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Short communication

Effect of organic manures and inorganic fertilizers on fruit yield of tomato

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ABSTRACT

Treatments with organic manure, inorganic fertilizers and their combinations showed significant differences for fruit yield and yield attributing traits. Among the treatments, application of 20 t FYM/ ha along with full dose of recommended NPK i.e. 150:60:60 kg NPK / ha recorded the highest fruit yield of 428.32 and 530.55 q/ ha during the year 2002 and 2003, respectively with grand mean fruit yield of 479.43 q/ ha. This treatment was on par with 40 tonnes FYM + ½ dose of recommended NPK during 2002 and 2003, which recorded mean fruit yield of 456.17 q/ ha. Both these treatments were significantly superior to recommended inorganic NPK fertilizer treatment (435.57 q/ ha) as well as to application of different doses of organic manure alone such as FYM and green manure, indicating that integration of both organic manures and inorganic fertilizers are important for obtaining higher fruit yield in tomato. Addition of organic manure besides having favourable effect on crop yield was also found to be better in maintaining soil health and growth of succeeding crop.

Key words: Fruit yield, inorganic fertilizers, organic manures, tomato

Tomato (*Lycopersicon esculentum* Mill.) is one of the most popular vegetables grown all over the world. It is a rich source of minerals, vitamins and organic acids and is universally treated as "Protective food". For realizing higher yields and quality produce, soil health is a critical factor. Therefore, chemical fertilizers must be integrated with organic manures such as, FYM, crop residues and green manures which are renewable and eco friendly to achieve sustainable productivity with minimum deleterious effects of chemical fertilizers on soil health and environment. The yield per unit area can be increased along with the improvement of its quality through the balanced application of organic and inorganic fertilizers in proper combination. Therefore the present investigation was undertaken to find out the optimum dose and best combination of organic manures and inorganic fertilizers for obtaining higher yield of tomato.

The field experiment was conducted at the Vegetable Experimental Farm of the Division of Olericulture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar during Kharif 2002 and 2003.The climate at the experimental site is temperate characterized by mild summers and very cold winters. The soil is clay loam having organic carbon (1.724%), pH (7.0), available N (228.0 kg/ ha), available P (20.67 kg/ ha), available K (156.8 kg/ ha) and electric conductivity (0.16 dsm^{-1}). The experiment was laid out in Randomized Block Design with three replications at a spacing of 60 x 30cm. Nine treatments of organic manures, inorganic fertilizers and their combinations i.e. FYM 40t / ha, FYM 20t / ha, Green manures with cowpea @ 5t / ha, recommended NPK (150:60:60kg / ha), ½ recommended NPK, FYM 40t / ha + ½ recommended NPK, FYM 20t / ha + ½ recommended NPK, FYM 20t / ha + full recommended NPK and Green manuring + ½ recommended NPK were tried on tomato cv. Shalimar –II. The data on growth and yield were recorded from 10 randomly selected plants of each treatment and data analyzed statistically as per standard procedures.

Treatments exhibited significant differences for fruit yield and yield attributing traits. Among the treatments, application of 20t FYM along with full dose of recommended NPK (150:60:60 kg/ ha) recorded the highest fruit yield of 428.32 and 530.55 q/ ha during the year 2002 and 2003, respectively with the grand mean fruit yield of 479.43q / ha. This treatment was at par with 40t FYM + ½ dose of recommended NPK during 2002 and 2003 which recorded mean fruit yield of 456.17q / ha. Both these treatments were significantly superior to recommended inorganic NPK fertilizer treatment (435.57q / ha) as well

Table 1. Response of organic manures v/s inorganic fertilizers on fruit yield of tomato cv. Shalimar-II

