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Effect of Foliar Application of Boron and Zinc on Growth, Yield and Quality of Local Brinjal (*Solanum melongena* L.) Genotypes

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ABSTRACT: Brinjal (*Solanum melongena* L.) or eggplant is one of the most common, popular and principle vegetable crop grown in West Bengal. The flower dropping and less fruit setting which resulted low fruit yields of brinjal are remarkably observed due to micronutrient deficiencies in soil particularly boron and zinc. Keeping this view, the field experiment was conducted at Experimental Farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal during two consecutive winter seasons of 2018-19 and 2019-20 to find out suitable local brinjal genotype in combination with micronutrient application. The experiment was laid out in Factorial RBD with three replications. The treatments comprised of eight local brinjal genotypes (V_1 - Kaljani, V_2 - Seleti, V_3 - Guriarpar, V_4 - Lopcha, V_5 - Baromasi, V_6 - Barshali, V_7– Lambate & V_8 - Ashapuri) and four micronutrient foliar application (T_0 - Control, T_1 - 150 ppm boron, T_2 - 0.4% Zinc Sulphate & T_3 - 150 ppm boron + 0.4% Zinc Sulphate). There were significant variations among genotypes for all growth and yield as well as quality trait due to boron and zinc applications. The maximum plant height (67.66 cm), number of flowers/plant (68.66), number of fruits/plant (28.49), fruit length (19.74 cm), fruit diameter (62.67 mm), individual fruit weight (164.50 g) and fresh fruit yield (23.46 t/ha) were exhibited by foliar application of 150 ppm boron + 0.4% zinc sulphate followed by foliar application of 0.4% zinc sulphate. Among the genotypes, Lopcha recorded maximum fresh fruit yield per plant (2.01 kg) and total marketable fruit yield of 25.15 t/ha followed by Kaljani (24.72 t/ha) and Guriarpar (23.53 t/ha). Whereas, lowest fresh fruit yield (14.14 t/ha) was produced by genotype Barshali. The maximum total soluble solid (TSS) of 4.92°Brix was recorded by Barshali, but it was found highest (4.74^0 Brix) in control treatment *i.e.* no micronutrient application.

Keywords: Brinjal, *Solanum melongena*, genotypes, micronutrients, growth, yield and quality.

INTRODUCTION

Brinjal or eggplant (*Solanum melongena* L.) which belongs to family Solanaceae with diploid chromosome number, is one of the most common, popular and principal vegetable crops grown in India and other parts of the world. Other major brinjal producing countries are China, Turkey, Japan, Egypt, Indonesia, Iraq, Italy, Syria and Spain. Basically, brinjal is a perennial herbaceous crop but cultivated as annual with hermaphrodite flowers production. It can easily be cultivated under wide range of climatic condition. Due to the wide diversity the demand of cultivar depends on regional preferences for colour, size and shape of the fruits. It is rich source of vitamins particularly group ‘B’, protein, minerals, fibre and organic acids (Gopalan *et al.*, 2004; Nachar *et al.*, 2019) as well as medicinal importance (Neill *et al.*, 1999).

Micronutrients are those nutrients which are required by the plant in very small quantity but very essential to complete their lifecycle successfully and deficiency of which may cause drastic reduction in yield. Among the eight essential micro-nutrients for plant, boron and zinc is one of the most important elements. Boron have unique role for growth and development of the plant. It has direct effect on regulation of various physiological and bio-chemical activities in plant system *viz.*, division of cell, respiration, metabolism of RNA, transportation sugar, development of hormone, cell wall formation and development, metabolism of Indole Acetic Acid (IAA) and cell membrane formation (Marschner, 1995). Boron deficiency causes delay in pollen germination and pollen tube development and ultimately it halts flowering and fruit setting (Halfacre and Barden, 1979). Boron also plays an important role in flowering and fruit formation (Nonnecke, 1989). Several studies have been conducted on effect of boron on flowering and fruit setting in tomato and potato which are belong to the same family Solanaceae. Zinc plays important role on growth and development as well as carbohydrates, protein metabolism and sexual fertilization of plant (Imtiaz *et al.*, 2003; Vasconcelos *et al.*, 2011). It is alsovery essential element for various enzymatic activities that control different metabolic activities in plant system. It is helpful for producing plant hormone like auxin which is one of the endogenous plant growth substances. Carbohydrate transportation from one place to another, sugar movement and respiration process are also regulated by zinc. Due to deficiency of zinc not only the growth, flowering, fruit formation, fruit setting percentage, fruit development is reduced remarkably but also delay in maturity is observed and the eventual outcome is low in yield (Gupta, 1995).

