The Pharma Innovation Journal 2022; 11(6): 1917-1921

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(6): 1917-1921

www.thepharmajournal.com
Received: 02-03-2022
Accepted: 16-05-2022

Sarla Verma
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Jitendra Trivedi
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Vijay Jain
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Dhananjay Sharma
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Kamal Narayan Verma
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Shani Raj
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Corresponding Author:
Sarla Verma
Department of Vegetable Science, College of Agriculture and Research Station, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Effect of foliar application of micronutrient on yield of tomato (*Solanum lycopersicum*) var. Kashi Adarsh under Chhattisgarh plain condition

Sarla Verma, Jitendra Trivedi, Vijay Jain, Dhananjay Sharma, Kamal Narayan Verma and Shani Raj

Abstract
A field experiment was conducted at the Farm of Krishi Vigyan Kendra, Pahanda (A), Durg (C.G.) under Department of Vegetable Science, College of Agriculture, IGKV, Raipur (C.G.). During *rabi* season of 2020-21 with a view to study the "Studies on the effect of foliar application of micronutrient on yield of tomato (*Solanum lycopersicum*) var. Kashi Adarsh under Chhattisgarh plain condition". The tomato variety Kashi Adarsh was used to grown and treatment was replicated three times in completed randomized block design. The soil of experimental site was vertisol belonging to textural class clay. The investigation There were two nutrients Boron (B), and Zinc (Zn), which were applied at different concentrations in tomato in seven treatment *viz*., T_1: - Control (water spray only), T_2:- Zinc 0.1%, T_3:- Zinc 0.2%, T_4:- Boron 0.1%, T_5:- Boron 0.2%, T_6:- Zinc 0.1% + Boron 0.1% and T_7:- Zinc 0.1% + Boron 0.1%. The yield parameters *i.e.,* number of fruits per plant, fruit diameter (cm), yield per plant (kg), yield per plot (kg), total yield (t/ha), total soluble solids (°Brix), acidity % and dry matter content (%) were significantly superior in the treatment T_7 (Zinc 0.2% + Boron 0.2%). On the basis of above findings, treatment T_7 (Zinc 0.2% + Boron 0.2%) stand could be better performance first in position and T_6 (Zinc 0.1% + Boron 0.1%) stand in second order of preference. However, treatment T_5 (Boron 0.2%) comes in next in order. Therefore, it may be concluded that treatment T_7 (Zinc 0.2% + Boron 0.2%) may be prefer for higher growth and yield in tomato.

Keywords: Yield parameter, boron, zinc, °brix, tomato, Kashi Adarsh, micronutrient

1. Introduction
Tomato (*Solanum lycopersicum*) is one of the most important vegetable crop in India as in the world. It was originated in Western South America and domestication is thought to have occurred in Central America. Its belong to family solanaceae having chromosome number 2n=2x=24. It is cultivated all over the world. At present, there exists a great range of varieties cultivated all year round with fruits of different sizes, shapes and colours. Besides, it is rich in fibre and low in calories, it also supplying good amount of vitamins and minerals also. Apart from the raw consumption, it is also cooked, stewed, fried, pickling, as sauce or combining with other foodstuffs. Also it view as best when the maximum yield is observed in warm climates with good illuminance.

Tomato is mainly grown in India, America, Pakistan, China, Nepal, Bangladesh etc. In India, it is commercially grown in Rajasthan, Gujarat, Madhya Pradesh, Haryana, West Bengal, Punjab and Maharashtra etc. In India, tomato is grown in an area of 0.79 million hectare with an annual production of 19.33 million tones. (Anon., 2018-19) [2].

