

Original Research Article

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Influence of Foliar Application of Secondary and Micronutrient Combinations on Plant Height and Plant Canopy Spread Attributes Pertaining to Guava cv. Allahabad Safeda

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ABSTRACT

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In recent years, a large number of guava orchards have become chronically affected by bronzing because of imbalanced nutrient management. Hence, the experiment on effect of foliar application of secondary and micronutrients on major growth parameters viz., plant height (cm) and plant canopy spread (m²) of Guava cv. Allahabad Safeda is carried out at Regional Horticultural Research and Extension Centre, Bengaluru during August 2014 to March 2015 with fourteen treatment combinations which are replicated thrice. The results showed that the application of RDF + foliar spray of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% recorded the maximum plant height (238.20 cm) and plant canopy spread (5.01 m²) where as minimum plant height (199.03 cm) and plant canopy spread (3.05 m²) was recorded in RDF+ foliar spray of Zn + DAP @ 0.5%.

Introduction

Guava (*Psidium guajava* L.) is one of the most popular fruit crop cultivated all over India. It is the fourth most important fruit crop in area and production after mango, banana and citrus (Pedapati and Tiwari, 2014). Guava belongs to the family Myrtaceae and is classified under the genus *Psidium*, which

contains 150 species, but only *Psidium guajava* has been exploited commercially. Guava is a native of tropical America, the crop was introduced into India during 17th century by the Portuguese. It is the fruit that has been often referred to as “apple of tropics.” Total area under guava production in India is 2,36,000 ha with a production of 31,98,000 MT and Maharastra is the leading

state in guava production with 0.31 MT followed by Madhya Pradesh and Uttar Pradesh (Anon, 2014).

In recent years, several nutritional disorders in guava have been noticed, because of imbalanced nutrient management. A large number of guava orchards have become chronically affected by bronzing. In view of this, Foliar feeding of nutrients to fruit plants has gained much importance in recent years, which is quite economical and obviously an ideal way of evading the problems of nutrient disorder and supplementing the fertilizers.

Materials and Methods

The present investigation was conducted at Regional Horticultural Research and Extension Centre, Bengaluru during August 2014 to March 2015. Geographically positioned between 12^o58' latitude North, 77^o11' longitude East and altitude 930 meters above than mean sea level and is situated in the Eastern dry zone of Karnataka.

The experiment was conducted on well established orchard of 4 years old Allahabad Safeda guava trees which are planted at 6 x 3 m spacing and exposed to identical conditions of weather, having identical soil and cultural operations.

All the plants were supplied with uniform application of manures, fertilizers, prophylactic plant protection measures and irrigation at regular intervals. The experiment was laid out in Randomized Complete Block Design (RCBD) with fourteen treatments replicated thrice. Recommended dose of fertilizer applied 100:40:75 g NPK and 25 Kg FYM per tree. The treatment details are given in Table 1. The foliar application of these treatments as per the plan was made at 8 sprays per season at an interval of 15 days.

Observations on plant height and plant canopy spread

Observations were recorded on three plants for each treatment, and growth parameters were recorded at monthly interval. For plant height, from collar region to the apical tip portion of the plant was recorded using measuring scale and expressed in centimetre. In plant canopy spread, the distance from one end of leaf tip to other end of leaf tip in both North- South and East- West direction was measured using measuring scale, by multiplying the North- South and East- West distance plant canopy spread was calculated and expressed in meter square.

Statistical Analysis

The data on plant height and plant canopy spread during the course of investigation were statistically analysed, applying the technique of analysis of variance suggested by Panse and Sukhatme (1985). Wherever, the treatment differences were found significant, (F-test) critical difference was worked out at five per cent probability level. The treatment differences that were not significant were denoted by "NS".

Results and Discussion

The data on effect of foliar application of secondary and micronutrients on growth parameters viz., plant height (cm), plant canopy spread (m²) of Guava Cv. Allahabad Safeda from 30 days to 240 days after foliar spray at monthly intervals are presented here which showed the significance differences among the treatments.

Plant height (cm)

The data pertaining to plant height of Guava cv. Allahabad Safeda recorded at monthly intervals as influenced by foliar application of

secondary and micronutrients are presented in Table 2. The plant height at all stages after foliar spray showed significant differences.

