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Response of foliar application of zinc sulphate magnesium sulphate and boron on quality of guava

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Abstract
The present investigation entitled "Response of foliar application of zinc sulphate magnesium sulphate and boron on quality of guava" was conducted in a well maintained Orchard of Khalsa College, Amritsar during 2015-16. 30 guava trees with uniform size and vigour were selected and were sprayed with different concentrations of different nutrients ($ZnSO_4$ @ 0.50 %, 0.75 % and 1.0 %), ($MgSO_4$ @ 0.50 %, 0.75 % and 1.0 %) and (H_3BO_3 @ 0.50 %, 0.75 % and 1.0 %) at fruit set to find out optimum concentrations of these chemicals for improving yield and quality. The investigation was laid out in RBD (Randomised Block Design) with 10 treatments which replicated thrice. Fruits were analysed for their biochemical characteristics in the laboratory of Department of Horticulture, Khalsa College Amritsar. The results of present study revealed that the fruit biochemical characters as TSS (10.46 %) was improved significantly under treatment T_8 (B @ 0.75 %) and total and reducing sugars were increased to a maximum 7.20 per cent and 5.16 per cent respectively with the application of B @ 1.0 per cent.

Keywords: Zinc sulphate, magnesium sulphate, boron.

Introduction
Guava is one of the most common and important fruit crop cultivated all over India. Although it is hardy and can grow under marginal soil conditions. It responds well to nutrient application. To obtain higher yields, micronutrients are becoming necessary in fruit crop nutrition. Zinc is one of the essential micronutrient for plant growth, flowering and yield characters in guava. Zinc plays a part in improving fruit TSS, acidity, sugars, vitamin C and pectin content (Waskela *et al*., 2013). Magnesium on the other hand is a constituent of chlorophyll, protoplasm and chromosomes (Salaria and salaria, 2010) [5]. Boron on the other hand increases berry size and weight and improves quality of fruits (Nikkhah *et al*., 2013) [3]. The foliar feeding of fruit trees has gained much importance in recent years, as nutrients applied through soil are needed in high quantities due to leaching. Keeping this in view, the present investigation was undertaken to study the effect of foliar application of Zn, Mg and B on yield and quality of guava.

Material and methods
The experiment was carried out during 2015-16 at the experimental Orchard of Khalsa College Amritsar. The experiment was laid out in a randomized block design with ten treatments replicated three times. The trees were sprayed with zinc sulphate, magnesium sulphate and boric acid at three concentrations i.e 0.50, 0.75 and 1.00 per cent. Three trees were sprayed with zinc sulphate at 0.50 per cent, another three trees with zinc sulphate at 0.75 per cent and other trees were sprayed with zinc sulphate at 1.00 per cent. Similarly 18 other trees were sprayed with magnesium sulphate and boric acid and remaining three trees were selected for control. Only mrigbahar flush was taken for study and trees were sprayed twice once in September and then in October. The experimental details are discussed here under in Table 1.

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Table 1: Experimental details

Treatments	Concentration
T1 Zinc Sulphate	0.50 %
T2 Zinc Sulphate	0.75%
T3 Zinc Sulphate	1.00%
T4 Magnesium Sulphate	0.50%
T5 Magnesium Sulphate	0.75%
T6 Magnesium Sulphate	1.00%
T7 Boric acid	0.50%
T8 Boric acid	0.75%
T9 Boric acid	1.00%
T10 Control	plain water only

Results and Discussion

The yield and quality parameters were most effected by the application of zinc and boron

Table 2: Chemical Characters

Treatments	TSS (%)	Titrable acidity (%)	TSS: Acid	Organoleptic rating	Fruit colour	Total sugars (%)	Reducing sugars (%)
T_1- $ZnSO_4$ @ 0.50%	9.10	0.43	82.70	3.40	2.67	4.20	3.40
T2- ZnSO4 @ 0.75%	8.06	0.41	98.53	5.23	2.47	4.33	3.63
T_3 – $ZnSO_4$ @ 1.0%	10.06	0.45	83.11	5.53	2.20	4.70	3.96
T_4 –$MgSO_4$ @ 0.50%	9.30	0.44	70.59	6.13	3.33	4.96	3.93
T_5- $MgSO_4$ @ 0.75%	8.60	0.37	118.20	6.67	3.60	5.06	4.06
T_6- $MgSO_4$ @ 1.0%	8.47	0.35	127.93	7.03	3.70	5.33	4.26
T_7- B @0.50%	9.20	0.40	111.83	7.77	4.30	6.23	4.83
T_8- B @ 0.75%	10.46	0.35	173.33	8.47	4.50	6.83	5.03
T_9- B @ 1.0%	8.73	0.32	119.63	9.5	4.80	7.20	5.16
T_{10}- control	7.23	0.38	94.13	1.77	3.20	4.33	2.86
Mean	8.92	0.39	108.05	6.27	3.48	5.32	4.12
CD (p=0.05)	1.48	NS	NS	0.69	0.32	1.35	1.11

The chemical characters as seen in Table 2 i.e. titrable acidity was minimum under the application of boric acid at 1 per cent. The TSS of the fruits was maximum (10.46 %) under the treatment of boric acid at 0.75 per cent increase. The increase in the amount of total soluble solids might be due to the role of boron in transmembrane sugar transport (Gaur *et al.* 2014) [2]. The organoleptic rating of the guava fruits were most affected by the application of boric acid at 1.00 per cent. On the other hand the TSS: acid ratio remained unaffected by the application of either of chemicals.

The sugars (total and reducing) in the guava fruits were increased by the treatment of boric acid at 1.00 per cent to as maximum as 7.20 per cent (total sugars) and 5.16 per cent (reducing sugars). The increase in the sugars by the action of boric acid might be due to the translocation of photosynthates by the regulation of boron (Arora *et al.* 1972) [1].

Conclusion

According to the results of the present study the biochemical characters like TSS, titrable acidity, TSS:acid, reducing and total sugars and organoleptic rating were significantly affected with the application of boric acid at 1.00 per cent (sugars and titrable acidity) and at 0.75 per cent (TSS and TSS:acid).

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