In Chhattisgarh, tomato is grown in an area of 64,717 hectare, with an annual production of 11,82,648 metric tonnes and the productivity of 16.42 MT/ha which is less than the national average (Anonymous, 2019-20) [3]. The major tomato producing districts of Chhattisgarh are Raipur, Durg, Bastar, Balod and Jaspur. Majority of Indians are vegetarian, with a per capita consumption of 135 g per day as against the recommended 300 g vegetable per day. It is still very less than recommended daily diet level. Moreover, tomato enjoys a significant position based on nutritional view point as its 100 g encompasses virtually 48 mg calcium, 27 mg ascorbic acid, 20 mg phosphorus, 3.6 g carbohydrates, 0.9 g proteins, 0.8 g fiber, 0.4 mg iron, 0.2 g fats and 20 K calories of energy. Besides these nutrients it also comprises β-carotene and lycopene pigments. Lycopene is extremely vital as it is responsible for the respective red colour of tomatoes. Tomatoes also keep the blood vessels in healthy condition and prevent scurvy (Ejaz *et al.*, 2011) [4].

2. Materials and Methods

The field experiment was conducted at the farm of Krishi Vighyan Kendra, Pahanda (A), Block- Patan, Dist-Durg, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). lies between 20º54' and 21º32' North latitude & 81º10' and 81º36' East longitude and at an altitude of 317 m above mean sea level. Climate of the Durg is of tropical type. Summer is a little bit hotter. Rise of temperature begains from the month of March to May. May is hottest among other. Durg district's annual average rainfall is 1052 mm. During the year, most rainfall occurs during the monsoon months June to September. July is the month of highest rainfall. In general, weekly maximum temperature goes upto 47 °C during the summer season and minimum temperature falls upto 12 °C during the winter season. And the soil of experimental site was vertisol belonging to textural class clay.

The manures, at the pace of 120:100:60 kg NPK ha^{-1}, were applied individually. The entire full dose of P_2O_5 and K_2O in form of Single Super Phosphate and Muriate of Potash were applied. Half amount of nitrogen as a basal portion use of Urea, and remaining dose of nitrogen was applied split two application of 35 DAT and 45 DAT at blossoming stage. Nitrogen, Phosphorus and Potassium were applied through Urea, Single Super Phosphate (SSP) and Muriate of Potash (MOP), individually. Observations were recorded on single plant basis from five randomly tagged competitive plants of each treatment for all the traits separately. Recorded observations were averaged over replication to get treatment mean.

3. Results and Discussion

Data pertaining to yield attributes influenced by various treatment has been given in table 1 and fig 1, 2, 3, 4, 5, 6, 7 and 8.

Significantly highest number of fruits per plant (43.34) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest number of fruits per plant (30.25) was observed in treatment $T_{1:}$ Control (water spray only). Also similar result found by Kumar *et al*. (2016), Studied the effect of micronutrients and bio-fertilizers on yield and yield attributes of tomato. The experiment was laid out in randomized block design with eleven treatments including control (water spray only) and replicated three times and results were showed in pooled basis.

Significantly highest fruit diameter (4.54 cm) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest fruit diameter (3.05 cm) was observed in treatment T_1 (Control (water spray only) plot water spray). Also similar result found by Shukla (2017), conducted an experiment to study the effect of foliar application of micronutrients on growth and yield of tomato (*Lycopersicon esculentum* L.) cv. Arka Rakshak.

Significantly highest yield per plant (1.49 kg) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest yield per plant (1.22 kg) was observed in treatment $T_{1:}$ Control (water spray only). Similar result were reported by Reddy *et al*. (2018), studied the effect of foliar application of micronutrients on growth and yield parameters in tomato (*Solanum lycopersicon* L.) resulted that tomato cv. Arka sourabh, maximum growth rate (85.7%) was observed with application of zinc, followed by micronutrients mixture (78.2%) and boron (77.5%). However in tomato cv. Arka vikas, maximum increase in branches per plant was observed with the application of manganese (148.7%) followed by micronutrient combination (144.1%). In Arka sourabh, the fruit yield per plant ranged from 1.336 kg to1.867 kg and in Arka vikas, it ranged from 1.500 kg to 1.967 kg. This study proves that foliar application of micronutrients produced the good growth and maximum fruit yield in tomato.