Foliar application of liquidated nutrients to the foliage of the plant is very important approach that allows plants to uptake the nutrients through their leaves (stomata), epidermis and bark. Although, it is not a substitute of soil application but obviously supplement. In adverse condition when soil application of nutrients become impossible then foliar fertilization may become very effective, specifically for micronutrients. Since plants directly absorb the nutrients through their leaves due to having higher nutrients absorption capacity of stomata in comparison to other parts of the plant. Hence, there is no chance for leaching loss and fixation in the soil as well as promotes quick response of the plants is noticed against foliar fertilization. Keeping all the information in purview present investigation was laid out with the basic objectives to find out the suitable brinjal genotype with high yield potential and good quality as well as effect of foliar application of Boron and Zinc under Terai region of West Bengal.

MATERIALS AND METHODS

The experiment was conducted at the Experimental Farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, India under the department of Vegetable and Spice Crops during 2018-19 and 2019-20. Geographically the farm is situated at 26 019'86" N latitude and 890 23'53" E longitude, at an elevation of 43 meter above mean sea level. The area lies under the teraiagro-climatic zone of West Bengal. The soil is sandy loam in nature, coarse in texture, poor in water holding capacity with low pH (5.5). The climatic condition of terai zone is sub-tropical humid in nature characterized by high rainfall, high relative humidity, moderate temperature, prolonged winter with high residual soil moisture. The experiment was laid out in Factorial Randomized Block Design with three replications. The seeds were sown in the nursery bed during rabi seasons *i.e.* first week of September in both the years. Forty days old seedlings were transplanted at a spacing of 90 cm × 90 cm in well prepared plot of 4 m x 2 m in each replication. The experiment comprised of eight brinjal genotypes (V_1 - Kaljani, V_2 - Seleti, V_3 - Guriarpar, V_4 - Lopcha, V_5 - Baromasi, V_6 - Barshali, V_7–Lambateand V_8 - Ashapuri) and four micronutrient foliar application (T_0- Control, T_1 - 150 ppm boron, T_2 - 0.4% Zinc Sulphate & T_3 - 150 ppm boron + 0.4% Zinc Sulphate). A recommended dose of 25 t FYM/ha, 120: 90: 80 kg N: P_2O_5: K_2O kg/ha were applied. The entire dose of phosphorus, potash and 1/3rd of nitrogen were applied at the time of planting as basal dose. The remaining 2/3rd nitrogen were applied in two split doses at 30 and 60 days after planting. The recommended package of practices and plant protection measures were followed to raise a successful crop. Observations were recorded from five randomly selected plants in each plot on different traits viz. plant height, number of leaves per plant, number of primary branches, number of flowers per plant, number of fruits per plant, fruit length, fruit diameter, individual fruit weight, fruit yield and total soluble solids (TSS). The mean data for all observations were pooled and subjected to statistical analysis by the Analysis of Variance method (Gomez and Gomez 1984).

