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Research Paper

Role of micronutrients on growth, yield and quality production of turmeric

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ABSTRACT

Turmeric is very important spice crop commercially grown throughout the country from last many centuries; it is used in various commercial industries as well as in pharmaceutical industries. It has a great demand in domestic as well as in international market. Due to various schemes sponsored by Spice Board of India and National Horticulture Mission its acreage significantly increased in last few years especially in central India. Considering the importance of turmeric crop it is well documented fact that micronutrients especially zinc and iron played very important role in almost all horticultural crops. In respect of turmeric it was found that zinc and iron alone with FYM played very important role in mother-rhizome production as well as fresh yield of rhizome and fingers and many more related attributes.

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KEY WORDS : Turmeric, Micronutrients, Farm yard manure, Growth, Yield, Quality

Turmeric (*Curcuma longa*) is very important spice crop commercially grown throughout the country from last many countries, it is used in various commercial industries as well as in pharmaceutical industries. It has a great demand in domestic as well as in international market, due to its wider adaptability and also various schemes sponsored by spice board of India and National Horticulture Mission. Its acreage significantly increased in last few years especially in Central India.

It is a well documented fact that micronutrients especially zinc and iron played very important role in almost all horticultural crops. Considering importance of turmeric crop the present experiment was undertaken to study the role of micronutrients on growth and quality production of turmeric.

RESEARCH PROCEDURE

The experiment was conducted at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Experiment was laid in Randomized Block Design with three replications. The treatments were T_1 – 20 t FYM ha^{-1}, T_2 – 20 t FYM + 15 kg Zn ha^{-1}, T_3 – 20 t FYM + 30 kg Zn ha^{-1}, T_4 – 20 t FYM + 15 kg Fe ha^{-1}, T_5 – 20 t FYM + 30 kg Fe ha^{-1}, T_6 – RDF (200:100:100 kg NPK ha^{-1}), T_7 – control (without any application of manures/fertilizers). Turmeric rhizomes were planted at the sides of ridges having plot size 5.40 x 4.50 m^2 (gross plot) and 4.95 x 4.25 m^2 (net plot) with spacing of 45 x 25 cm.

Initial soil status was soil pH (8.57), soil EC (0.38 dSm^{-1}, organic carbon (0.73%), available N, P_2O_5 and K_2O (157.89, 20.16 and 418.88 kg ha^{-1}).

Calculated quantity of fertilizers and FYM with respective quantities of micronutrient were applied as per the treatments. The fertilizers of urea, single super phosphate and muriate of potash were used as source of N, P_2O_5 and K_2O, respectively for T_6 treatment. One fifth of N and K_2O and full dose of P_2O_5 were applied as basal dose. The remaining quantity of N and K were applied as top dressing in split dose of 30, 60, 90 and 120 days after planting. Calculated quantities of FYM with respective dose of micronutrient as per treatment were also applied. Keeping T_7 as control (without any application of fertilizer/ manure).

Growth, yield and quality parameters were recorded with following observation.

Growth:

Height of plant, number of leaves, girth of stem, number of tillers, length of leaf and breadth of leaf.

Yield:

Yield of fresh rhizome/plot, yield of mother rhizome/ ha, yield of fresh finger/plot and yield of fresh finger/ha.

Quality:

Number of mother rhizome/ plant, weight of mother rhizome/ plant, number of fresh finger/plant, weight of fresh finger/plant.

The data were analyzed and interpreted.

RESEARCH ANALYSIS AND REASONING

It is revealed from Table 1 that, the plant growth parameters *i.e.* plant height, number of leaves, stem girth, number of tillers and leaf size were significantly influenced by application of zinc and iron along with FYM. All growth parameters were significantly superior with the application of 20 t FYM + 30 kg Zn ha^{-1} over all treatments except girth of stem. Application of $ZnSO_4$ to the plants plays an important role in regulation of plant growth, as it forms a part of enzyme system, photosynthesis and also play an important role in protein synthesis (Possingham, 1956) similar results of micronutrients were also observed by Viswanath *et al.* (2011) in turmeric cv. SALEM.

