The Pharma Innovation Journal 2021; 10(10): 842-844

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(10): 842-844

www.thepharmajournal.com
Received: 17-08-2021
Accepted: 29-09-2021

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# Influence of foliar application of micronutrients on yield and chemical attributes of Mrig bahar guava (*Psidium guajava* L.) cv. sardar

**KS Giram, SJ Shinde, SB Jaiswal and LG Pavankumar**

**Abstract**
The present investigation entitled "Influence of foliar application of micronutrients on yield and chemical attributes of Mrig bahar guava (*Psidium guajava* L.) cv. Sardar" was carried out at College of Agriculture, Golegaon under VNMKV, Parbhani, M.S. (India) during year 2020-21. The experiment was laid out in Randomized Block Design having eleven treatments with three replications. The details of treatments were as $T_1$: Control treatment, $T_{2:}$ zinc sulphate 1.0%, $T_{3:}$ copper sulphate 1.0%, $T_4$: boron 1.0%, $T_5$: magnesium sulphate 1.0%, $T_6$: zinc sulphate 1.0% + magnesium sulphate 1.0%, $T_7$: copper sulphate 1.0% + magnesium sulphate 1.0%, $T_8$: zinc sulphate 1.0% + boron 1.0%, $T_9$: copper sulphate 1.0% + boron 1.0%, $T_{10:}$ magnesium sulphate 1% + boron 1.0% and $T_{11:}$ zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%. The maximum yield per tree (19.75 kg) and yield per hectare (219.43 q/ha) were recorded in $T_{11}$ treatment (zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%). The maximum TSS (12.67 $^0$B) was observed in the treatment $T_{11}$ (zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%). The minimum acidity (0.42%) and maximum ascorbic acid (171.53 mg/100g) were found under the treatment $T_4$ (boron 1.0%). The highest reducing sugar (4.6%), was recorded under treatment $T_2$ (zinc sulphate 1.0%) and highest non reducing sugar (3.92%) with $T_5$ i.e. magnesium sulphate (1.0%).

**Keywords:** Guava, Sardar, zinc sulphate, magnesium sulphate, boron, copper sulphate, micronutrients, foliar spray

## 1. Introduction
Guava (*Psidium guajava* L.) "Apple of the tropics" and also known as "Poor man's apple" is an important fruit crop of country, not because of large area and production but due to its wider soil-climatic adaptability, hardy to various biotic and abiotic stresses, early maturing and profuse bearing habit, quality fruit with high nutritive value, medicinal properties, consumed both as fresh fruit and post processing in different value added products and considered as multiuse tree due to its usefulness as a fruit, fuel, fodder, timber and it is highly profitable crop.
Guava is one of the fourth most important fruit crop in India after Mango, Banana and Citrus (Ray, 2002) [7]. It is native of tropical America and become a commercially important fruit crop in a several countries.
The required supply of micronutrients not only increases the productivity but there is improvement in the quality of the produce. The application of nutrients through the foliar means is effective nutrient management. The required nutrients can be easily supplied as and when they are needed. This is an effective method for correcting the micronutrients deficiencies. It has been reported that the guava plant can readily absorb mineral nutrients spray or painted on the foliage. Spraying method using the correct strength have been great merit of simplicity and requires about 1 or 2 weeks to produce clear effects.
Foliar application experiments conducted in India showed that guava has given good response to foliar application of different micronutrients. Use of different single and mixed micronutrients like, zinc sulphate, copper sulphate, magnesium sulphate, boron applied through foliar means was found advantageous and the recommendations which have been given by different workers for various micronutrients appears to have intense effect on fruit quality through its influence on size, appearance, colour, soluble solids, sugar, acidity, pectin and vitamin contents. Foliar application of different micronutrients have rise in the growth, yield and quality parameters in guava (Balakrishnan, 2001 and Trivedi *et al.* 2012) [1, 12].
Micronutrients are trace elements required in less quantity but play a vital role in growth,

development, yield and quality. The micronutrients are applied by soil and foliar application. Presently farmers are also aware about use of micronutrients. Nowadays due to rise in demand for quality produce by the consumers the interest of fruit growers in production of high quality fruits is increasing. The information regarding foliar application of micronutrients is scarce for improving the growth, yield and quality of guava fruits under Maharashtra condition. The extension agencies and the farmers are also demand the application of micronutrients technology which will be helpful for quality guava fruit production.