RESULTS AND DISCUSSIONS

A. Effect of boron and zinc on Vegetative Growth

The data recorded concerning to plant height of brinjal genotypes was presented in Table 1 revealed that different micronutrient applications had significant effects on plant height but their interaction had no positive influences on this parameter. The highest mean value (67.66 cm) of plant height was recorded by plants treated with foliar application of 150 ppm boron + 0.4% zinc sulphate (T_4) followed by the foliar application of 0.4% zinc sulphate (64.94 cm); whereas minimum plant height (61.79 cm) was observed in control treatment (T_0). Among the brinjal genotypes, Lambate(V_7) produced maximum plant height (78.82 cm) closely followed by Lopchu (77.32 cm). While, Ashapuri (V_8) recorded shortest plant height (54.61 cm). The genotype Lambate with foliar application of 150 ppm boron + 0.4% zinc sulphate contributed highest plant height of 80.85 cm. The statistical analysis revealed that the brinjal genotypes had significant effect on number of primary branches per plant but micronutrient application and their interaction were found non-significant (Table 1). The pooled values for number of primary branches per plant due to different micronutrient application confirmed that comparatively greater number of primary branches per plant (5.56) was recorded with foliar application of 150 ppm boron (T_1).The mean values intended for number of primary branches per plant cleared that this trait was counted maximum (6.86) for genotype Baromasi followed by Guriarpar (5.94) and Kaljani (5.58), whereas, the least number of primary branches per plant (4.65) was recorded for Lopcha. The genotype Baromasi without micronutrient application (control) produced comparatively the higher number of primary branches per plant (7.25) followed by Baromasi with 150 ppm boron (6.90).

B. Effect of boron and zinc on yield and yield related traits

Table 2 presented that different micronutrient foliar applications had significant influences on number of flowers per plant. The brinjal genotypes were also significantly varied for number of flowers per plant but the interaction between genotypes and micronutrient foliar application was found to be non-significant. The number of flowers per plant ranged between 22.83 to 276.74 for brinjal genotypes. Maximum number of flowers per plant (276.74) were recorded in Baromasi (276.74) followed by Lambate (52.47), whereas, lowest magnitude was recorded in Barshali (22.83). The highest number of flowers per plant (68.66) was recorded with150 ppm boron + 0.4% zinc sulphate, while the least number of flowers per plant (60.57) was counted in control treatment (T_0). The genotype Baromasi produced significantly highest number of flowers plant^{-1} (285.92) when treated with150 ppm boron + 0.4% zinc sulphate, against the least number (18.57) was evidenced for Barshali with no micronutrient application. The data concerning to number of fruits per plant of brinjal genotypes are demonstrated in Table 2. The statistical analysis of the data revealed that different brinjal genotypes and micronutrient foliar applications had significant effects on number of fruits plant^{-1}. The mean values of different micronutrient applications confirmed that maximum number of fruits per plant (28.49) was contributed with 150 ppm boron + 0.4% zinc sulphate, against the minimum number of fruits per plant(24.37) was counted from control treatment. The highest number of fruits per plant (90.52) was counted for genotype Baromasi, whereas, the least number (11.87) was recorded by genotype Barshali. The interaction effects were found to be non-significant. Comparatively, the genotype Baromasi with 150 ppm boron + 0.4% zinc sulphate produced highest number of fruits per plant (94.35) followed by Baromasi with 0.4% zinc sulphate (90.37), Baromasi with 150 ppm boron (89.52) and Baromasi without micronutrient application (87.85), whereas lowest number (10.06) was produced by genotype Barshali with without micronutrient application. Earlier, Pandav *et al.* (2016) reported that application of zinc sulphate as foliar spray at the rate of 0.4% markedly enhanced the number of fruits per plant (25.56 over control 18.80) in brinjal. Suganiya and Harris (2015) in brinjal *cv.* Thinnavelli purple observed that 150 ppm boron markedly enhanced the number of fruits per plant (40.10) which was 216% higher as compared to control.

Significant variations were observed among brinjal genotypes with respect to fruit length, while micronutrient had no positive effects on this trait (Table 3). Based on pooled performance the highest magnitude for fruit length (27.12 cm) was recorded in Barshali followed by Kaljani (25.47 cm) and Seleti (24.09 cm). While, lowest value was recorded in Ashapuri (8.71 cm). The analysed data cleared that comparatively the longer fruit (20.54 cm) was exhibited by foliar application of 0.4% zinc sulphate followed by foliar application of 150 ppm boron + 0.4% zinc sulphate (19.74 cm), whereas, lowest estimate (19.25 cm) was recorded in control (T_0). Among the interactions, comparatively the longer fruit (27.40 cm) was recorded in Barshali treated with 0.4% zinc sulphate followed by Barshali treated with 150 ppm boron + 0.4% zinc sulphate (27.20 cm). Pandav *et al.* (2016); Angami *et al.* (2017); Saha *et al*. (2020) in their earlier works suggested the effect of boron and zinc on fruit length.

