Research Paper | *The Asian Journal of Horticulture,* (June, 2010) Vol. 5 No. 1 : 36-39

Efficacy of multimicronutrients on growth, yield and quality of brinjal (*Solanum melongena* L.) cv. GUJARAT OBLONG BRINJAL-1

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Accepted : *January, 2010*

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ABSTRACT

A field experiment was carried out at the Horticultural Research-cum-Demonstration Farm, B. A. College of Agriculture, Anand Agricultural University, Anand during the year 2007-08 on "Efficacy of multimicronutrients on growth, yield and quality of brinjal (*Solanum melongena* L.) var. GUJARAT OBLONG BRINJAL–1. There were ten treatment combinations comprised of T_1 [NPK (Recommended dose)], T_2 [NPK + FYM (15 t/ha)], T_3 [NPK + FYM + $ZnSO_4$(0.5% FS)], T_4 [NPK + FYM + $FeSO_4$ (0.5% FS)], T_5 [NPK + FYM + $ZnSO_4$ (0.5% FS) + $FeSO_4$ (0.5% FS)], T_6 [NPK + FYM + Local formulation Grade-I (FS)], T_7 [NPK + FYM + Local formulation Grade-II (FS)], T_8 [NPK + FYM + Local formulation Grade-III (FS)], T_9 [NPK + FYM + Local formulation Grade-IV (FS)] and T_{10}[NPK + FYM + Local formulation Grade-V (SA)] were tried in RBD with three replications. The maximum plant height (89.33 cm) was observed in T_5 [NPK + FYM + $ZnSO_4$ (0.5% FS) + $FeSO_4$ (0.5% FS)]. While, maximum plant spread (0.70 sq.m) and numbers of branches per plant (12.33) were observed in T_{10} [NPK + FYM + Local formulation Grade-V (SA)]. Significantly maximum number of fruits per plant (25.00) and total yield per hectare (554.30 q) were recorded in the same treatment. Maximum ascorbic acid (10.13 mg/100g pulp) was registered in T_5 [NPK + FYM + $ZnSO_4$ (0.5% FS) + $FeSO_4$ (0.5% FS)].

Key words : Multimicronutrient, Brinjal, Yield, Quality

Vegetable farming is one of the most important source of farm income and creates impact on the agricultural development and economy of the country. Brinjal or Eggplant (*Solanum melongena* L.) is an important vegetable crop belongs to the family *Solanaceae.* Brinjal is cultivated in India as one of the leading vegetables and it is the second major vegetable crop next to potato. The fruit borne singly or in clusters on branch. The supply of micronutrient along with recommended dose of NPK and organic manures in adequate amounts and in proper proportion is one of the important factors which control the growth and development of brinjal. Nutrition plays an important role in growth, yield and quality of brinjal. Micronutrients like Zn, Fe and different multimicronutrients grade like Grade–I, Grade–II, Grade–III, Grade-IV and Grade-V etc. are used in brinjal crop for better growth, yield and quality of fruits. Keeping this in view, the present investigation was carried out.

MATERIALS AND METHODS

The experiment was laid out in Randomized Block Design (RBD) with 10 treatments comprising of T_1 [NPK (Recommended dose)], T_2 [NPK + FYM (15 t/ha)], T_3 [NPK + FYM + $ZnSO_4$(0.5% FS)], T_4 [NPK + FYM + $FeSO_4$ (0.5% FS)], T_5[NPK + FYM + $ZnSO_4$ (0.5% FS) + $FeSO_4$ (0.5% FS)], T_6 [NPK + FYM + Local formulation Grade-I (FS)], T_7 [NPK + FYM + Local formulation Grade-II (FS)], T_8 [NPK + FYM + Local formulation Grade-III (FS)], T_9 [NPK + FYM + Local formulation Grade-IV (FS)] and T_{10}[NPK + FYM + Local formulation Grade-V (SA)] were tried. All treatments were replicated thrice.