S.No	Treatments	Plant height(cm)			No. of fruits/ plant			Av. Fruit weight (g)			Yield (q/ ha)			T.S.S ^{0}Brix		
		2001-02	2002-03	Mean	2001-02	2002-03	Mean	2001-02	2002-03	Mean	2001-02	2002-03	Mean	2001-02	2002-03	Mean
1.	Application of FYM @ 40 t ha^{-1}	38.40	37.80	38.10	21.13	18.10	19.61	30.11	39.59	34.85	353.35	398.14	375.74	4.17	3.66	3.91
2.	Application of FYM @ 20 t ha^{-1}	37.40	34.06	35.73	19.93	10.87	15.40	29.16	53.05	41.10	322.80	320.37	321.58	4.17	3.66	3.91
3.	Green manuring	38.37	36.93	37.65	19.47	16.87	18.17	31.71	38.53	35.12	342.93	361.11	352.02	4.33	4.00	4.16
4.	Application of RFD NPK (150:60:60) ha^{-1}	41.20	47.46	44.33	21.40	20.27	20.83	33.88	41.60	37.74	402.63	468.52	435.57	4.33	4.33	4.33
5.	Application of ½ RFD NPK	39.27	40.33	39.80	18.93	14.13	16.53	30.04	36.33	33.18	315.86	285.18	318.52	4.17	3.66	3.91
6.	Application of FYM @ 40 t ha^{-1} + ½ RFD of NPK	39.53	40.80	40.16	22.40	22.67	22.53	34.04	38.82	36.43	423.46	488.88	456.17	4.00	4.00	4.00
7.	Application of FYM @ 20 t ha^{-1} + ½ ½ RFD of NPK	39.03	40.00	39.51	21.27	19.40	20.33	32.15	38.32	35.23	379.73	412.96	396.34	4.33	3.33	3.83
8.	Application of FYM @ 20 t ha^{-1} + full RFD of NPK	43.27	50.86	47.06	24.00	23.87	23.93	32.13	40.01	36.07	428.32	530.55	479.43	4.17	3.33	3.75
9.	Green manuring + application of ½ RFD of NPK	40.20	44.46	42.33	21.00	17.33	19.16	30.18	43.28	36.73	351.96	416.66	384.31	4.17	3.33	3.75
CD (*P=0.05*)		0.851	NS	0.85	2.02	2.07	2.04	1.76	2.37	2.06	37.49	37.14	37.31	0.33	0.47	0.40

as to application of different doses of organic manures i.e. FYM or green manure, indicating that integration of both organic manures and inorganic fertilizers is important for obtaining higher yield in tomato. The results are in line with the findings of Abusaleha and Shanmugavelu (1998) in bhindi, and Malewar *et al* (1998) in chillies. Organic manures when applied with inorganic fertilizers increases the effectiveness of inorganic manures (Robert and Stephen, 1953). Similarly maximum number of fruits per plant and plant height were recorded with the application of 20t FYM / ha and full recommended dose of NPK followed by 40t FYM / ha and ½ recommended dose of NPK. It is obvious that organic form in combination with inorganic form proved better in increasing the number of fruits / plant, plant height and average fruit weight. This could be attributed to a higher C/N ratio and increased plant metabolism. These results are in conformity with Abusaleha and Shanmugavelu (1988) in bhindi and Mellengouda *et al* (1995) in chillies. The increased vegetative growth and balanced C/N ratio could lead to increased synthesis of carbohydrates which ultimately promoted greater yield. The highest value of total soluble solids in tomato fruit (4.33^0 B) was observed with the treatment combination of 20t FYM / ha + ½ recommended dose of NPK during the year 2002, whereas during the year 2003, maximum of 4.33^0 B was found with the application of recommended NPK *i.e.* 150:60:60 kg NPK /ha. These results are in agreement with the earlier findings of Mohd Rafi *et al* (2002). From the present study it can be inferred that the application of 20t FYM / ha along with full dose of recommended NPK (150:60:60 kg / ha) produce higher yields. Therefore, the results show that the combination of organic manure and inorganic fertilizers helps to improve yield of tomato.

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