The analysed data for fruit diameter in Table 3 revealed that brinjal genotypes varied significantly for this trait but non-significant influences were found due to micronutrient applications and their interactions. The highest magnitude for fruit diameter (81.20 mm) was recorded in Ashapuri which was closely followed by genotype Guriarpar (79.62 mm) and Lopcha (79.56 mm), whereas, the lowest mean value of fruit diameter (15.39 mm) was resulted in genotype Baromasi. Comparatively the highest fruit diameter of 62.67 mmwas exhibited by foliar application of 150 ppm boron + 0.4% zinc sulphate. Among the interaction effects considerably the highest magnitude of fruit diameter (81.41 mm) was recorded in Ashapuri genotype treated with 150 ppm boron as foliar application. In similar way, the thinner fruit (15.08 mm) was recorded in Baromasi without micronutrient application. Though, Pandav *et al.* (2016); Angami *et al. (*2017); Saha *et al*. (2020) in their earlier works suggested the significant effects of boron and zinc on fruit diameter.

The data pertaining to individual fruit weight of brinjal genotypes are demonstrated in Table 4. The statistical analysis revealed that different genotypes, micronutrient applications and their interaction had significant effects with respect to individual fruit weight. The pooled values indicated that maximum fruit weight (164.50 g) was documented for plants sprayed with 150 ppm boron + 0.4% zinc sulphate followed by 0.4% zinc sulphate treatment (160.80 g) and 150 ppm boron application (160.76 g), at the same time the lowest weight (159.68 g) was evidenced in control treatment (T_0). The maximum individual fruit weight (216.60 g) was calculated for genotype Kaljani followed by followed by Ashapuri (183.02 g) and Seleti (182.47 g), whereas, it was recorded minimum (25.30 g) in Baromasi. The genotype Kaljani with foliar application of 150 ppm boron + 0.4% zinc produced the maximum individual fruit weight (220.90 g), against the minimum fruit weight (25.02 g) was found in cultivar Baromasi without micronutrient application. The perusal of data in Table 4 exposed that different micronutrient applications, genotypes and their interaction significantly influenced the fruit yield plant per plant. The maximum fruit yield per plant (1.87 kg) was recorded for plots treated with 150 ppm boron + 0.4% zinc sulphate. While, minimum amount of fruits per plant (1.48 kg) was recorded from plots. Among the genotypes, maximum fruit yield per plant (2.01 kg) was exhibited by Lopcha which was statistically *at par* with Kaljani (1.99 kg), against the minimum value of 1.14 kg was recorded by genotype Barshali. The foliar application of 150 ppm boron + 0.4% zinc sulphate to genotype Lopcha contributed highest fruit yield per plant (2.32 kg) followed by Kaljani treated with 150 ppm boron + 0.4% zinc sulphate (2.20g). On contrary, it was found minimum (0.95 kg per plant) in genotype Barshali without micronutrient spray. Fruit yield per plant is very important which can be improved and explored through varietal or agronomic practices for the success of any crop. In fact, the augmentation in fruit yield was predicted for the positive involvement of micronutrients application in the direction of yield contributing components such as number of flowers per plant, number of fruits per plant, individual fruit weight and producing more vigorous growth. These consequences are in concord with the findings of Siddiky *et al.* (2007); Singh and Mukherjee (2010); Raj *et al.* (2001) in brinjal; Sivaiah *et al.* (2013); Swetha *et al.* (2018) in tomato and Ramgiry *et al.* (2019) in chilli. The perusal of data in Table 5 revealed that brinjal genotypes showed significant variations due to different micronutrient applications and their interactions with respect to total fruit yield per hectare. The maximum marketable fruit yield per hectare (23.46 t) was recorded from plants treated with 150 ppm boron + 0.4% zinc sulphate followed by foliar application of 150 ppm boron (20.78 t/ha) and foliar application of 0.4% zinc sulphate (20.41 t/ha). At the same time, lowest amount of fresh marketable fruit (18.43 t/ha) was recorded in control plots (T_0). Among the genotypes, Lopcha produced maximum fruit yield (25.15 t/ha) followed by Kaljani (24.72 t/ha), Guriarpar (23.53 t/ha), while minimum yield of 14.14 t/ha was observed in Barshali genotype. The cultivar Lopcha combined with 150 ppm boron + 0.4% zinc sulphate exhibited highest total fruit yield (29.06 t/ha), whereas, it was minimum (11.82 t/ha) in genotype Barshali without micronutrient application.

