

Effect of Foliar Application of Micronutrients on Fruit Set, Yield Attributes and Yield of Winter Season Guava (*Psidium guajava* L.) cv. L-49

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ABSTRACT

The present investigation entitled “Effect of foliar application of micronutrients on fruit set, yield attributes and yield of winter season guava cv. L-49” was carried out at Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, U.P. India during the year 2012-2013. The experiment was laid out in Randomized Block Design having seven treatments with three replications. The details of treatments were as T₁- Control (water spray), T₂- Zinc sulphate (0.5%), T₃ - Zinc sulphate (1.0%), T₄- Borax (0.5%), T₅ - Borax (1.0%), T₆- Copper sulphate (0.5%) and T₇ - Copper sulphate (1.0%). The maximum fruit set (68.80 per cent), fruit retention (65.80 per cent), fruit length (7.10 cm.), fruit width (6.75 cm.), fruit weight (137.70 g.), fruit volume (148.70 cm³), specific gravity (0.93) and fruit yield (42.30 kg/plant) was recorded with foliar application of borax 1.0 per cent. However, the minimum values of all characters were recorded under the control.

Key words: Guava, Foliar application, Micronutrient, Winter season, Yield attributes.

INTRODUCTION

Guava (*Psidium guajava* L.), is an important fruit crop of tropical and sub-tropical region of the world. It belongs to the family Myrtaceae. It is classified under genus *Psidium* which contains 150 species, but only *Psidium guajava* has been exploited commercially. It is native of tropical America stretching from Mexico to Peru and gradually become a commercial significance in a several countries because of its shradly nature, prolific bearing, high vitamin C content, pleasant aroma and good flavour. In India it has been introduced

in early 17th century and gradually become a commercial crop all over the country particularly in Maharashtra, Uttar Pradesh, Karnataka, Bihar, Orissa, Punjab, Uttrakhand, Gujarat, Madhya Pradesh and West Bengal. Guavas produced in Allahabad region of Uttar Pradesh are best in the world². In India it occupies an area of 0.26 million ha. with annual production of 3.66 million tonnes¹⁵.

Guava has earned the popularity as ‘poor man apple’ available in plenty to every person at very low price during the season. It is no inferior to apple for its nutritive value.

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It is pleasantly sweet and refreshingly acidic in flavour and emits sweet aroma. It is wholly edible along with skin. The fruits outer layer is green and as it ripens turns into a pale yellow.

Guava fruit is considered as one of the delicious and luscious fruit. Nutritive value of guava is very high. Therefore, it is an ideal fruit for nutritional security. Guava is one the cheapest and good source of vitamin C and pectin. Guava fruit contain 82.5% water, 2.45% reducing sugar, 2.33% non-reducing sugar, 0.48% ash, 260 mg/100g pulp vitamin C as well as good amount of iron, calcium and phosphorous. The composition of guava fruit varies with cultivars, stage of maturity and season⁴. The guava fruit is good source of pectin, which is an important constituent of the jelly and other quality products⁵.

In northern Indian guava flowers twice in year, first in April-May for rainy season crop and then in August- September for winter season crop⁶. The yield of guava fruit is higher in Rainy season but quality of fruit is poor due to higher water content, less vitamin C and sugars, fruit are insipid and do not keep well. However, winter season yield is less than rainy season guava but quality is better than rainy season guava.

The judicious supply of micronutrients not only increases the productivity but is also improve the quality of the produce¹. Boron is a heavy non-metal micronutrient helps in translocation of sugars, reproduction of plants and germination of pollen grains. Its role has been observed in hormone movement and active salt absorption. It has also an important role in fruit quality. Boron has an effect on cell wall structure and also has a major effect on

cell elongation^{8,14}. Zinc is involved in many enzymatic reactions for growth and development of plant. It is also involved in regulating the protein and carbohydrates metabolism¹⁶.

MATERIALS AND METHODS

The study was conducted out at Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, U.P. India during the year 2012-2013 on guava tree. The plants having uniform vigour size with the age of 21 year old were selected for the study. Nutrient application and other orchard management practices were followed as per recommended package and practices for guava. Manure and fertilizer were applied in each treatment before flowering in the month of July for taking winter season crop. First spraying of micro nutrients was done before flowering (first week of August) and second after fruit set (second week of September) during 2012-13. The detail of treatments were as **T₁**- Control (water spray), **T₂**- Zinc, sulphate (0.5%), **T₃** - Zinc sulphate (1.0%), **T₄**-Borax (0.5%), **T₅** -Borax (1.0%), **T₆**- Copper sulphate (0.5%) and **T₇**- Copper sulphate (1.0%). Treatments were replicated thrice with Randomized Blok Design. The statistical analysis of data was carried out as per method prescribed by Panse and Sukhatme (1985). The yield attributes and yield parameters were recorded as following.