Significantly highest yield per plot (894.00 kg) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest yield per plot (750.00 kg) was observed in treatment $T_{1:}$ Control (water spray only). Increase in yield was due to increase in number of fruits per plant, fruit weight and number of branches per plant. Also similar result found by Reddy *et al*. (2018)**.**

Significantly highest total yield (62.04 t/ha) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest total yield (51.60 t/ha) was observed in treatment $T_{1:}$ Control (water spray only). Boron and zinc is a component of every cell wall and is involved in cell elongation and cell division. It influences the structural stability and permeability of cell membranes.

Significantly highest total soluble solids (5.52 ºBrix) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest total soluble solids (3.97 ºBrix) was observed in treatment $T_{1:}$ Control (water spray only). The increase in TSS content of fruits may be attributed to growth promoting substances which could have accelerated synthesis of carbohydrates, vitamins and other quality characters.

Significantly highest acidity (0.58%) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest acidity (0.50%) was observed in treatment $T_{1:}$ Control (water spray only). This might be due to application of zinc, Cu and other micronutrients had increased the titratable acidity in fruits.

Significantly highest dry matter content (5.60%) was observed in treatment T_7 (Zinc 0.2% + Boron 0.2%) which remained at par with treatment T_6 (Zinc 0.1% + Boron 0.1%) and T_5 (Boron 0.2%). Significantly lowest dry matter content (3.44%) was observed in treatment $T_{1:}$ Control (water spray only). Similar result were reported by Salam *et al*. (2010), investigated the effects of boron and zinc in presence of different levels of NPK fertilizers on quality of tomato.

Table 1: Effect of Foliar Application of Micronutrient on Yield of Tomato

Treatments	Number of fruits per plant	Fruit diameter (cm)	Fruit yield per plant (kg)	Yield per plot (kg)	Total yield (t/ha)	Total soluble solids (ºBrix)	Acidity %	Dry matter content (%)
T_1: Control (water spray only)	30.25	3.05	1.22	750.00	51.60	3.97	0.50	3.44 ± 0.5
T_2: Zinc 0.1%	32.92	3.17	1.37	822.00	56.96	4.16	0.52	4.41 ± 0.5
T_3: Zinc 0.2%	36.58	3.71	1.41	846.00	58.71	4.71	0.55	4.60 ± 0.5
T_4: Boron 0.1%	34.07	3.56	1.39	834.00	57.88	4.56	0.53	4.52 ± 0.5
T_5: Boron 0.2%	38.17	3.88	1.44	864.00	59.96	5.05	0.56	5.00 ± 0.5
T_6: Zinc 0.1% + Boron 0.1%	42.26	4.13	1.46	876.00	60.79	5.26	0.57	5.10 ± 0.5
T_7: Zinc 0.2% + Boron 0.2%	43.34	4.54	1.49	894.00	62.04	5.52	0.58	5.60 ± 0.5
S.Em (±)	1.90	0.19	0.05	28.57	2.03	0.29	0.18	0.31
CD (5%) =	5.65	0.57	0.16	84.91	6.04	0.87	0.05	0.97
CV (%) =	10.33	10.22	7.68	6.80	6.97	12.32	6.67	11.64

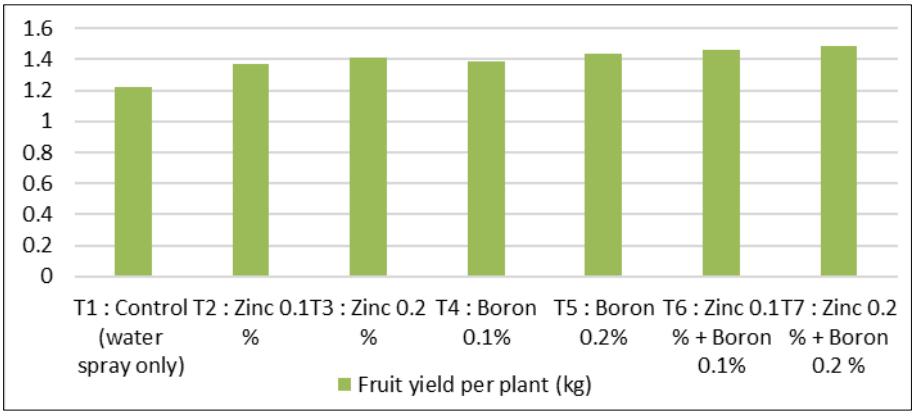

Fig 1: Fruit yield per plant (kg)