C. Effect of boron and zinc on quality trait

The data pertaining to total soluble solid (TSS) in Table 5 showed that there was significant effect due to application of different micronutrients in brinjal genotypes. Total soluble solid was decreased by application of micronutrients. The pooled values for this trait cleared that the highest TSS (4.74°Brix) was recorded in control treatment followed by foliar application of 150 ppm boron (4.66°Brix) and foliar application of 0.4% zinc sulphate (4.64°Brix). The brinjal genotypes were also significantly varied among themselves for total soluble solid. The genotype Guriarpar recorded maximum TSS (4.92°Brix), whereas, lowest magnitude was recorded in Ashapuri (4.49°Brix). Among the interactions, the highest magnitude for the total soluble solids (5.16°Brix) was recorded in Guriarpar treated with 150 ppm boron and Lopcha without micronutrient spray (5.16°Brix). On the other hand, the minimum total soluble solid (4.36°Brix) was recorded in Lopcha treated with 150 ppm boron + 0.4% zinc sulphate and Baromasi with 150 ppm boron + 0.4% zinc sulphate (4.36°Brix).

Table 1: Effect of boron and zinc on plant height & number of primary branches plant^{-1} of local brinjal genotypes (2 years pooled).

Treatment	Plant height (cm)					Number of primary branchesplant^{-1}				
	T_0	T_1	T_2	T_3	Mean	T_0	T_1	T_2	T_3	Mean
V_1	58.52	60.66	62.50	67.45	62.28	5.50	5.84	5.32	5.67	5.58
V_2	68.84	72.72	74.62	76.84	73.26	5.14	5.14	5.67	5.31	5.32
V_3	52.26	52.31	56.00	60.30	55.22	6.03	6.03	5.85	5.85	5.94
V_4	74.54	76.26	77.85	80.64	77.32	4.78	4.60	4.78	4.42	4.65
V_5	52.96	53.55	55.10	57.13	54.69	7.25	6.90	6.73	6.56	6.86
V_6	57.55	58.01	58.94	60.89	58.85	4.96	5.48	4.96	5.13	5.13
V_7	77.09	77.95	79.39	80.85	78.82	5.32	5.14	5.32	5.14	5.23
V_8	52.58	53.51	55.13	57.20	54.61	4.78	5.31	4.78	4.96	4.96
Mean	61.79	63.12	64.94	67.66		5.47	5.56	5.43	5.38	
	S. Em (±)		C.D. at 5%			S. Em (±)		C.D. at 5%		
V	0.50		1.55			0.16		0.46		
T	0.78		2.20			0.12		NS		
V × T	1.55		NS			0.33		NS		

T_0: Control, T_1: 150 ppm boron, T_2: 0.4% Zinc Sulphate, T_3: 150 ppm boron + 0.4% Zinc Sulphate, V_1: Kaljani, V_2: Seleti, V_3: Guriarpar, V_4: Lopcha, V_5: Baromasi, V_6: Barshali, V_7: Lambate, V_8: Ashapuri, NS: Non-significant

Table 2: Effect of boron and zinc on number of flowers plant^{-1}&number of fruits plant^{-1} of local brinjal genotypes (2 years pooled).