Number of tillers and breadth of leaf, which were at

Table 1 : Plant growth as influenced by different level of zinc and iron

Abbr.	Treatments	Height of plant (cm)	No. of leaves	Girth of stem (cm)	No. of tillers	Length of leaf (cm)	Breadth of leaf (cm)
T_1	20 t FYM ha^{-1}	80.35	8.1	1.74	3.23	41.80	14.06
T_2	20 t FYM $^{-1}$ + 15 kg. Zn ha^{-1}	87.62	8.7	1.81	3.86	43.13	14.68
T_3	20 t FYM $^{-1}$ + 30 kg. Zn ha^{-1}	99.77	9.7	1.97	4.20	49.53	15.06
T_4	20 t FYM $^{-1}$ + 15 kg. Fe ha^{-1}	92.45	9.2	1.85	4.06	46.00	14.80
T_5	20 t FYM $^{-1}$ + 30 kg. Fe ha^{-1}	77.67	7.8	1.71	3.00	40.93	13.65
T_6	RDF (200: 100: 100 kg NPK ha^{-1})	83.51	8.5	1.77	3.33	42.36	14.20
T_7	Control	64.22	7.6	1.60	2.50	37.73	13.60
	S.E. (m) $\pm$	0.992	0.090	0.050	0.146	0.637	0.587
	C.D. (P=0.05)	2.787	0.253	0.142	0.411	1.790	1.649

Table 2 : Yield contributing parameters as influenced by different level of zinc and iron

Abbr.	Treatments	No. of mother rhizome/ plant	Wt. of mother rhizome/ plant (g)	No. of fresh finger / plant	Weight of fresh finger / plant (g)
T_1	20 t FYM ha^{-1}	3.13	85.48	11.00	247.76
T_2	20 t FYM $^{-1}$ + 15 kg. Zn ha^{-1}	3.53	96.83	11.33	287.58
T_3	20 t FYM $^{-1}$ + 30 kg. Zn ha^{-1}	3.80	111.45	13.20	342.77
T_4	20 t FYM $^{-1}$ + 15 kg. Fe ha^{-1}	3.66	102.68	11.46	318.24
T_5	20 t FYM $^{-1}$ + 30 kg. Fe ha^{-1}	2.93	83.59	9.46	231.65
T_6	RDF (200: 100: 100 Kg NPK ha^{-1})	3.26	86.74	11.13	265.33
T_7	Control	2.50	64.38	7.16	197.33
	S.E. $\pm$	0.179	2.367	0.496	6.279
	C.D. (P=0.05)	0.503	6.650	1.394	17.636

Table 3 : Yield of turmeric as influenced by the application of different organic manure

Abbr.	Treatments	Yield of fresh mother rhizome/ plot (kg)	Yield of fresh mother rhizome/ ha (q)	Yield of fresh finger / plot (kg)	Yield of fresh finger / ha (q)
T_1	20 t FYM ha^{-1}	7.210	34.28	51.898	246.77
T_2	20 t FYM $^{-1}$ + 15 kg. Zn ha^{-1}	8.695	41.34	61.385	291.88
T_3	20 t FYM $^{-1}$ + 30 kg. Zn ha^{-1}	11.765	55.94	75.326	358.18
T_4	20 t FYM $^{-1}$ + 15 kg. Fe ha^{-1}	9.875	46.95	69.848	332.13
T_5	20 t FYM $^{-1}$ + 30 kg. Fe ha^{-1}	5.970	28.38	48.565	230.92
T_6	RDF (200: 100: 100 Kg NPK ha^{-1})	7.825	37.20	56.638	269.31
T_7	Control	4.315	20.51	31.245	148.56
	S.E. $\pm$	1.127	1.372	1.8444	8.710
	C.D. (P=0.05)	3.166	3.854	5.180	24.163

par with the application of 20 t FYM + 15 kg Fe ha^{-1}. Whereas, minimum performance was recorded in control treatment for all growth characters.

The yield contributing parameters were also significantly influenced by the application of zinc and iron along with FYM (Table 2). The treatment 20 t FYM + 30 kg Zn ha^{-1} exhibited maximum number of mother rhizomes per plant (3.80), similar results were found by Velu (1988) and Balashanmugam *et al.* (1990), which was at par with FYM with 15 kg Fe ha^{-1} (3.66) and with FYM with 15 kg Zn ha^{-1} (3.53).

All other yield parameters such as weight of mother rhizome (111.45), number of fresh fingers (13.20) and weight of rhizome (11.765 kg $plot^{-1}$ and 55.94 q ha^{-1}) fresh finger (342.77 g), yield of fresh finger (75.326 kg $plot^{-1}$ and 358.18 q ha^{-1})were significantly higher in 20 t FYM + 30 kg Zn ha^{-1}. The yield of fresh rhizome per plot was at par with 15 kg Fe ha^{-1} (9.87 kg) and FYM with 15 kg Zn ha^{-1} (8.695 kg) (Table 3). However, minimum values of all these yield contributing parameters were noticed in control treatment.

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