The plant height (218.53 cm) was significantly more with application of RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% (T₁₃) followed by T₉ (210.63 cm), T₁₁ (208.43 cm) and T₁₂ (207.26 cm) at 30 days after foliar spray. Similar, significant trend was observed at 60 (221.46 cm), 90 (223.13 cm), 120 (225.96 cm), 150 (229.23 cm), 180 (232.40 cm), 210 (235.50 cm) and 240 (238.20 cm) days after spraying.

This was followed by RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % along with Cu +Fe @ 0.5% (T₉) during all the observed days and was at par with T₁₁ and T₁₂ at 30 days, T₈, T₁₀, T₁₁ and T₁₂ at 60, 90, 120 and 150 days after spray, while at 180, 210 and 240 days of spray T₈, T₁₁ and T₁₂ were at par with RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % along with Cu +Fe @ 0.5%. The minimum plant height was recorded in control (T₁₄) at all stages (Table 2).

The data on 240 days after foliar spray indicated that plant height differed significantly among the treatments. The application of RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% (T₁₃) recorded the maximum plant height (238.20 cm) and minimum plant height (199.03 cm) was recorded in RDF+ foliar spray of Zn + DAP @ 0.5% (T₁₄).

Plant canopy spread (m²)

The plants canopy spread of guava cv. Allahabad Safeda (Table 3) as influenced by application of RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% (T₁₃) recorded the maximum plant

canopy spread (4.51 m²), which was followed by T₉ (4.36 m²) at 30 days after foliar spray. Likewise, 60 days after foliar spray also T₁₃ (4.59 m²) was followed by T₉ (4.42 m²).

Similarly, the plant canopy spread was significantly superior in treatment 13 at 90 days (4.67 m²), 120 days (4.74 m²), 150 days (4.81 m²), 180 days (4.86 m²), 210 days (4.91 m²) and 240 days (5.01 m²), this was followed by RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % along with Cu +Fe @ 0.5% (T₉) at different stages of observation and also at par with T₁₁ at 30, 60, 90, 120 and 150 days after spray. The minimum plant canopy spread (3.05 m²) was recorded in control (T₁₄) at 240 days after foliar spray (Table 3).

Application of RDF+ foliar spray of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% (T₁₃) recording significantly maximum plant canopy spread (5.01 m²). Whereas, minimum plant canopy spread (3.05 m²) was recorded in (T₁₄) RDF+ foliar spray of Zn + DAP @ 0.5%.

Hence the application of recommended dose of fertilizer along with foliar application of Zn + Mg + Mn @ 0.75 % + Cu +Fe @ 0.5% + MAP 0.5% significantly influenced the plant height, plant canopy spread (N-S and E-W).

The increase in growth parameters such as plant height, plant canopy spread (N-S and E-W) in the present investigation might be due to the foliar application of micronutrients which may have influenced the photosynthetic compounds in the plant tissue which may be involved in the synthesis of tryptophan, a precursor of IAA, so ultimately increasing the vegetative growth of the plant. Similar result was observed by Yadav *et al.*, (2010) in banana and Shamashad *et al.*, (2009) in aonla.

Table.1 Treatment details

Treatments No.	Treatments
T ₁	RDF+ foliar spray of MAP 0.5 %
T ₂	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 %
T ₃	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % +MAP 0.5%
T ₄	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 %
T ₅	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % +MAP 0.5%
T ₆	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25%
T ₇	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25%
T ₈	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5%
T ₉	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5%
T ₁₀	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25% +MAP 0.5%
T ₁₁	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25% +MAP 0.5%
T ₁₂	RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5% +MAP 0.5%
T ₁₃	RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5% +MAP 0.5%
T ₁₄	RDF+ foliar spray of Zn+DAP @0.5% (Control)

Table.2 Effect of foliar application of secondary and micronutrient combinations on plant height of guava cv. Allahabad Safeda