Treatment	Number of flowers plant^{-1}					Number of fruits plant^{-1}				
	T_0	T_1	T_2	T_3	Mean	T_0	T_1	T_2	T_3	Mean
V_1	25.95	29.19	31.21	34.11	30.12	14.93	16.63	16.62	17.95	16.53
V_2	37.35	30.62	32.66	35.23	33.97	13.45	16.49	18.07	20.02	17.01
V_3	27.35	29.58	30.82	34.61	30.59	16.61	18.64	19.75	21.53	19.13
V_4	27.68	31.06	33.29	36.42	32.11	18.65	20.00	18.83	22.48	19.99
V_5	266.83	275.72	278.47	285.92	276.74	87.85	89.52	90.37	94.35	90.52
V_6	18.57	21.97	23.50	27.28	22.83	10.06	11.80	11.35	14.25	11.87
V_7	48.84	51.26	52.81	56.97	52.47	18.74	18.58	20.22	20.50	19.51
V_8	31.97	34.72	35.96	38.74	35.35	14.67	16.17	16.04	16.82	15.93
Mean	60.57	63.02	64.84	68.66		24.37	25.98	26.41	28.49	
	S. Em (±)		C.D. at 5%			S. Em (±)		C.D. at 5%		
V	0.74		2.10			0.20		0.57		
T	0.53		1.48			0.14		0.40		
V × T	1.49		NS			0.09		NS		

T_0: Control, T_1: 150 ppm boron, T_2: 0.4% Zinc Sulphate, T_3: 150 ppm boron + 0.4% Zinc Sulphate, V_1: Kaljani, V_2: Seleti, V_3: Guriarpar, V_4: Lopcha, V_5: Baromasi, V_6: Barshali, V_7: Lambate, V_8: Ashapuri, NS: Non-significant

Table 3: Effect of boron and zinc on fruit length & fruit diameter of local brinjal genotypes (2 years pooled).

Treatment	Fruit length (cm)					Fruit diameter (mm)				
	T_0	T_1	T_2	T_3	Mean	T_0	T_1	T_2	T_3	Mean
V_1	25.06	25.15	25.52	26.14	25.47	65.70	65.49	65.69	65.85	65.68
V_2	24.11	24.06	24.06	24.13	24.09	59.68	60.04	60.49	60.80	60.25
V_3	17.12	17.20	17.07	17.30	17.17	79.54	79.65	79.57	79.70	79.62
V_4	17.53	17.66	17.68	17.69	17.64	78.15	80.05	80.01	80.01	79.56
V_5	15.81	16.60	16.69	16.70	16.45	15.08	15.45	15.35	15.67	15.39
V_6	26.86	27.02	27.40	27.20	27.12	39.71	40.00	40.09	40.53	40.08
V_7	18.95	19.32	27.40	19.76	21.36	76.56	76.93	77.00	77.54	77.01
V_8	8.52	8.78	8.53	9.01	8.71	81.03	81.41	81.06	81.28	81.20
Mean	19.25	19.47	20.54	19.74		61.93	62.38	62.41	62.67	
	S. Em (±)		C.D. at 5%			S. Em (±)		C.D. at 5%		
V	0.36		1.03			0.65		1.83		
T	0.26		NS			0.46		NS		
V × T	0.73		NS			0.78		NS		

T_0: Control, T_1: 150 ppm boron, T_2: 0.4% Zinc Sulphate, T_3: 150 ppm boron + 0.4% Zinc Sulphate, V_1: Kaljani, V_2: Seleti, V_3: Guriarpar, V_4: Lopcha, V_5: Baromasi, V_6: Barshali, V_7: Lambate, V_8: Ashapuri, NS: Non-significant

Table 4: Effect of boron and zinc on individual fruit weight & fruit yield plant^{-1} of local brinjal genotypes (2 years pooled).

Treatment	Individual fruit weight (g)					Fruit yield plant^{-1} (kg)				
	T_0	T_1	T_2	T_3	Mean	T_0	T_1	T_2	T_3	Mean
V_1	213.08	216.19	216.23	220.90	216.60	1.76	2.00	1.99	2.20	1.99
V_2	181.00	181.34	181.36	186.16	182.47	1.35	1.66	1.82	2.07	1.73
V_3	174.72	175.06	175.08	183.23	177.02	1.61	1.81	1.92	2.19	1.88
V_4	179.00	179.57	179.60	185.43	180.90	1.85	1.99	1.88	2.32	2.01
V_5	25.02	25.33	25.37	25.48	25.30	1.22	1.26	1.27	1.33	1.27
V_6	171.19	172.60	172.66	174.65	172.78	0.95	1.13	1.09	1.38	1.14
V_7	152.75	153.20	153.24	154.31	153.38	1.59	1.58	1.72	1.76	1.66
V_8	180.65	182.79	182.85	185.80	183.02	1.47	1.64	1.63	1.74	1.62
Mean	159.68	160.76	160.80	164.50		1.48	1.63	1.66	1.87	
	S. Em (±)		C.D. at 5%			S. Em (±)		C.D. at 5%		
V	0.32		0.90			0.02		0.05		
T	0.23		0.64			0.01		0.03		
V × T	0.64		1.80			0.03		0.09		