Fruit set: it was calculated as number of fruit set, divided by number of flowers appeared. It expressed in percentage.

$$\text{Fruit set (\%)} = \frac{\text{No. of fruit set}}{\text{No. of flower appeared}} \times 100$$

Fruit retention: It was computed as number of fruits retained till maturity, divided by

number of fruit set and expressed in percentage.

$$\text{Fruit retention (\%)} = \frac{\text{No. of fruit reaches till maturity}}{\text{No. of fruit set}} \times 100$$

Fruit length and width: The length and width of 10 sample fruits from each treatment were

measured with the help of Vernier calipers and expressed in centimeter.

Fruit weight: Weight of above sampled fruit was taken on physical and expressed in gram.

Fruit volume and Specific gravity: Fruit volume was measured in graduated

measuring cylinder and specific gravity was computed by water displacement method.

$$\text{Specific gravity} = \frac{\text{Weight of fruit (g)}}{\text{Displaced water by fruit (ml)}} \times 100$$

Fruit yield: The weight of fruit was recorded at every harvesting under each treatment and total yield per plant was calculated at final harvesting.

RESULTS AND DISCUSSION

The yield attributing characters of fruits were affected by different treatment (Table-1). All the treatments significantly increased fruit set over the control. The maximum fruit set (68.80 per cent) and maximum fruit retention (65.80 per cent) was found with the foliar application of borax 0.1 per cent (T₅). The minimum fruit set (54.80 per cent) and minimum fruit retention (57.00) was recorded under control. Increase in the fruit set might be due to boron which play an important role in translocation of carbohydrates auxin synthesis to the sink and increased in pollen viability and fertilization. Similar results are also observed by Prasad *et al.*¹², Yadav *et al.*¹⁷, Yadav *et al.*¹⁸ and Hada *et al.*⁷ in guava.

The foliar application of micronutrients improve the fruit size (length and width) as comparison to control. The maximum fruit size in terms of fruit length (7.10 cm) and fruit width (6.75 cm) was recorded with foliar feeding of borax 1.0 per cent (T₅). Increase in size with spraying of borax which provides the boron to the plant, might have regulated the cell wall permeability, thereby allowing more mobilization of water in fruit attributing to larger fruit size. These results are close conformity with findings of Prasad *et al.*¹², Pal *et al.*¹⁰ in guava and Mishra *et al.*⁹ in aonla.

The weight of fruit was improved significantly by all the micronutrients over the control except copper sulphate (T₆). The

maximum fruit weight (137.70 g.) was recorded with foliar spray of borax 1.0 per cent (T₅) which is closely followed by zinc sulphate 1.0 per cent (T₃) whereas minimum fruit weight was recorded under the control. An increase in fruit weight due boron appear to have indirect role hastening the process of cell division and cell elongation as well as increase in fruit size. Similar results have been reported by Trivedi *et al.*¹⁶ in guava and Mishra *et al.*⁹ in aonla.

The result indicate that the fruit volume significantly increased by different treatments over the control. The maximum fruit volume (148.70 cm³) was observed in the treatment T₅ (borax 1.0 per cent). This is due to that the borax increase the fruit weight and larger size of fruit might be due to their involvement in cell division, cell expansion and increased volume of intercellular space in mesocarpic cells. Similar results were also obtained by Pal *et al.*¹⁰, Chander *et al.*³ in guava.

The maximum specific gravity (0.93) was found with foliar spray of borax 1.0 per cent (T₅). The minimum specific gravity (0.90) was found in control. The results are similar to Trivedi *et al.*¹⁶ in guava.

The data on respect to fruit yield was significantly increased by various treatments over the control. The maximum yield (42.30 kg/tree) was recorded with borax 1.0 per cent (T₅) followed by zinc sulphate 1.0 per cent (T₃). These micronutrients improve the fruit length, width and weight which ultimately increased the yield. These results are close conformity with findings of Rajput and Chand¹⁴, Prasad *et al.*¹², Trivedi *et al.*¹⁶ in guava and Rajkumar *et al.*¹³ in mango.

Table 1: Effect of foliar application of micronutrients on fruit set, yield attributes and yield of winter season guava

Treatments	Fruit set (%)	Fruit retention (%)	Fruit length(cm.)	Fruit width (cm.)	Fruit weight (g.)	Fruit volume(cm ³)	Specific gravity	Fruit yield (kg/plant)
T ₁ –control	54.80	57.00	5.50	5.20	115.10	128.60	0.90	27.50
T ₂ -Zinc sulphate (0.5%)	64.20	55.40	6.20	5.90	130.60	140.50	0.93	39.35
T ₃ -Zinc sulphate (1.0%)	66.70	61.50	6.55	6.25	132.50	144.60	0.92	41.55
T ₄ -Borax (0.5%)	66.30	59.70	6.58	6.20	131.40	141.50	0.93	39.85
T ₅ -Borax (1.0%)	68.80	65.80	7.10	6.75	137.70	148.70	0.93	42.30
T ₆ -Copper sulphate (0.5%)	60.20	55.20	6.10	5.80	121.50	134.60	0.90	33.65
T ₇ -Copper sulphate (1.0%)	63.10	57.20	6.40	6.10	125.60	138.50	0.91	35.50
SEm±	1.65	1.30	0.19	0.19	2.62	1.75	0.00	1.35
CD at 5%	5.10	4.03	0.59	0.61	8.10	5.39	NS	4.17

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