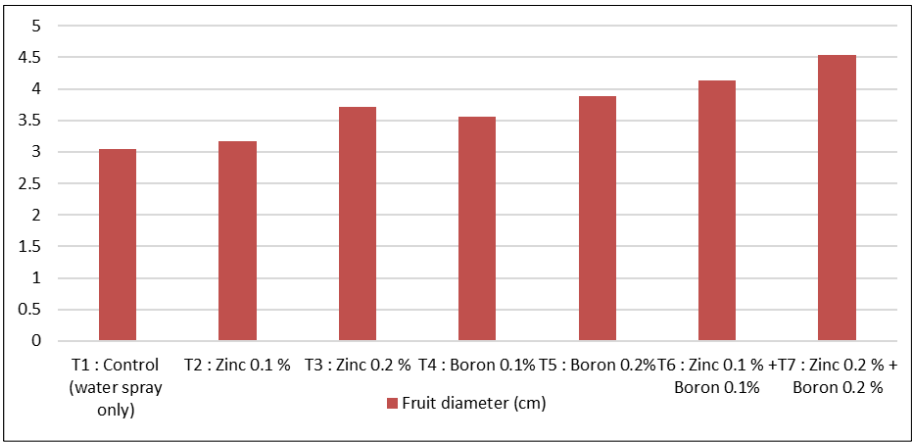

Fig 2: Fruit diameter (cm)

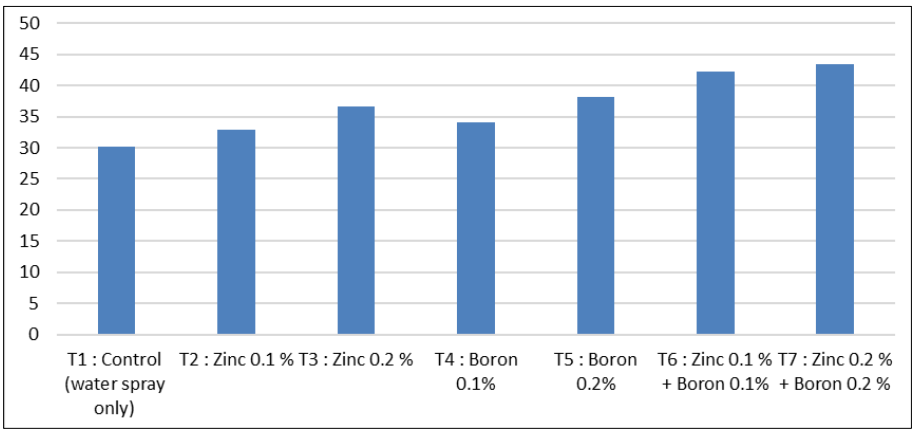

Fig 3: Number of fruits per plant

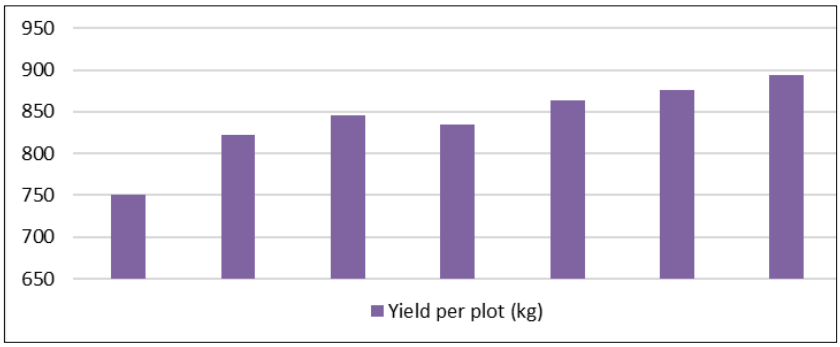

Fig 4: Yield per plot (kg)

