Environment and Ecology 37 (3B) : 1086—1091, July—September 2019
Website: environmentandecology.com ISSN 0970-0420

# Studies on the Effect of Foliar Application of Secondary and Micronutrient Combinations on Shoot Parameters of Guava cv Allahabad Safeda

**N. S. Sushmitha, Jagannath, A. Mamatha, U. Premchand**

Received 8 April 2019; Accepted 13 May 2019; Published on 6 June 2019

**Abstract** The study was aimed to investigate the effects of foliar application of secondary and micronutrients on shoot characteristics such as shoot length (cm), shoot diameter (mm) and trunk girth (mm) of Guava cv Allahabad Safeda. The field experiment was conducted during August 2014 to March 2015. The experiment was laid out in a Randomized Block Design with 14 different treatments of various secondary and micronutrients. Experimental findings showed that the application of RDF+foliar spray of Zn+Mg+Mn @ 0.75%+Cu+Fe @ 0.5% + MAP 0.5% recorded the maximum shoot length (25.53 cm), shoot diameter (5.40 mm) and trunk girth and 68.30 mm under treatment 13 at 240 days after foliar spray whereas, minimum shoot length (14.76 cm) shoot diameter (3.46 mm) and trunk girth (50.23 mm) was recorded in RDF + foliar spray of Zn+DAP @ 0.5% at 240 days after foliar spray of treatment 14, which may influenced the photosynthetic compounds in the plant tissue involved in the synthesis of tryptophan, a precursor of IAA, so ultimately increasing the vegetative growth of the plant.

**Keywords** Guava, Shoot length, Shoot diameter, Trunk girth, Foliar spray.

## Introduction

Fruits are nature's gift to mankind. These are not only delicious and refreshing but are also the chief source of vitamins, minerals and proteins. These constituents are essential for normal physiological well-being and help in maintaining healthy state through development of resistant against pathogen. The Guava (*Psidium guajava* L.) is one of the most common and important fruit crop cultivated all over India. It is fourth most important fruit crop in area and production after mango, banana and citrus (Pedapati and Tiwari 2014). Much of interest in common Guava has been due to its delightful taste and flavor (Pedapati and Tiwari 2014). It is the fruit that has been often referred as "Apple of tropics". Micronutrients like Fe, Zn, B, Cu, Mn, Mo and Cl plays a vital role in

N. S. Sushmitha
Assistant Horticulture officer, Department of Horticulture, Tirthahalli, Karnataka 577432, India

Jagannath
Professor and Head of the Fruit Science Department (Retired), Department of Fruit Science, College of Horticulture, Bangalore, Karnataka 560065, India

A. Mamatha*
Scientist (Horti), Vegetable Research Station, ARI Campus, Rajendranagar, Hyderabad, Telangana 500030, India

U. Premchand
PhD Scholar, Department of Plant Pathology, College of Horticulture, Bagalkot, Karnataka 587104, India
e-mail : mamathahorti@gmail.com
*Corresponding author

**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) |

plants. Micronutrients can be applied to plants by soil and foliar application. Foliar application of micronutrients is more successful than soil application. 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

A field experiment was carried out during 2014-15 at the Regional Horticultural Research and Extension Center, Bangaluru to know the effect of foliar applications of Secondary and Micronutrient applications on shoot length, shoot diameter and trunk girth characteristics of Guava cv Allahabad Safeda. The experiment was conducted on well established orchard of 4 years old Allahabad Safeda Guava trees which are planted at 6 × 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 and irrigation at regular intervals. The experiment was laid out in Randomized Complete Block Design (RCBD) with 14 treatments replicated thrice. For this three tress were taken as unit for treatment. Recommended dose of fertilizer applied 100:40:75 g NPK and 25 kg FYM per tree.The treatments details 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 shoot length, shoot diameter and trunk girth

The observations recorded and techniques adapted to record the observations are, Five newly emerged shoots were randomly selected from each plant was measured from point of emergence to the tip with a measuring scale and expressed in centimeter for measuring shoot length (cm) and shoot diameter was calculated using vernier caliperse. The average value was recorded and expressed in millimeter. The trunk girth was recorded at 30 cm above the soil using a vernier caliperse and expressed in millimeter.

### Statistical analysis

The data on shoot length, shoot diameter and trunk girth during the course of investigation were statistically analyzed, applying the technique of analysis of variance. Wherever, the treatment differences were found significant, (F-test) critical difference was worked out at 5% 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., shoot length (cm), shoot diameter (mm) and trunk girth (mm) 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.