Brinjal (*Solanum melongena* L.) is usually propagated through seedling. Four weeks old healthy and uniform seedlings of Brinjal var. 'Gujarat Oblong Brinjal -1' were selected and transplanted in the experimental plots at a spacing of 90 ´ 60 cm. The recommended cultural practices were followed during the experimentation. Foliar spraying was carried out at 30, 60, 90, days after transplanting. $ZnSO_4$, $FeSO_4$, Grade-I, Grade-II, Grade-III and Grade-IV were applied as a foliar spray. For foliar spraying, solution was prepared in water @ 1 ml/lit of water. Finally spraying was carried out with standard knapsack sprayer uniformly, whereas Grade- V was applied as a soil application @ 20 kg/ha.The data on plant growth, yield and quality were recorded and statistically analyzed.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been presented in the following sub heads:

Efficacy of multimicronutrients on growth characters:

The maximum plant height was recorded in T_5 [NPK + FYM + $ZnSO_4$ (0.5% FS) + $FeSO_4$ (0.5% FS)] at 30, 60 and 90 days after transplanting, the values being 30.63, 66.33, 89.33 cm, respectively. This perceptible increase in height is due to active synthesis of tryptophan, in the presence of Zn which acts as precursor of IAA, which stimulates the growth of plant tissues. There is an enhancement in cell multiplication and cell elongation resulting in more plant height. Application of Fe, though promotive, but comparatively less effective than Zn. This poor response may be due to its immobility in the plant body as compared to other elements. These results are in consonance with those of Medhi and Kakati (1994) and Bose and Tripathi (1996).

The maximum plant spread was recorded in T_{10} [NPN + FYM + Grade-V (SA)], at 30, 60 and 90 days after transplanting, the values being 0.21, 0.48, 0.70 sq.m, respectively. Improvement in plant spread could be attributed to multimicronutrients. The positive influence of zinc could be because of increase in shoot length and plant vigour, while iron is involved in carbohydrate metabolism, protein synthesis, formation of chlorophyll and biological oxidation. Moreover, multimicronutrients activate several enzymes (catalyse, peroxidase, alcohol, dehydrogenase, carbonic dehydrogenase, tryptophan synthatase etc.) and involved themselves in chlorophyll synthesis and various physiological activities which encouraged plant spread. These findings are in line with the results obtained by Bose and Tripathi (1996).

The maximum number of branches was recorded in T_{10} [NPK + FYM + Grade-V (SA)] at 30, 60 and 90 days after transplanting, the values being 6.67, 8.33, 12.33, respectively. The increase in number of branches due to multimicronutrients could be attributed to improved root system of plants resulting in absorption of more water and nutrients and its utilization. The positive influence of zinc on number of branches could be due to increase in shoot length and vigour, while boron plays an essential role in the development and growth of new cell in the plant meristem by increasing auxin activity. These findings are in conformity with the results reported by Singh and Singh (1986-89), Singh *et al.* (1989) and Bose and Tripathi (1996).

Efficacy of multimicronutrients on yield and yield attributing characters :

The number of flowers per plant was found non-significant but maximum flowers (43.00) were recorded in T_{10}. The number of fruits were found significant.It was maximum (25.00) in T_{10} [NPK + FYM + Grade-V (SA)]. The number of fruits per plant was increased due to the influence of Fe, Zn, B, Mn, Cu for higher rate of photosynthesis and sugar formation by increase in chlorophyll content and enzymaytic activities. There was a favourable effect of Zn on number of fruits per plant which may be ascribed to its involvement in all the six classes of enzymetic activities of plant metabolism, while the effect of Fe may be attributed to higher rate of chlorophyll synthesis, cytochrome photoxidase activity and enhanced rate of photolysis of water, whereas boron has beneficial effect on better fertilization and faster fruit development due to increasing pollen producing capacity of the anthers as well as the viability of pollen grains (Agrawal *et al.,* 1981), all of which contribute to more photosynthetic activity and higher production of sugars and ultimately more number of fruits per plant. These

Table 1: Efficacy of multimicronutrients on different growth parameters of brinjal var. 'GOB-1' at 30, 60 and 90 days interval

