International Journal of Agriculture Innovations and Research
Volume 7, Issue 4, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy):
Received: 05/02/2019 | Accepted on: 20/02/2019 | Published: 02/03/2019

Response of Foliar Application of Nova Amino Chelated-Boron on Vegetative Growth, Fruit Yield and Quality of Tomato

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Abstract **– An investigation was carried out during *kharif*, 2018 in tomato crop by application of Nova Ami-B in combination with recommended dose of fertilizers to evaluate the efficiency of Nova amino chelated boron. The experiment was laid out in Randomized Block Design(RBD) with five treatments and control i.e T_1: Control (No application of any fertilizer), T_2: Recommended Dose of Fertilizers (RDF), T_3: T_2+ 2.5g/l Boron at 20 and 45 DAT, T_4: T_2 + 2.5ml/l of Nova Ami-B at 20 and 45 DAT, T_5: 2.5g/l Boron at 20 and 45 DAT, T_6: 2.5ml/l of Nova Ami-B at 20 and 45 DAT. Experiment revealed that application of (T_4) Recommended Dose of Fertilizers + Nova Ami-B resulted in improved plant height, number of flowers per plant, number of fruits per plant, fruit weight per plant, total soluble solids and lycopene content over other treatments but T_3 showed more number of leaves per plant.**

Keywords **– Amino Chelate, Boron, Plant Height, Tomato.**
Abbreviations: **TSS - Total Soluble Solids; Ami - B - Aminochelated Boron; KG - Kilograms; RDF - Recommended Dose of Fertilizers; DAT - Days After Transplanting.**

I. Introduction

Tomato is one of the most important vegetable crop in the world. It ranks third in the worlds vegetable production next to potato and sweet potato, placing itself first as processing crop among the vegetables. Tomato is important and popular vegetable in India. India is a second largest producer (11.5%) of tomato in the world after China. Tomato plays an important role in human nutrition by providing essential amino acids, vitamins and minerals [1]. It also contains lycopene, which is very important antioxidant and can prevent cancer.

Boron (B) is a micronutrient critical to the growth and health of all crops. Boron plays a key role in a diverse range of plant functions including cell wall formation, stability, maintenance of structural and functional integrity of biological membranes. Reported that Boron is involved in movement of sugar or energy into growing parts of plants, pollination and seed set [2]. Have suggested the involvement of boron in stomatal regulation [3].

In crop production boron (B) is one of the essential micronutrient required for normal growth of most of the crops. Boron fertilization is necessary for improvement of crop yield as well as nutritional quality. Boron fertilization improves photosynthetic activity, enhances activity of enzymes and plays significant role in protein and nucleic acid metabolism [4]. The boron requirement is much higher for reproductive growth than for vegetative growth in most plant species. Boron increases flower production and retention, pollen tube elongation and germination, seed and fruit development. Foliar application of boron is preferred over soil application because of the very narrow range from deficient to toxic levels [5].

II. Material and Methods

A field experiment on tomato (cv. Pusa Ruby) was conducted in the *kharif*, 2018 at Nova Agritech Ltd. Experimental farm, Kamareddy, Telangana, India. To determine the effect of Nova amino chelated-boron on yield components and quality parameters of tomato. The six treatments were replicated in four times in a randomized block design. The field was prepared by ploughing and leveling, divided into small plots of 25m^2 (5m×5m) and the tomato seedlings were raised on nursery beds. Then 25 days after, seedling with 3-4 leaves transplanted in prepared plots with a distance of 60cm×60cm within and between the rows. The crop was grown under recommended package of practices and proper care was taken to protect it from weeds, insects, pests and diseases during entire cropping season. Data was recorded on established plants at 10 days after sprayings. Plant height, number of leaves per plant, number of flowers per plant, number of fruits per plant, fruit weight, lycopene content, total soluble sugars and yields were recorded. A total of two foliar sprays were carried out during the cropping season.