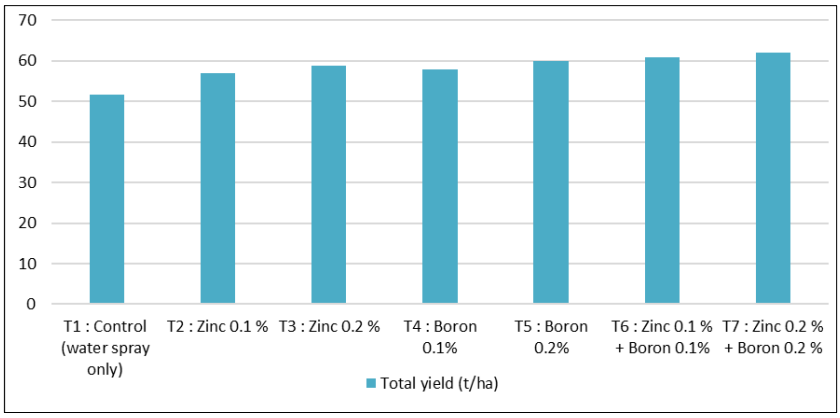

Fig 5: Total yield (t/ha)

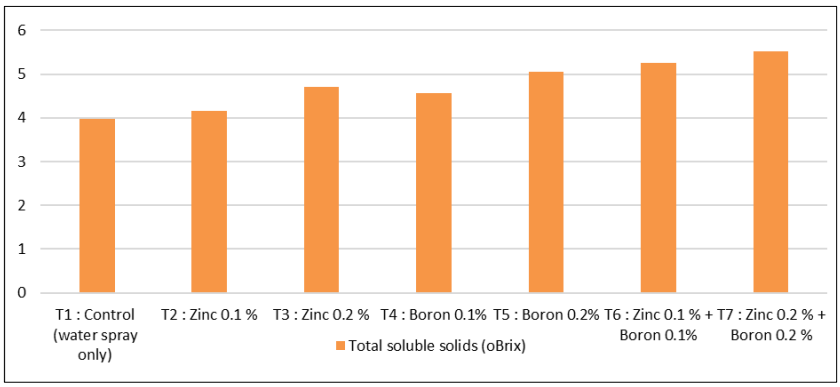

Fig 6: Total soluble solids (oBrix)