### Shoot length (cm)

The shoot length varied significantly with foliar appli-

**Table 2.** Effect of foliar application of secondary and micronutrient combinations on shoot length of Guava cv Allahabad Safeda. Detail treatments are given in Table 1.

| Treatments | Shoot length (cm) at days after spray | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 |
| $T_1$ | 9.96 | 10.96 | 11.96 | 12.96 | 14.06 | 15.10 | 16.13 | 17.13 |
| $T_2$ | 10.43 | 11.50 | 12.50 | 13.50 | 14.53 | 15.56 | 16.56 | 18.23 |
| $T_3$ | 10.93 | 11.93 | 12.93 | 13.93 | 14.93 | 15.93 | 16.93 | 17.93 |
| $T_4$ | 13.63 | 14.66 | 15.66 | 16.66 | 17.73 | 18.76 | 19.80 | 20.80 |
| $T_5$ | 13.80 | 14.80 | 15.80 | 16.80 | 17.83 | 18.90 | 19.90 | 20.90 |
| $T_6$ | 12.83 | 13.83 | 14.83 | 15.83 | 16.83 | 17.83 | 18.83 | 19.90 |
| $T_7$ | 13.99 | 14.96 | 15.96 | 16.96 | 17.96 | 18.90 | 19.80 | 20.80 |
| $T_8$ | 14.06 | 15.06 | 16.10 | 17.10 | 18.10 | 19.23 | 20.43 | 21.56 |
| $T_9$ | 15.03 | 16.03 | 17.03 | 18.33 | 19.40 | 20.40 | 21.50 | 23.80 |
| $T_{10}$ | 13.50 | 14.50 | 15.50 | 16.53 | 17.63 | 18.63 | 19.30 | 20.30 |
| $T_{11}$ | 14.80 | 15.80 | 16.80 | 17.80 | 18.86 | 19.93 | 20.96 | 21.96 |
| $T_{12}$ | 14.10 | 15.10 | 16.10 | 17.20 | 18.43 | 19.53 | 20.53 | 21.70 |
| $T_{13}$ | 16.53 | 17.86 | 19.03 | 20.36 | 21.36 | 22.40 | 23.40 | 25.53 |
| $T_{14}$ | 8.10 | 9.16 | 10.16 | 11.00 | 12.03 | 12.73 | 13.76 | 14.76 |
| SEm ± | 0.49 | 0.49 | 0.49 | 0.48 | 0.48 | 0.50 | 0.49 | 0.61 |
| CD at 5% | 1.43 | 1.42 | 1.42 | 1.41 | 1.40 | 1.47 | 1.44 | 1.78 |

cation of secondary and micronutrients on Guava cv Allahabad Safeda (Table 2). The plants provided with RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded significantly maximum shoot length (16.53 cm) and was followed by $T_9$ (15.03 cm), $T_4$ (13.63 cm), $T_5$ (13.80 cm), $T_7$ (13.99 cm), $T_8$ (14.06 cm), $T_{11}$ (14.80 cm) and $T_{12}$ (14.10 cm) which were on par. The minimum shoot length was observed in control ($T_{14}$), where the plants provided with RDF + foliar spray of Zn + DAP @ 0.5% (8.10 cm) at 30 days after foliar spray. At 60 and 90 days after foliar spray the maximum shoot length was observed in $T_{13}$ (17.86 and 19.03 cm respectively), which was followed by $T_9$ (16.03 and 17.03 cm respectively), $T_4$ (14.66 and 15.66 cm), $T_5$ (14.80 and 15.80 cm), $T_7$ (14.96 and 15.96 cm), $T_8$ (15.06 and 16.10 cm), $T_{11}$ (15.80 and 16.80 cm) and $T_{12}$ (15.10 and 16.10 cm) were at par with RDF + foliar spray of Zn + Mg + Mn @ 0.75% along with Cu + Fe @ 0.5%. Whereas, the minimum shoot length (9.16 and 10.16 cm respectively) was recorded in control ($T_{14}$).

Though at 120 days after foliar spray, the shoot length was significantly higher (20.36 cm) in RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), this was followed by $T_9$ (18.33 cm), $T_{11}$ (17.80 cm), $T_{12}$ (17.20 cm), $T_8$ (17.10 cm) and $T_7$ (16.96 cm) were at par. Whereas, minimum shoot length (11.00 cm) was recorded in control ($T_{14}$). But, at 150 to 210 days after foliar spray the maximum shoot length was observed in $T_{13}$ (21.36, 22.40 and 23.40 cm respectively), which was followed by $T_9$ (19.40, 20.40 and 21.50 cm respectively), $T_8$, $T_{11}$ and $T_{12}$ were at par with RDF + foliar spray of Zn + Mg + Mn @ 0.75% along with Cu + Fe @ 0.5% from 150 to 210 days. Whereas, the minimum shoot length was recorded in control ($T_{14}$) at all stages. The application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), registered maximum shoot length (25.53 cm) which was significantly on par with $T_9$ (23.80 cm), while minimum shoot length (14.76 cm) was recorded in control ($T_{14}$) at 240 days after foliar spray.