T_0: Control, T_1: 150 ppm boron, T_2: 0.4% Zinc Sulphate, T_3: 150 ppm boron + 0.4% Zinc Sulphate, V_1: Kaljani, V_2: Seleti, V_3: Guriarpar, V_4: Lopcha, V_5: Baromasi, V_6: Barshali, V_7: Lambate, V_8: Ashapuri

Table 5: Effect of boron and zinc on total fresh fruit yield & total soluble solid of local brinjal genotypes (2 years pooled).

Treatment	Fruit yield hectare^{-1} (t)					TSS (^{0}Brix)				
	T_0	T_1	T_2	T_3	Mean	T_0	T_1	T_2	T_3	Mean
V_1	21.96	24.85	24.69	27.38	24.72	4.66	4.46	4.41	4.66	4.55
V_2	16.84	20.80	22.75	25.92	21.58	4.46	4.61	4.61	4.56	4.56
V_3	20.12	22.60	23.95	27.45	23.53	4.96	5.16	4.81	4.76	4.92
V_4	23.13	24.92	23.48	29.06	25.15	5.16	4.41	4.76	4.36	4.67
V_5	15.17	15.67	15.85	16.67	15.84	4.71	4.66	4.46	4.36	4.55
V_6	11.82	13.94	13.51	17.28	14.14	4.71	4.71	4.86	4.96	4.81
V_7	19.87	19.88	21.59	22.08	20.86	4.76	4.66	4.76	4.71	4.72
V_8	18.50	20.65	20.43	21.84	20.36	4.46	4.46	4.61	4.41	4.49
Mean	18.43	20.41	20.78	23.46		4.74	4.64	4.66	4.60	
	S. Em (±)		C.D. at 5%			S. Em (±)		C.D. at 5%		
V	0.18		0.50			0.05		0.14		
T	0.13		0.35			0.03		0.10		
V × T	0.35		1.07			0.09		0.27		

T_0: Control, T_1: 150 ppm boron, T_2: 0.4% Zinc Sulphate, T_3: 150 ppm boron + 0.4% Zinc Sulphate, V_1: Kaljani, V_2: Seleti, V_3: Guriarpar, V_4: Lopcha, V_5: Baromasi, V_6: Barshali, V_7: Lambate, V_8: Ashapuri, NS: Non-significant

CONCLUSIONS

From the above discussion, it is concluded that foliar application of 150 ppm boron + 0.4% zinc sulphate followed by 0.4% zinc sulphate considered best for growth, yield, earliness and quality parameter in brinjal. Among the different varieties, Lopcha, Kaljani and Guriarpar considered as most promising. Lopcha and Guriarpar treated with foliar application of 150 ppm boron + 0.4% zinc sulphate considered best for yield as well as quality respectively.

FUTURE SCOPE

There is need for evaluation of performance with multiple levels of micro nutrient to establish the synchronicity between crop demand and nutrient supply, as well as, to find out the optimum region-specific dose to obtain ensured yield and quality. Evaluation of the performance under varied agro-climatic conditions need to be worked out. Detailed study of nutrient response and crop demand on economical characters may be carried out. Nutrient response on other quality parameters *viz.*, phenol, anthocyanin can be carried out.

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REFERENCES

Angami, T., Chandra, A., Makdoh, B., Raghav, C. S., Assumi, S. R., Baruah, S., Bam, B., Sen, A. and Kalita, H. (2017). Promising influence of micronutrients on yield and quality of chilli under mid hill conditions of Arunachal Pradesh. *The Bioscan, 12*(3),1633-1636.

Gomez, K. A., and Gomez, A. A. (1984). *Statistical procedures for agricultural research (2nd Edn.)*. pp 680. John Wiley and Sons, New York.

Gopalan, C., Sastri, B. V. R. and Balasubramanian, S. C. (2004). *Nutritive value of Indian foods*, pp 2-58. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India.

