

RESEARCH ARTICLE :

Impact of front line demonstration of INM on growth and yield in tomato (*Lycopersicon esculentum* Mill.) cv. ARKARASHAK

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SUMMARY : A field experiment was conducted at the Farmers Field of village Hot Pipaliya district Dewas Madhya Pradesh. The effect of Integrated Nutrient Management (INM) on the growth, yield and contributing nutrient status in tomato. By following a Randomized Complete Block Design, 9 treatments with 3 replications were maintained. The study revealed that the integration of organic manures in combination with inorganic fertilizers was found significant in improving the overall plant growth, yield and soil macro nutrient status than the soil application of either of these nutrients. Maximum plant height and number of leaves per plant were observed with treatment T₇ (FYM 15 mt/ha + Vermicompost 7.5 mt/ha + 75% NPK). The earlier of days to 50% flowering was observed in treatment 20 mt/ha FYM. Highest number of fruit clusters, maximum fruit weight and fruit yield (26.74 mt/ha) were recorded in treatment T₇ (FYM 15 mt/ha + Vermicompost 7.5 mt/ha + 75% NPK). The highest available nitrogen, phosphorus and potassium were found in treatment of ½ NPK + vermicompost 15 mt/ha.

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KEY WORDS :

 FYM, INM, NPK,
Vermicompost,
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BACKGROUND AND OBJECTIVES

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetable crops of India. It is used as a vegetable, soup, salad, pickle, ketchup, puree, sauce and many other ways. It is a good source of vitamin A, B and C. Tomato has acquired the status of world's most popular vegetable crop due to its wider adaptability to various agro climatic conditions. At present, tomatoes rank second, next to potato. Integrated Nutrient management refers to the maintenance of soil

fertility and plant nutrient supply at an optimum level for sustaining the desired productivity through optimization of the benefits from all possible sources of organic, inorganic and biological components in an integrated manner (Kumar *et al.*, 2009) while little information is available on the combined effect of NPK and organic manures on tomato, this study was made to find out the effect of INM on the soil nutrient status of tomato. Fertilizers, no doubt, have played a key role in agriculture production and have changed Asia from a

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region of food scarcity to food sufficiency. But the fertilizer production is largely dependent on the nonrenewable energy sources. Consequently, the use of organic manures to supplement fertilizers has declined substantially. Front line demonstrations on vegetables (Suman, 2014) and chickpea (Singh *et al.*, 2014) had show high impact for enhancing crops productivity.

RESOURCES AND METHODS

The NHRDF-Indore has arranged 5 ha F1 Hybrid Tomato variety Arka Rashak crop demonstrations in Rabi 2014-15 on 20 farmer's field in supervisions of NHRDF Technical under MIDH. All the parents were sown at Farmers Field of village Hot Pipaliya District Dewas M.P. during Rabi 2014 – 2015. Five week old tomato seedlings were transplanted at main field at a distance of 60 x 45 cm. The experiment was laid out in a Randomized Complete Block Design with 3 replications. There were 9 treatments *viz.*, T₁ = FYM 20 mt/ha, T₂ = Half of the recommended NPK + FYM 30 mt/ha, T₃ = Three fourth of the recommended NPK + FYM 25 mt/ha, T₄ = Vermicompost 10 mt/ha, T₅ = Half of the recommended NPK + Vermicompost 15 mt/ha, T₆ = Three fourths of the recommended NPK + Vermicompost 12.5 mt/ha, T₇ = 75% NPK + FYM 15 mt/ha + Vermicompost 7.5 mt/ha, T₈ = Recommended NPK (100:80:60 kg/ha), and T₉ = Control (no organic manures and inorganic fertilizers). The treatments were tested at 5% level of significance. The required amount of fertilizers and manures were weighted by a weighing balance separately. Organic

manures were applied in the field an hour before transplanting by mixing properly with soil. In case of chemical fertilizers, half of the total amount was basal dressed and the remaining half was in circular furrows. The data were collected on nine quantitative characters, *viz.*, plant height (cm), Stem girth (cm), days to 50 % flowering, number of leaves per plants, number of fruit cluster per plant, Days to first fruiting, Days to maturity, fruit weight (g), and yield per plant. While the estimations and analysis of available nitrogen, available phosphorus, and available potash were done in the soil laboratory Indore, Madhya Pradesh.