Table 1. Treatments:

T_1	Control (No application of any fertilizer).
T_2	Recommended dose of fertilizers (RDF)
T_3	T_2+2. 5g/l Boron at 20 and 45 DAT
T_4	T_2 + 2.5ml/l of Nova Ami-B at 20and 45 DAT.
T_5	2.5g/l Boron at 20 and 45 DAT
T_6	2.5ml/l of Nova Ami-B at 20and 45 DAT

III. Result and Discussions

The findings in the present study as well as relevant discussion have been presented under following heads.

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Table 2. Effect of Nova Ami-Boron on Growth and Yield of Tomato.

Treatments	Plant height (cm)	No. of leaves/ plant	No. of flowers /plant	No. of fruits /plant	Fruit weight/ Plant (kg)	TSS (˚Brix)	Lycopene content mg/100g
T_1	85.00	55.50	35.75	18.75	0.710	3.69	4.408
T_2	110.50	67.00	76.75	53.25	1.248	5.38	4.798
T_3	116.75	75.50	90.25	56.25	1.748	5.53	4.845
T_4	121.88	74.75	95.75	67.25	1.903	5.64	4.918
T_5	99.75	58.50	66.50	34.50	1.003	4.54	4.600
T_6	107.5	60.00	61.50	40.50	1.208	4.70	4.683
SEm	2.1755	2.5275	3.3019	1.8981	0.0510	0.0790	0.0816
CD 5%	6.5575	7.618	9.9531	5.7215	0.1538	0.2382	0.2458
CV	4.07	7.752	9.2903	8.4204	7.8345	3.2155	3.4641

A. *Plant Height*

Plant height ranged from 122 to 85 cm. Among the various treatments, application of RDF + 2.5ml/l of Nova Ami-B at 20and 45 DAT (T_4) results significantly higher plant height of 122cm. Reported that higher dose of boron and medium dose of nitrogen were influential nutrients for increasing the plant height [6]. Boron increased plant height and the number of branches of tomato plant by promoting root growth, which enhances nutrient absorption [7]. Deficiency of calcium and boron decreases plant height by decreasing mitotic activity in the terminal meristem [8].

B. *Number of Leaves per Plant*

Results revealed that significant differences were present in number of leaves per plant. Among six treatments T_3 (T2 + 2.5g/l Boron at 20 and 45 DAT) recorded the highest number of leaves followed by T_4 (T2 + 2.5ml/l of Nova Ami-B at 20 and 45 DAT). Boron enhance the number of metabolites necessary for building plant organs, conse--quently the vegetative growth of plants [9]. The foliar application of B and Zn have a significant effect on overall development of plant [10].

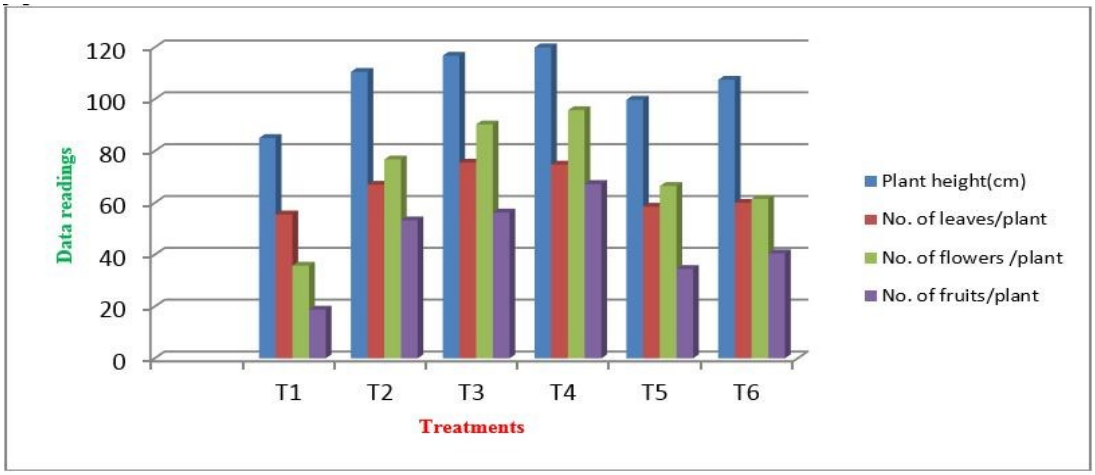

Fig. 1. Influence of Nova Ami-B on plant height, no. of leaves, no. of flowers and no. of fruits.