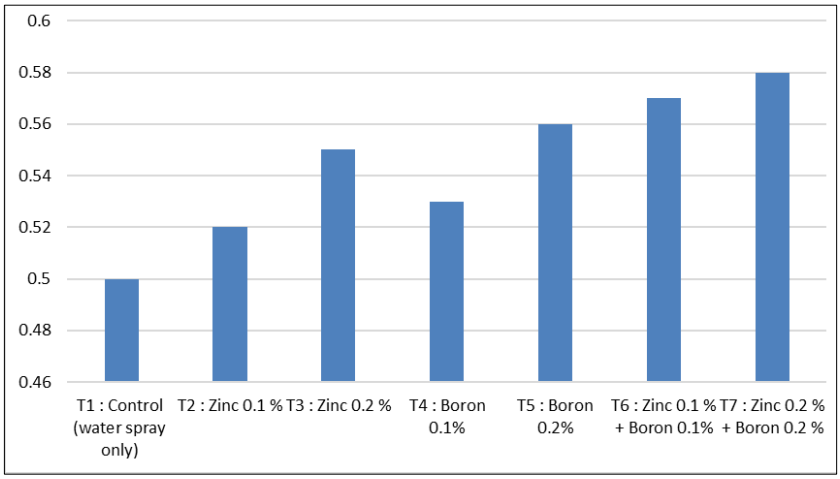

Fig 7: Acidity %

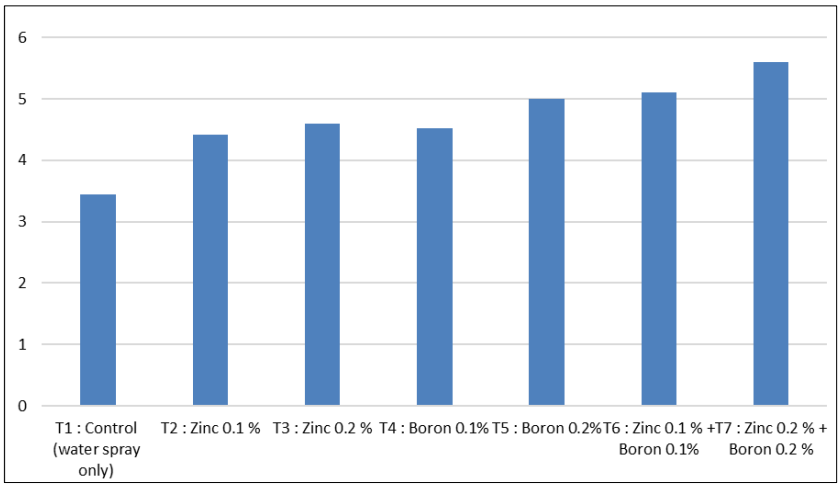

Fig 8: Dry matter content (%)

4. Conclusion

The yield parameters *i.e.* number of fruits per plant, fruit diameter (cm), yield per plant (kg), yield per plot (kg), total yield (t/ha), total soluble solids (°Brix), acidity % and dry matter content (%) were significantly superior in the treatment T_7 (Zinc 0.2% + Boron 0.2%).

On the basis of above findings, treatment T_7 (Zinc 0.2% + Boron 0.2%) stand could be better performance first in position and T_6 (Zinc 0.1% + Boron 0.1%) stand in second order of preference. However, treatment T_5 (Boron 0.2%) comes in next in order. Therefore, it may be concluded that treatment T_7 (Zinc 0.2% + Boron 0.2%) may be prefer for higher growth and yield in tomato.

References

1. Anonymous. Horticultural Statistics at a Glance, Horticulture statistics division department of agriculture, cooperation & Farmers welfare ministry of agriculture & farmers welfare government of India, 2015.
2. Anonymous. Indian Horticulture Database, National Horticulture Board, Gurgaon, 2018, 131.
3. Anonymous. Krishi Darshika, Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2019, 5.
4. Ejaz M, Rehman SU, Waqas R, Manan A, Imran M, Bukhari MA. Combined efficacy of macronutrients and micro-nutrients as a foliar application on growth and yield of tomato grown by vegetable forcing. International Journal for Agro Veterinary and Medical Sciences. 2011;5(3):327-335.
5. Bose TK, Som MG. Vegetable crops in India. *Naya Prakash*, Calcutta, India, 1990, 687-691.
6. Bose US, Tripathi SK. Effect of micronutrients on growth, yield and quality of Tomato cv. Pusa Ruby in M. P. Crop Research Hisar. 1996;12(2):61-64.
7. Magalhaes JR, Desilva WC, Monnerod PH. Levels and methods of boron application in tomato. Pesquisa Agropecuaria Brasileira. 1981;16(2):151-153.
8. Naga SK, Swain SK, Verma SV, Raju B. Effect of foliar application of micronutrients on growth parameters in tomato (*Lycopersicon esculentum* Mill.). Discourse J Agri. Food Sci. 2013;1(10):146-151.
9. Naga Sivaih K, Swain SK, Raju B, Varma S. Effect of micronutrients foliar application on seed yield in tomato. International journal of Plant and Animal Sciences. 2013;1(7):2167-0437.