 kg/ha), T₁₁-Absolute control. The treatment were replicated thrice in Randomized Block Desine The seedlings were transplanted on 17th September 2004 at spacing of 90x 30 cm.

RESULTS AND DISCUSSION

The data regarding the number of fruits per plant influenced by various treatments are presented in Table 1. The treatment T₁₀ recorded the maximum number of fruits per plant (29.00) while minimum number of fruits per plant was recorded in the treatment T₁₁ (absolute control) (12.28).

The average weight of fruits was significantly influenced by various treatments. The treatment T₆ recorded significantly highest fruit weight (84.75g) and was at par with treatment T₈ (84.62g). The lowest average

weight of fruit (68.11g) was recorded in the treatment T₁₁ (absolute control) and was at par with T₁₀ and T₂ (69.00 and 70.06 g, respectively).

The yield per plant significantly differed due to various treatments. The treatment T₃ recorded the highest yield per plant (2.01 kg/plant) followed by treatment T₁₀ (2.00 kg/plant) which was at par with T₇ (1.93 kg /plant). The lowest yield per plant (0.83 kg/ plant) was recorded by T₁₁ (absolute control). The fruit yield of tomato differed significantly due to different treatment. The treatment yields ranged between 370.75 to 748.37q/ha. The treatment T₃ recorded significantly the highest fruit yield (748.37 q/ha) which was at par with the treatment T₁₀ and T₇ where as lowest yield (370.75q/ha) was recorded in the T₁₁ (absolute control).

Among the various treatments the treatment T₁₀ gave significantly highest number of fruits per plant (Table 1). This might be due to higher level of N, P and K provided by the inorganic fertilizer that readily led to good vegetative growth, which ultimately gave good yield. However, application of organic fertilizers also gave satisfactory number of fruits per plant, especially the T₂, T₃ the T₇ (24.44, 25.38, 26.00 fruit / plant, respectively) as compared to absolute control (12.28 fruit / plant). The

Table 1 : The yield attributing character of tomato as influenced by different treatments

Tr. No.	Treatments	No. of fruits/ plant	Average weight of fruit(g)	Yield/ plant (kg)	Yield/ plot (kg)	Yield /ha (q)
T ₁	FYM (75%N) + Cotton seed cake (25%N)+ Vermiphos + Sulphate of potash + Package	21.31	81.957	1.743	76.833	646.883
T ₂	FYM (75%N) + Poultry manure (25%N) + Vermiphos + Sulphate of potash + Package	24.44	70.067	1.713	75.537	630.850
T ₃	FYM (50%N) + Cotton seed cake(50%N) + Vermiphos + Sulphate of potash + Package	25.38	79.503	2.013	88.903	748.377
T ₄	FYM (25%N) + Poultry manure (50%N) + Vermiphos + Sulphate of potash + Package	19.25	84.130	1.620	71.467	601.623
T ₅	FYM (50%N)+ Cotton seed cake (75%N) + Vermiphos + Sulphate of potash + Package	18.34	76.840	1.410	62.177	523.403
T ₆	FYM (25%N) + Poultry manure (75%N) + Vermiphos + Sulphate of potash + Package	15.02	84.750	1.270	56.060	481.920
T ₇	Cottonseedcake (75%N)+ Poultry manure (25%N) + Vermiphos + Sulphate of potash + Package	26.00	74.470	1.937	85.537	720.067
T ₈	Cottonseedcake (50%N)+ Poultry manure (50%N) + Vermiphos + Sulphate of potash + Package	20.75	84.620	1.757	77.553	652.837
T ₉	Cottonseedcake (25%N)+ Poultry manure (75%N) + Vermiphos + Sulphate of potash + Package	21.91	75.753	1.657	73.067	615.083
T ₁₀	Inorganic fertilizer (N:P:K, 300:150:150 kg/ha)	29.00	69.000	2.000	88.340	743.620
T ₁₁	Absolute control	12.28	68.110	0.833	36.953	370.750
	S.E±	0.907	1.768	0.055	2.409	20.449
	C.D. (P=0.05)	2.676	5.250	0.161	7.105	60.316

increased number of fruits in these treatments could be attributed to higher metabolic activities because of optimum nitrogen supplies and phytohormones which were manifested in the form of optimum growth (Nirmala *et al.*, 1999).

Average weight of fruit is one of the most important yield contributing character. The treatment T₆ with 84.75g fruits weight was the highest followed by the treatment T₈ (84.62g) as against the treatment of inorganic fertilizer (69.00g) and absolute control (68.11g) this indicated that application of organic manures were effective in increasing fruits size. The finding are in agreement with Nirmala and Vadivel (2000). The yield is a function of fruit size which directly contribute to it could be seen from Table 1 that various treatment of organic and inorganic fertilizers significantly influenced the yield per hectare. The treatment T₃ showed highest fruit yield followed by treatment T₁₀ which was at par with T₇. Both organic (601.623 to 748.377q/ha) and inorganic (743.62q/ha) treatment gave more fruit yield over control (370.75q/ha).The influenced of biofertilizers in increasing yield has been reported by Warade *et al.* (2002)

The number of fruits per plant and average weight of fruit was more in inorganic fertilizer, this might be due to more number of primary branches, yield per plant and per hectare was obtained significantly highest in all organic fertilizer treatment .The yield was significantly influenced various treatments. It varied between 307.75 to 748.377q/ha. On the basis of present investigation following conclusion can be drawn. Use of inorganic fertilizers showed good response for yield parameter and per hectare yields were observed more with inorganic fertilizers. Earliness in flowering fruiting, maximum yield with best performance were obtained with organic manures over inorganic fertilizer and absolute control .The maximum yield could be obtained by the application of FYM (50%N)+Cotton seed cake (50%N) combination followed by the application of inorganic fertilizers. The application

of organic manure helped in improving the soil fertility. Among the organic N sources, FYM and cotton seed cake at different levels and combination stimulated better response than the poultry maures. Treatment T₃ [FYM (50%N) + Cottonseedcake(50%N)+Vermicompost +Suphate of potash + Packge] turned to be the best for increasing the yield of tomato. Thus it could be concluded that, organic farming with use of biofertilizer had a beneficial effect in tomato production and can be practiced for more yield and better quality fruits.

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Received : June, 2010; Accepted : August, 2010