Gupta, V. K. (1995). *Micronutrient Research and Agricultural Production (Tandon, HLS. Ed.)*, pp 132-160. Fertilizer Development and Consultation Organisation, New Delhi, India.

Halfacre, R. G. and Barden, J. A. (1979). *Horticulture*, pp 27-28. McGraw Hill Book. Co. USA.

Imtiaz, M., Alloway, B. J., Shah, K. H., Siddiqui, S. H., Memon, M. Y., Aslam, M. and Khan, P. (2003). Zinc Nutrition of Wheat: II: Interaction of zinc with other trace elements. *Asian Journal of Plant Sciences, 2*(2), 152-5.

Marschner, H. (1995). *Mineral Nutrition of Higher Plants, 2nd ed*. Academic Press, New York.

Nachar, K. A., Hasian, J. and Khatib, R. A. (2019). Investigation and Measurement of Some Mineral and Vitamins in Eggplant Fruit Calyx, and the Possibility of being Used as Food Supplements and Alternative Medicine. *Journal of Food and Nutrition, 5***,** 1-10.

Neill, O. C., Hawkes, F. R., Lourenco, N. D. and Pinheiro, H. M. (1999). Colour in textile effluents-source, measurement, discharge contents and simulation A review. *J Chem Technol Biotechnol, 74***,** 1009-1018.

Nonnecke, I. B. L. (1989). *Vegetable Production*. pp 220-229. Avi Book Publishers. New York, USA.

Pandav, A. K., Nalla, M. K., Aslam, T., Rana, M. K.and Bommesh, J. C. (2016). Effect of foliar application of micronutrients on growth and yield parameters in eggplant cv HLB 12. *Environment & Ecology, 35*(3), 1745-1748.

Raj, G. B., Patnaik, M. C., Reddy, I. P. and Rao, A. P. (2001). Response of brinjal (*Solanum melongena* L.) to zinc and iron. *Vegetable Science, 28*(1), 80-81.

Ramgiry, M., Ramgiry, P. and Verma, B. K. (2019). Effect of foliar spray of micronutrients to enhance seed yield and quality in chilli (*Capsicum annuum* L.). *International Journal of Pure and Applied. Biosciences, 7*(2), 275-278.

Saha, B., Prabhakar, M., Saha, S., Pal, M., Mandal, J., Singh, R., Singh, A. P., Ranjan, A., Shamim, M.and Singh, P. K. (2020). Could maneuvering the methods of zinc and boron application influences yield and agro-morphological traits of brinjal in inceptisols? *International Journal of Chemical Studies, 8*(2), 11-15.

Siddiky, M. A., Halder, N. K., Islam, Z., Begam, R. A. and Masud, M. M. (2007). Performance of brinjal as influenced by boron and molybdenum. *Asian Journal of Plant Sciences, 6*(2), 389-393.

Singh, D.and Mukherjee, S. (2010). Effect of farm yard manure, chemical and biofertilizers on growth parameters and yield of brinjal (*Solanum melongena* L.). *Green-Farming, 1*(2), 155-157.

Sivaiah, N. K., Swain, S. K., Varma, S. V. and Raju, B. (2013). Effect of foliar application of micronutrients on growth parameters in tomato (*Lycopersicon esculentum* Mill.). *Discourse Journal of Agriculture and Food Sciences, 1*(10), 146-151.

Suganiya, S.and Harris, K. D. (2015). Effect of boron on flower and fruit set and yield of ratoon brinjal crop. *International Journal of Scientific Research and Innovative Technology, 2*(1), 135-141.

Swetha, K., Saravanan, S. and Banothu, L. N. (2018). Effect of micronutrients on fruit quality, shelf life and economics of tomato (*Solanum lycopersicum* L.) cv. pkm-1. *Journal of Pharmacognosy and Phytochemistry, 7*(5), 3018-3020.

Vasconcelos, A. C. F., Nascimento, C. W. A. and Filho, F. C. (2011). Distribution of zinc in maize plants as a function of soil and foliar Zn supply. *International Research Journal of Agricultural Science and Soil Science, 1*(1), 1-5.

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