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Effect of foliar application of micronutrients on flowering and fruit set of tomato (*Lycopersicon esculentum* Mill.) cv. PHULE RAJA

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ABSTRACT

The flowering parameters like days required for initiation and 50 per cent flowering, number of clusters, number of flowers, total number of flowers and fruit setting percentage per plant were influenced significantly due to different treatments. The minimum number of days (30.00) for initiation of flowering and 50 % flowering (38.86) were recorded with Boron 50 ppm and 100 ppm while the maximum number of days were recorded in control. The treatment Boron 100 ppm + Iron 200 ppm + zinc 200 ppm was most effective in increasing number of clusters (13.85) and number of flowers (51.24) per plant. Maximum number of flowers (3.80) per cluster and per cent fruit setting (47.76 %) was recorded with boron 50 ppm + Iron 100 ppm + zinc 100 ppm, while minimum was recorded in control.

Key words : Micronutrients, Foliar application, Tomato, Flowering, Cluster, ppm.

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is one of the most commonly grown vegetable crop of the world due to its wide adaptability under various agroclimatic conditions. In India, it occupies an area of 5.35 Lakh hectares with annual production of 93.62 MT (Anonymous, 2008). It is one of the most popular and widely grown vegetable in the world ranking second in important to potato in many countries. The fruits are eaten raw or cooked. Its many forms are adopted to wide range of soils and climates extending from the tropics to almost the Arctic circle. It has many other uses; tomato seeds contain 24 per cent oil used as salad oil and in the manufacture of margarine. The productivity of tomato in India is 17.50 MT ha^{-1} which is quite low and it is being affected in different areas due to deficiencies of micronutrients observed primarily due to intensive cropping and imbalanced fertilization. Tomato being a heavy feeder and exhaustive crop removes substantial amount of micronutrients from soil. To maintain sustainability in its production and nutritive value, it is becoming essential to apply micronutrients through foliar spray to meet the immediate need of the crop. The micronutrients like boron, zinc, copper and iron, if applied through foliar can also improve the flowering and fruit set percentage of tomato (Arora *et al.*,1983). Response of vegetable crops to the application of small quantities of micronutrients element have been reported by Mallick and Muthukrishnan (1980) in tomato. An investigation was, therefore, conducted to find out the influence of foliar application of micronutrients on flowering and fruit setting of tomato cv. PHULE RAJA.

MATERIALS AND METHODS

A field experiment was conducted at Instructional-cum Research Farm, Department of Horticulture, College of Agriculture, Latur, Marathwada Agricultural University, Parbhani during *Kharif* 2008-09. The experiment was laid out in a Randomized Block Design with nine treatment *viz.*, T_1) Control, T_2) Boron 50 ppm, T_3) Boron 100 ppm, T_4) Iron 100 ppm, T_5) Iron 200 ppm, T_6) Zinc 100 ppm, T_7) Zinc 200 ppm, T_8) Boron 50 ppm + Iron 100 ppm + Zinc 100 ppm and T_9) Boron 100 ppm + Iron 200 ppm + Zinc 200 ppm. The micronutrients were applied in the form of borax, ferrous sulphate and zinc sulphate as source of Boron, Iron and Zinc, respectively. The crop was raised at a spacing 60 cm x 60 cm with recommended dose of N, P and K *viz.*, 100: 50: 50 kg/ha, respectively. The required concentration of micronutrients were prepared by directly mixing required quantity of micronutrients in water and the spray solutions were used for spraying immediately after preparation. The spray of micronutrients was given using hand sprayer (Ganesh). These sprays are given at 30, 40 and 50 days after transplanting. All the leaves on both sides were completely sprayed with micronutrients. Precautions were taken to avoid the drizzling of the sprays on the other treatments. Observations were recorded and statistically analyzed as per method given by Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Table 1:

The minimum number of days (30.00) required for initiation of flowering were recorded in treatments T_2 and

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Table 1: Effect of foliar application of micronutrients on flowering and fruit set (%) of tomato cv. PHULE RAJA