## 2. Materials and Methods

The present investigation was conducted at experimental farm, College of Agriculture, Golegoan Tq. Aundha (Nagnath), Dist. Hingoli under Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during 2020-2021. The treatments comprised of $T_1$: Control treatment, $T_2$: zinc sulphate 1.0%, $T_3$: copper sulphate 1.0%, $T_4$: boron 1.0%, $T_5$: magnesium sulphate 1.0%, $T_6$: zinc sulphate 1.0% + magnesium sulphate 1.0%, $T_7$: copper sulphate 1.0% + magnesium sulphate 1.0%, $T_8$: zinc sulphate 1.0% + boron 1.0%, $T_9$: copper sulphate 1.0% + boron 1.0%, $T_{10:}$ magnesium sulphate 1% + boron 1.0% and $T_{11:}$ zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%. The experiment was laid out in Randomized Block Design with three replications.

All cultural operations were carried out as per recommendations and need of the crop. The selected variety i.e. Sardar having uniform growth and vigour were subjected to mrig bahar treatment by withholding the irrigation from April 20 to June 5, 2020. The spraying of different micronutrients as per treatments was done at marble size fruit stage and 15 days after first spray.

## 3. Results and Discussion

The result noted in the table 1 show that foliar application of micronutrients recorded significant difference.

### 3.1 Influence of foliar application of micronutrients on yield attributes of guava

The data revealed that significantly highest yield per tree (19.75 kg) was recorded by foliar application of zinc suphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0% (T11), as compared to control and was statistically at par with treatment T8 (19.47 kg), as compared to control and lowest yield per tree (9.72 kg) was observed in control. The growth in yield per tree was obviously due to promotion of starch formation which is followed by rapid transportation of carbohydrates in plants activated by micronutrients like boron which help in maximum fruit set percentage and fruit retention. Similar results were also found by Gurjar *et al*. (2015) [4] in mango and Sachin *et al*. (2019) [8] in guava.

The highest yield per hectare (219.43 q/ha) [which was (111.35 q) more as compared to control ($T_1$)] was recorded with the treatment $T_{11}$ (zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%) and it was statistically at par with $T_8$ (zinc sulphate 1.0% + boron 1.0%) which was (108.29 q) more as compared to control ($T_1$). Although, the lowest yield per hectare (108.08 q/ha) was observed in control ($T_1$) treatment. The results revealed that the fruit yield was increased due to combine application of zinc and boron. It was believed that boron brings about inactivation of superfluous growth hormone by formation of complex compound. These activities improve length and width of fruit which is ultimately increases the yield of the fruit. Similar results were also observed by Chander *et al.* (2017) [2] in guava and Sachin *et al*. (2019) [8] in guava.

**Table 1:** Influence of foliar application of micronutrients on yield and chemical attributes of guava

| Treatments | Yield per tree (kg) | Yield per hectare (q/ha) | Total Soluble Solids ($^0$B) | Acidity (%) | Reducing sugar (%) | Non reducing sugar (%) | Ascorbic acid (mg/100g) |
|---|---|---|---|---|---|---|---|
| $T_1$ water spray (Control) | 9.72 | 108.08 | 9.19 | 0.52 | 2.40 | 2.44 | 155.93 |
| $T_2$ zinc sulphate 1.0% | 15.11 | 167.89 | 12.58 | 0.46 | 4.60 | 2.78 | 158.80 |
| $T_3$ copper sulphate 1.0% | 12.08 | 134.21 | 10.64 | 0.49 | 2.69 | 2.90 | 168.26 |
| $T_4$ boron 1.0% | 17.72 | 196.95 | 11.44 | 0.42 | 4.34 | 3.55 | 177.60 |
| $T_5$ magnesium sulphate 1.0% | 12.00 | 133.32 | 11.68 | 0.44 | 2.76 | 3.92 | 158.80 |
| $T_6$ zinc sulphate 1.0% + magnesium sulphate 1.0% | 11.37 | 126.33 | 12.35 | 0.46 | 4.06 | 3.68 | 160.80 |
| $T_7$ copper sulphate 1.0% + magnesium sulphate 1.0% | 14.95 | 166.12 | 11.08 | 0.48 | 2.79 | 3.62 | 162.06 |
| $T_8$ zinc sulphate 1.0% + boron 1.0% | 19.47 | 216.38 | 10.89 | 0.43 | 4.09 | 3.10 | 165.53 |
| $T_9$ copper sulphate 1.0% + boron 1.0% | 17.94 | 199.37 | 10.99 | 0.43 | 3.89 | 3.24 | 168.40 |
| $T_{10}$ magnesium sulphate 1.0% + boron 1.0% | 14.41 | 160.10 | 11.49 | 0.45 | 3.54 | 3.48 | 164.33 |
| $T_{11}$ zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0% | 19.75 | 219.43 | 12.67 | 0.463 | 4.08 | 3.35 | 171.53 |
| SE (m) ± | 0.51 | 5.77 | 0.02 | 0.002 | 0.024 | 0.023 | 0.48 |
| C.D. at 5% | 1.53 | 17.05 | 0.06 | 0.008 | 0.072 | 0.069 | 1.44 |