Treatments	Plant height (cm) at days after spray							
	30	60	90	120	150	180	210	240
T ₁	196.00	198.50	200.90	203.56	205.76	209.26	211.63	214.70
T ₂	199.10	202.63	204.76	207.00	208.83	211.76	214.06	216.76
T ₃	200.56	204.00	206.16	208.86	210.56	212.96	215.40	217.76
T ₄	201.80	204.16	205.86	208.63	210.53	213.70	216.73	219.03
T ₅	202.46	205.70	207.53	210.00	212.13	214.83	217.76	220.33
T ₆	203.16	206.06	208.56	211.10	213.23	215.26	217.63	220.40
T ₇	204.46	207.23	209.63	212.10	215.00	217.26	219.86	221.76
T ₈	206.16	208.86	210.96	213.56	216.20	218.50	221.83	224.16
T ₉	210.63	212.26	214.40	216.86	219.56	222.13	225.20	227.73
T ₁₀	206.66	209.63	211.60	213.76	215.46	217.96	220.80	223.10
T ₁₁	208.43	211.36	213.90	215.80	218.30	221.70	224.73	227.23
T ₁₂	207.26	209.66	212.10	214.10	218.26	220.60	223.20	224.76
T ₁₃	218.53	221.46	223.13	225.96	229.23	232.40	235.50	238.20
T ₁₄	181.50	184.23	186.16	188.56	191.43	193.93	196.36	199.03
S. Em.±	1.28	1.52	1.51	1.46	1.42	1.37	1.41	1.40
C.D. at 5%	3.72	4.43	4.41	4.24	4.15	3.99	4.12	4.07

T₁- RDF+ foliar spray of MAP 0.5 %

T₂- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 %

T₃- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % +MAP 0.5%

T₄- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 %

T₅- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % +MAP 0.5%

T₆- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25%

T₇- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25%

T₈- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5%

T₉- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5%

T₁₀- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25% +MAP 0.5%

T₁₁- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25% +MAP 0.5%

T₁₂- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5% +MAP 0.5%

T₁₃- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5% +MAP 0.5%

T₁₄- Control - RDF+ foliar spray of Zn+DAP @0.5%

Table.3 Effect of foliar application of secondary and micronutrient combinations on plant canopy spread of guava cv. Allahabad safeda

Treatments	Plant canopy spread (m ²) at days after spray							
	30	60	90	120	150	180	210	240
T ₁	2.65	2.70	2.80	2.89	2.95	3.02	3.06	3.12
T ₂	2.71	2.77	2.90	2.99	3.03	3.09	3.12	3.18
T ₃	3.30	3.37	3.40	3.47	3.50	3.55	3.62	3.65
T ₄	3.35	3.45	3.51	3.58	3.63	3.68	3.72	3.79
T ₅	3.92	3.96	4.06	4.12	4.20	4.25	4.30	4.36
T ₆	3.51	3.60	3.66	3.73	3.79	3.85	3.89	4.01
T ₇	4.09	4.16	4.22	4.25	4.32	4.37	4.44	4.47
T ₈	4.10	4.20	4.26	4.32	4.37	4.43	4.47	4.53
T ₉	4.36	4.42	4.47	4.53	4.57	4.62	4.67	4.74
T ₁₀	3.70	3.80	3.83	3.88	3.94	4.01	4.09	4.13
T ₁₁	4.33	4.36	4.42	4.48	4.52	4.55	4.60	4.64
T ₁₂	4.14	4.24	4.29	4.34	4.40	4.45	4.50	4.55
T ₁₃	4.51	4.59	4.67	4.74	4.81	4.86	4.91	5.01
T ₁₄	2.56	2.61	2.70	2.81	2.89	2.94	3.00	3.05
S. Em.±	0.04	0.02	0.02	0.01	0.01	0.02	0.01	0.02
C.D. at 5%	0.12	0.08	0.08	0.05	0.05	0.06	0.05	0.06

- T₁- RDF+ foliar spray of MAP 0.5 %
- T₂- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 %
- T₃- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % +MAP 0.5%
- T₄- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 %
- T₅- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % +MAP 0.5%
- T₆- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25%
- T₇- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25%
- T₈- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5%
- T₉- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5%
- T₁₀- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.25% +MAP 0.5%
- T₁₁- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.25% +MAP 0.5%
- T₁₂- RDF+ foliar spray of Zn+Mg+Mn @ 0.5 % + Cu +Fe @0.5% +MAP 0.5%
- T₁₃- RDF+ foliar spray of Zn+Mg+Mn @ 0.75 % + Cu +Fe @0.5% +MAP 0.5%
- T₁₄- Control - RDF+ foliar spray of Zn+DAP @0.5%

Further, application of proper dose of micronutrients, play an important functional role in chlorophyll synthesis and development of cells in meristematic tissues (Shekar *et al.*, 2010) in papaya, while Ram and Bose (2000) have indicated that combination of micronutrients, helps to increase the plant growth since zinc is an activator of enzyme, involve in the protein synthesis and had direct effect on the level of auxin in mandarin orange plants.

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