Tr. No.	Treatments	Days required for initiation of flowering	Days required for 50% flowering	No. of clusters/plant	No. of flowers/cluster	Total No. of flowers/plant	Fruit set/ plant (%)
T_1	Control	30.93	39.80	13.37	3.40	45.45	45.76
T_2	Boron (50 ppm)	30.00 (-3.00)	38.86 (-2.36)	13.65 (2.09)	3.65 (7.35)	49.87 (9.72)	45.05
T_3	Boron (100 ppm)	30.00 (-3.00)	38.86 (-2.36)	13.07 (-2.24)	3.43 (0.88)	44.86 (-1.29)	47.83
T_4	Iron (100 ppm)	30.33 (-1.93)	39.40 (-1.00)	13.16 (-1.57)	3.54 (4.11)	46.63 (2.59)	44.69
T_5	Iron (200 ppm)	30.40 (-1.72)	39.20 (-1.50)	13.03 (-2.54)	3.45 (1.47)	44.97 (-1.05)	44.78
T_6	Zinc (100 ppm)	30.06 (-2.81)	39.40 (-1.00)	13.07 (-2.24)	3.53 (3.82)	46.19 (1.62)	43.66
T_7	Zinc (200 ppm)	30.33 (-1.93)	39.00 (-2.01)	13.63 (1.94)	3.30 (-2.94)	45.30 (-0.33)	44.21
T_8	Boron+ Iron+ Zinc (50 +100 +100 ppm)	30.60 (-1.06)	39.46 (-0.85)	13.16 (-1.57)	3.80 (11.76)	50.00 (10.01)	47.76
T_9	Boron+ Iron+ Zinc (100+200+200 ppm)	30.20 (-2.36)	39.06 (-1.85)	13.85 (3.59)	3.70 (8.82)	51.24 (12.73)	46.58
	S.E. $\pm$	0.26	0.36	0.10	0.06	0.77	0.04
	C.D. (P=0.05)	0.79	NS	0.29	0.18	2.32	0.12

Fig. in parenthesis indicated the per cent increases over control NS = Non significant

T_3 followed by treatments T_6, T_4, T_7, and T_5. These treatments were at par with each other. These treatments were significantly superior over control. Maximum number of days (30.93) required for initiation of flowering were recorded in control (T_1). The minimum number of days (38.86) required for 50% flowering were recorded in T_2 and T_3 while maximum number of days required for 50 % flowering was recorded in control (T_1).

Early and better flowering might be due to cell wall development, cell division and pollen growth took place by boron. Similar results were reported by Pillai and Vadivelu (1966), Pillai (1967) and Makhan *et al*. (2003) in tomato.

The application of Boron 100 ppm + Iron 200 ppm + Zinc 200 ppm (T_9) recorded maximum number of clusters (13.85 *i.e.* 3.59%) per plant. This was significantly superior over all other treatments and at par with treatment T_2 and T_7. The minimum number of clusters (13.03) per plant was recorded in treatment T_5 and which was at par with treatments T_3, T_6, T_8 and T_4. The maximum number of flowers per cluster (3.80 *i.e.* 11.76%) were recorded in treatment T_8 which was statistically at par with treatments T_9 and T_2. This treatment was significantly superior over all other treatments. The minimum number of flowers per cluster (3.30) were recorded in treatment T_7 which was statistically at par with treatments T_5, T_3 and T_1. Rest of the treatments were statistically similar. The highest number of flowers (51.24 *i.e.* 12.73%) per plant were recorded in treatment T_9 which was statistically at par with treatment T_8 (50.00 *i.e.* 10.01%) and T_2 (49.87 *i.e.* 9.72%). This treatment was most effective treatment for increasing number of flowers per plant and significantly superior over all other treatments.

The lowest number of flowers (44.86) per plant was recorded in treatment T_3 which was statistically at par with treatments T_5, T_7, T_1, T_6 and T_3.

The maximum number of flowers might be due to enhancement in the translocation of carbohydrates from the site of synthesis to the storage tissue in the plant. The above findings are in conformity with the results reported by Pillai and Vadivelu (1966) and Tamilselvi *et al.* (2005) in tomato.

Effect on fruit set (%) :

In tomato the maximum yield can be attributed to the maximum percentage of fruit set. The maximum per cent fruit set (47.83 %) was recorded with Boron 100 ppm which was atatistically at par with T_8. The increased fruit set due to Boron application might be due to the increased level of sugar in stigma of the flower which helped in better pollen germination and pollen tube growth. Increase in fruit set per centage in tomato might be due to biosynthesis of auxin. The results are in accordance with the findings of Rajamani *et al*. (1990), Singh and Singh (1996) and Tamilselvi *et al*.(2005).

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