OBSERVATIONS AND ANALYSIS

The maximum plant height (135.75 cm) was observed (Table 1) with T₇ (FYM 15 mt/ha + Vermicompost 7.5 mt/ha + 75%NPK). The better performance of organic manures in combination with inorganic fertilizers might be due to the fact that the organic manures would have provided the micronutrients in an optimum range to the plant. Application of organic manures would have helped in enhancing the metabolic activity through the supply of such important micronutrients in the early growth phase which in have encouraged the overall growth. Dubey *et al.* (2012) in garden pea and Kumar *et al.* (2012) in ashwagandha have also reported the height plant growth due to the combined application of organic manures and chemical fertilizers. The earliness in days to 50 % flowering (25.21) was recorded in treatments T₁ (FYM 20 mt/ha).

Table 1 : Effect of integrated nutrient management in tomato

Treatments	Treatment combination	Plant height (cm)	Stem girth (cm)	Days to 50% flowering	Number of leaves per plant	Number of clusters per plant	Days to first fruiting	Days to maturity	Fruit weight (g)	Yield (mt/ha)
T ₁	FYM (20 mt/ha)	109.90	2.58	25.21	108.55	4.89	38.50	69.25	39.54	20.71
T ₂	50 % NPK + FYM (30 mt/ha)	127.50	2.51	26.00	106.44	5.45	38.83	68.80	44.98	25.81
T ₃	25% NPK + FYM (25 mt/ha)	114.12	2.58	28.00	107.71	5.63	40.31	68.25	50.01	25.10
T ₄	VC (10 mt/ha)	112.33	2.75	26.00	105.50	6.81	40.31	69.30	43.82	23.07
T ₅	50% NPK + VC (15 mt/ha)	122.60	3.20	28.55	112.33	7.10	35.33	63.33	49.41	26.29
T ₆	25% NPK + VC (12.5 mt/ha)	123.24	2.48	28.66	109.33	6.96	39.57	67.75	52.78	25.33
T ₇	75% NPK + FYM (15 mt/ha) + VC (7.5 mt/ha)	135.75	2.52	26.33	114.50	7.21	38.79	65.28	55.90	26.74
T ₈	100% NPK (100:80:60 kg/ha)	110.60	2.14	30.50	112.44	6.40	44.81	76.96	42.53	22.70
T ₉	Control	105.13	2.60	31.33	97.95	6.06	39.56	68.62	35.28	20.07
	C.D. (P=0.05)	1.64	0.29	1.67	3.76	0.14	4.69	5.9	7.82	2.25

NPK = Nitrogen phosphorus potash, FYM = Farm yard manures, VC = Vermicompost

The earliness in flowering could be attributed to the faster enhancement of vegetative growth and storing sufficient reserved food materials for differentiation of buds into flower buds whereas the delayed flowering by the inorganic fertilizers treatment could be due to extended vegetative phase of the plant by the availability of inorganic nitrogen. Maximum number of leaves per plants (114.50) was recorded in treatment T₇ (FYM 15 mt/ha + vermicompost 7.5 mt/ha + 75% NPK) Table 1. Data clearly indicated that vegetative growth was higher in plots that received integrated (organic and inorganic) nutrient supply. This might be due to the fact that the application of NPK, FYM and vermicompost provided adequate N which is associated with high photosynthetic activity and vigorous vegetative growth. Combination of organic, biofertilizers and inorganic fertilizers significantly increased the number of leaves in cabbage (Kumar *et al.*, 2008). The maximum fruit weight (55.90 g) was recorded in FYM 15 mt/ha + vermicompost 7.5 mt/ha + 75% NPK. The maximum Stem girth (3.20 cm) was recorded in 50% NPK + VC (15 mt/ha). The Minimum Days to first fruiting and minimum Days to maturity 35.33 and 63.33 was recorded in T₅ (50% NPK + VC 15 mt/ha). This might be due to solubilization effect of plant nutrients by the addition of FYM and Vermicompost leading to increased uptake of NPK. Maximum number of fruit clusters (7.21/plant) was recorded with T₇ (FYM 15 mt/ha + vermicompost 7.5 mt/ha + 75% NPK). This confirms the significance of conjunctive use of chemical and organic fertilizers than the individual one which might be due to the solubilization effect of plant nutrients by the addition of FYM and vermicompost leading to increased uptake of NPK (Bahadur *et al.*, 2004). Tomato fruit yield was affected significantly by different treatment. Maximum yield (26.74 mt/ha) was observed in T₇ (FYM 15 mt/ha + vermicompost 7.5 mt/ha + 75% NPK). The reasons for increased fruit yield by the application of NPK with FYM and vermicompost leading to increased uptake of NPK. The results are in agreement with the findings of Kumar and Sharma (2004); Malik and Kumar (2009) and Kumaran *et al.* (1995) Who recorded an increase in fruit yield by the

application of integrated doses of NPK with FYM and vermicompost.

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