### 3.2 Influence of foliar application of micronutrients on chemical attributes of guava

The foliar application of zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0% ($T_{11}$) was recorded maximum TSS (12.67 $^0$B), which was at par with the treatment $T_2$ (zinc sulphate 1.0%) (12.58 $^0$B) and minimum TSS (9.19 $^0$B) was recorded in $T_1$. The increases in fruit TSS following (zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%) application might be attributed to fact that zinc is credited with definite role in the hydrolysis of complex polysaccharide in to simple sugars, synthesis of metabolites and rapid translocation of photosynthetic products and minerals from other parts of the plant to developing fruits. The results obtained in the present study are in agreement with that reported by Zagade *et al*. (2018) [13] in guava.

The treatment $T_4$ *i.e.* foliar application of boron 1.0% recorded lowest acidity (0.42%) which was at par with treatments $T_8$ (0.43%), $T_9$ (0.43%), $T_5$ (0.44) and $T_{10}$ (0.45%) however highest acidity (0.52%) was recorded in control. The maximum per cent decrease in acidity over control was recorded in $T_4$ (boron 1.0%), whereas minimum in $T_1$

(control). The reduction in acid content might be due to higher accumulation of sugars in to fruit tissues and conversion of organic acids in to sugars. Also the reduction in acidity per cent may be based on the fact that mineral compounds reduced the acidity in fruits, as it is neutralized in plants during metabolic pathways and used in respiratory process as a substrate (Gowsami *et al.*, 2014) [3]. Similar results were also observed by Suman *et al.* (2016) [11] in guava and Zagade *et al.* (2018) [13] in guava.

The data highlights that, the reducing sugar of guava increased significantly by the application of zinc sulphate 1.0%, boron 1.0% and their combinations with magnesium sulphate 1.0% and copper sulphate 1.0%. The maximum reducing sugar (4.6%) was recorded under treatment $T_2$ (zinc sulphate 1.0%), which was followed by treatment $T_4$ (boron 1.0%) having value of (4.34%). The minimum reducing sugar (2.4%) was recorded under control ($T_1$). The results obtained in the present study are in agreement with that reported by Zagade *et al*. (2018) [13] in guava.

The foliar application of magnesium sulphate (1.0%) i.e. $T_5$ recorded significantly and maximum non reducing sugar (3.92%), which was significantly superior over rest of the treatments the next best treatment was $T_6$ (3.68%), which was statistically at par with the treatment $T_7$ (3.62%). Significantly minimum non reducing sugar (2.44%) was observed in $T_1$ (control). This might be due to magnesium sulphate acts as an activator of number of enzymes including transphosphorylases, dehydrogenases and carboxylases which might have increased the various metabolites of the fruits (Singh and Singh, 1982) [9]. The results presented in this study are in agreement with that reported by Lambe *et al.* (2017) [5] in guava.

The maximum ascorbic acid of guava fruit (177.60 mg) was recorded with the treatment $T_4$ (boron 1.0%), which was significantly superior over rest of the treatments. It was followed by treatment $T_{11}$ (zinc sulphate 1.0% + boron 1.0% + copper sulphate 1.0% + magnesium sulphate 1.0%) and treatment $T_9$ (copper sulphate 1.0% + boron 1.0%) having values (171.53 mg) and (168.40 mg) respectively. The minimum ascorbic acid (155.93 mg) was recorded under control. Singh *et al.* (2001) [10] in aonla and Lambe *et al.* (2017) [5] in guava also found an improvement in ascorbic acid level during early stages of guava fruit growth may be attributed to adequate supply of hexose sugar during photosynthetic activity. These results are also found similar with Rawat *et al.* (2010) [6].

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