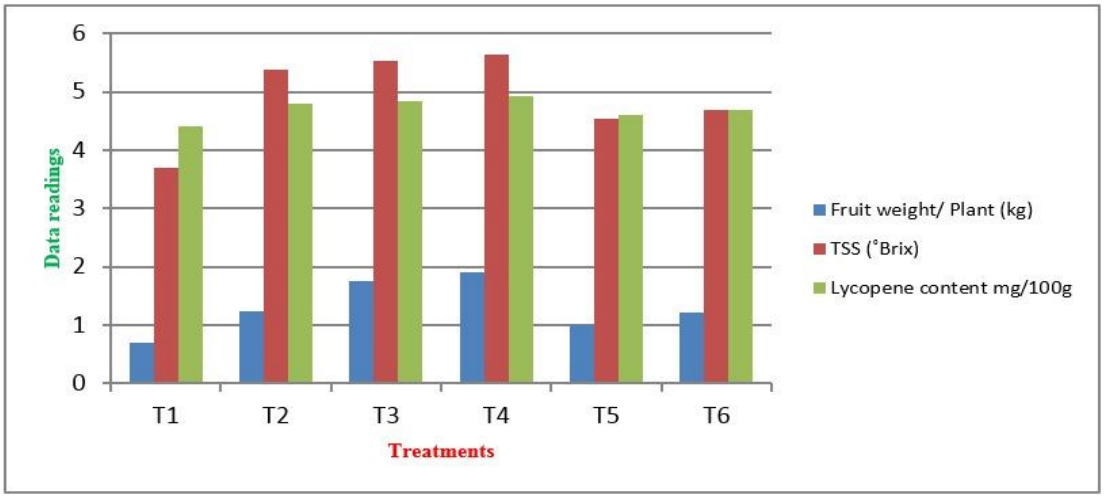

Fig. 2. Influence of Nova Ami-B on Fruit weight, TSS and Lycopene content.

C. *Number of Flowers per Plant*

The present research work showed that maximum number of flowers observed in T_4 (T2 + 2.5ml/l of Nova Ami-B at 20and 45 DAT) and minimum number of flowers recorded in T_1 (Control). Stated that higher dose of boron favored the higher number of flower clusters in tomato [6]. Reported that optimum supply of boron promoted more flower clusters formation [12]. Foliar application of borax resulted in a significant increase in the number of flowers per cluster [11].

D. *Number of Fruits per Plant*

This observation indicates that Highest number of fruits found in T_4 which differed significantly with all other treatments. Lowest number of fruits recorded in T_1 (Control). Observed that number of fruits per cluster was increased with increasing level of boron [6]. The application of boron enhances fruit set [13] by delaying abscission of flowers [14]. These results agree with reported by [15].

E. *Fruit Weight per Plant*

The obtained results shows fruit weight per plant varied from 1.903 to 0.710. Maximum fruit weight was observed in T_4 which shows significant differences with other treatments. Minimum fruit weight was recorded in T_1. The fruit weight of tomato increased significantly with foliar application of boron [11].

F. *Total Soluble Solids:*

The present study confirms that maximum TSS was recorded in T_4 which differed significantly with T_1, T_2, T_5, T_6 and showed parity with T_3. The total soluble solids (TSS) in tomato fruit was extremely low at the lowest B level. B is needed for the production of uracil, a pre-curser of uridine-diphosphate-glucose (UDPG), an essential enzyme for the production of sucrose. Sucrose is easily translocated, and important for carbohydrate translocation [14].

G. *Lycopene Content*

The present study revealed that significant differences were observed among treatments. Maximum amount of lycopene content observed in T_4 which shows on par with T_3, T_2 and minimum amount of lycopene recorded inT_1. Lycopene content of the fruit gradually increased with the increasing boron [16].

IV. Conclusion

It can be concluded that from the study application of Recommended Dose of Fertilizers + Nova Ami-B resulted in improved plant height, number of flowers per plant, number of fruits per plant, fruit weight per plant, total soluble solids and lycopene content over other treatments.

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