Treatments	Plant height (cm)			Plant spread (sq.m)			Number of branches/plant		
	30 Days	60 Days	90 Days	30 Days	60 Days	90 Days	30 Days	60 Days	90 Days
T_1	20.57	45.33	63.33	0.11	0.32	0.53	3.67	5.33	8.33
T_2	21.83	55.00	65.33	0.12	0.34	0.56	4.00	5.67	8.67
T_3	27.20	59.83	78.00	0.19	0.43	0.65	6.00	7.33	10.33
T_4	24.90	63.33	73.33	0.17	0.40	0.61	4.67	6.33	9.33
T_5	30.63	66.33	89.33	0.18	0.41	0.64	5.33	7.00	10.00
T_6	21.93	58.33	67.67	0.13	0.36	0.58	4.33	6.00	9.00
T_7	27.17	62.67	76.33	0.21	0.45	0.67	6.00	7.67	10.67
T_8	25.00	60.67	72.67	0.16	0.37	0.60	5.00	6.67	9.67
T_9	25.67	64.00	76.67	0.18	0.46	0.69	6.33	8.00	11.33
T_{10}	27.63	65.27	84.33	0.21	0.48	0.70	6.67	8.33	12.33
S.E. ±	1.28	3.26	4.27	0.005	0.01	0.02	0.34	0.42	0.43
C.D (P=0.05)	3.81	9.68	12.69	0.015	0.03	0.06	1.02	1.25	1.28
C.V %	8.80	9.40	9.91	5.51	5.52	6.01	11.46	10.68	7.50

Table 2 : Efficacy of multimicronutrients on flowering, yield and quality parameters of brinjal var.'GOB'-1

Treatments	No. of flower/ plant	No. of fruit /plant	Yield / plot (kg)	Yield (q/ha)	TSS (%)	Ascorbic acid (mg/100 g pulp)
T_1	32.00	17.00	29.76	344.44	4.23	7.33
T_2	34.00	21.00	38.87	449.83	4.67	7.23
T_3	36.33	24.00	43.90	508.13	4.90	7.37
T_4	36.00	23.33	43.18	499.74	4.83	8.03
T_5	33.00	24.33	46.71	541.00	5.13	10.13
T_6	35.00	22.00	40.48	468.52	4.90	7.57
T_7	39.00	24.67	46.40	537.04	5.03	8.73
T_8	37.00	23.00	41.95	485.56	4.97	9.00
T_9	40.00	21.33	39.59	458.20	5.40	8.60
T_{10}	43.00	25.00	47.89	554.30	5.20	9.80
S.E. ±	2.31	1.03	2.42	27.95	0.27	0.44
C.D (P=0.05)	NS	3.06	7.20	83.05	NS	1.33
C.V %	10.96	7.80	9.88	9.85	9.55	9.28

NS-Non significant

results are in accordance with the results reported by Sharma (1995), Bose and Tripathi (1996).

The yield of brinjal per hectare was found to be significant. It was maximum (554.30 q/ha) in T_{10} [NPK + FYM + Grade-V (SA)], followed by T_5 [NPK + FYM + $ZnSO_4$ 0.5% (FS) + $FeSO_4$ 0.5% (FS) and T_7 [NPK + FYM + Grad-II (FS)], the values being 541.00 and 537.04 q/ha, respectively. While it was minimum in T_1 *i.e.* recommended dose (344.44 q/ha). The higher yield observed due to the multimicronutrient treatments may be attributed to enhanced chlorophyll contents, enzymatic activity and rapidly increased photosynthetic activities and translocation of more photosynthates to growing fruits, which ultimately lead to higher production of dry matter and more yield (Table 2).

The multimicronutrient application in soil was more effective than foliar application. This may be due to the need for micronutrients at early stages for proper establishment and growth of brinjal. The soil application is the sound practice which can not be substituted by foliar feeding. These results are in conformity with the results reported by Kumbhar and Deshmukh (1993), Ravichandran *et al.* (1995) and Verma *et al*. (1995).

Efficacy of multimicronutrients on quality characters:

It was observed that the effect of multimicronutrients on total soluble solids was found to be non significant. However, it was recorded maximum (5.20%) in the treatment T_{10} [NPK + FYM + Grade-V (SA)], while it was minimum (4.23%) in T_1 (Recommended dose). Those results are in the line with those of Verma *et al*. (1995).

The maximum ascorbic acid (10.13 mg / 100g pulp) was recorded in treatment T_5, while it was minimum in treatment T_2 [NPK + FYM (15t/ha)] *i.e.* 7.23 mg / 100 g pulp. The higher ascorbic acid content of fruits may be due to accelerated activity of ascorbic acid oxidase enzyme in presence of these multimicronutrients (Fe, Zn). The role of zinc in enhancement of ascorbic acid content, may be due the ability of Cu uptake, which forms part of the enzyme ascorbic acid oxidase. These results are in agreement with the results obtained by Suryanarayana Reddy *et al*. (1985) Kumbhar and Deshmukh (1993) and Verma *et al.* (1995).

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