The shoot length was significantly influenced by the foliar application of secondary and micronutrients (Fig. 1). The application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded the maximum shoot length (25.53 cm) at 240 days after foliar spray. Whereas, minimum shoot length (14.76 cm) was recorded in ($T_{14}$) RDF + foliar spray of Zn + DAP @ 0.5% at 240 days after foliar spray. This can be attributed to the fact that the micronutrients stimulate the enzymatic activity in the plant tissues, which helps to enhancing the vegetative

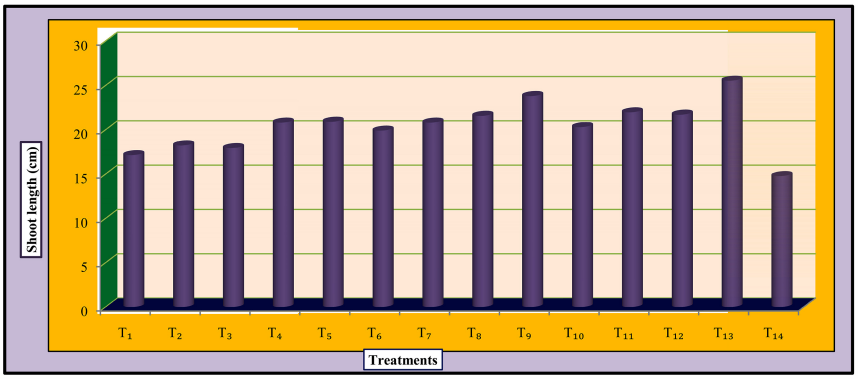


**Fig. 1.** Effect of foliar application of secondary and micronutrients on shoot length at 240 days after foliar spray of Guava cv Allahabad Safeda. Detail treatments are given in Table 1.

growth of the plant. These findings are in line with those of Jayabaskaran and Pandey (2008) in banana.

Shoot diameter (mm)

The shoot diameter significantly varied with foliar application of secondary and micronutrients on Guava cv Allahabad Safeda and the data are presented in Table 3. The plants provided with RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded the maximum shoot diameter (4.56 mm), which was significantly on par with $T_9$ (4.43 mm), $T_{11}$ (4.33 mm) and $T_{12}$ (4.23 mm). The minimum shoot diameter (2.61 mm) was observed in control ($T_{14}$), where the plants provided with RDF + foliar spray of Zn + DAP @ 0.5% at 30 days after foliar spray. At 60 days after foliar spray the maximum shoot diameter was observed in $T_{13}$ (4.63 mm), which was significantly on par with $T_9$ (4.50 mm), $T_{11}$ (4.46 mm) and $T_{12}$ (4.30 mm), whereas, the minimum shoot diameter (2.78 mm) was recorded in control treatment ($T_{14}$). At 90 days after foliar spray the shoot diameter was significantly higher (4.70 mm) with the application of RDF + foliar spray of Zn +

**Table 3.** Effect of foliar application of secondary and micronutrient combinations on shoot diameter of Guava cv Allahabad Safeda at different growth stages. Detail treatments are given in Table 1.

| Treatments | Shoot diameter (mm) at days after spray | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 |
| $T_1$ | 2.70 | 2.83 | 2.93 | 3.13 | 3.23 | 3.33 | 3.46 | 3.63 |
| $T_2$ | 3.36 | 3.63 | 3.73 | 3.83 | 3.93 | 4.03 | 4.20 | 4.30 |
| $T_3$ | 3.66 | 3.73 | 3.80 | 3.93 | 4.10 | 4.23 | 4.36 | 4.50 |
| $T_4$ | 4.03 | 4.10 | 4.16 | 4.23 | 4.33 | 4.43 | 4.53 | 4.66 |
| $T_5$ | 4.06 | 4.13 | 4.20 | 4.26 | 4.36 | 4.46 | 4.60 | 4.73 |
| $T_6$ | 3.76 | 3.86 | 3.96 | 4.03 | 4.20 | 4.30 | 4.40 | 4.53 |
| $T_7$ | 4.10 | 4.16 | 4.23 | 4.30 | 4.43 | 4.60 | 4.70 | 4.86 |
| $T_8$ | 4.13 | 4.20 | 4.26 | 4.36 | 4.50 | 4.63 | 4.76 | 4.86 |
| $T_9$ | 4.43 | 4.50 | 4.56 | 4.60 | 4.73 | 4.83 | 4.96 | 5.16 |
| $T_{10}$ | 3.96 | 4.03 | 4.13 | 4.16 | 4.30 | 4.40 | 4.53 | 4.66 |
| $T_{11}$ | 4.33 | 4.46 | 4.53 | 4.56 | 4.63 | 4.83 | 4.86 | 5.06 |
| $T_{12}$ | 4.23 | 4.30 | 4.36 | 4.40 | 4.50 | 4.66 | 4.80 | 4.93 |
| $T_{13}$ | 4.56 | 4.63 | 4.70 | 4.76 | 4.90 | 5.00 | 5.26 | 5.40 |
| $T_{14}$ | 2.61 | 2.78 | 2.83 | 3.00 | 3.16 | 3.26 | 3.36 | 3.46 |
| SEm ± | 0.14 | 0.12 | 0.11 | 0.12 | 0.13 | 0.13 | 0.12 | 0.12 |
| CD at 5% | 0.41 | 0.34 | 0.32 | 0.35 | 0.39 | 0.40 | 0.36 | 0.35 |

Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) which was significantly on par with $T_9$ (4.56 mm) and $T_{11}$ (4.53 mm), whereas, minimum shoot diameter (2.83 mm) was recorded in control ($T_{14}$). At 120 days after foliar spray, the shoot diameter was significantly higher (4.76 mm) with the application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), which was significantly on par with $T_9$ (4.60 mm) and $T_{11}$ (4.56 mm). Whereas, minimum shoot diameter (3.00 mm) was recorded in control ($T_{14}$).

At 150 days after foliar spray the maximum shoot diameter was observed in $T_{13}$ (4.90 mm), which was significantly on par with $T_9$ (4.73 mm) and $T_{11}$ (4.63 mm). Whereas, the minimum shoot diameter (3.16 mm) was recorded in control treatment ($T_{14}$). At 180 days after foliar spray the maximum shoot diameter was observed in $T_{13}$ (5.00 mm), which was significantly on par with $T_7$ (4.60 mm). $T_5$ (4.63 mm), $T_9$ (4.83 mm), $T_{11}$ (4.83 mm) and $T_{12}$ (4.66 mm). Whereas, the minimum shoot diameter (3.26 mm) was recorded in control treatment ($T_{14}$). At 210 days after foliar spray the maximum shoot diameter was observed in $T_{13}$ (5.26 mm), which was significantly on par with $T_9$ (4.96 mm). Whereas, the minimum shoot diameter (3.36 mm) was recorded in control treatment ($T_{14}$). The application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), registered the maximum shoot diameter (5.40 mm) which was significantly on par with $T_9$ (5.16 mm) and $T_{11}$ (5.06 mm), while minimum shoot diameter (3.46 mm) was recorded in control ($T_{14}$) at 240 days after foliar spray. At 30 days after spray $T_4$, $T_5$, $T_7$ and $T_8$, at 60 days afer spray $T_7$ and $T_8$, 90 days after spray $T_8$ and $T_{12}$, at 120 and 150 days after spray $T_5$, $T_7$, $T_8$ and $T_{12}$, at 180 days after spray $T_4$ and $T_5$, at 210 days after spray $T_5$, $T_7$, $T_8$, $T_{11}$ and $T_{12}$ while at 240 days after spray $T_7$, $T_8$ and $T_{12}$ were at par with RDF + foliar spray of Zn + Mg + Mn @ 0.75% along with Cu + Fe @ 0.5%.

The shoot diameter and trunk girth differed significantly among the treatments. The application of RDF + foliar spray of Zn + Mg + Min @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded the maximum shoot diameter (5.40 mm) at 240 days after foliar spray. Whereas, minimum shoot diameter (3.46 mm) was recorded in ($T_{14}$) RDF + foliar spray of Zn + DAP @ 0.5% at 240 days after foliar spray respectively.

Trunk girth (mm)

The trunk girth significantly varied with foliar application of secondary and micronutrients on Guava cv Allahabad Safeda and the data are presented in Table 4. The plants provided with RDF + foliar spray

**Table 4.** Effect of foliar application of secondary and micronutrient combinations on trunk girth of Guava cv Allahabad Safeda. Detail treatments are given in Table 1.

| Treatments | Trunk girth (mm) at days after spray | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 |
| $T_1$ | 52.53 | 53.00 | 55.16 | 55.50 | 55.66 | 55.86 | 56.13 | 56.33 |
| $T_2$ | 54.83 | 55.36 | 55.96 | 56.20 | 56.40 | 56.53 | 56.73 | 56.93 |
| $T_3$ | 55.00 | 55.50 | 56.10 | 56.21 | 56.43 | 56.60 | 56.80 | 57.03 |
| $T_4$ | 54.20 | 54.46 | 55.96 | 56.10 | 56.30 | 56.50 | 56.73 | 56.93 |
| $T_5$ | 54.90 | 55.23 | 55.90 | 56.30 | 56.50 | 56.70 | 56.93 | 57.16 |
| $T_6$ | 56.53 | 56.86 | 56.92 | 56.96 | 57.13 | 57.30 | 57.43 | 57.70 |
| $T_7$ | 55.13 | 55.33 | 55.93 | 56.20 | 56.36 | 57.16 | 57.43 | 57.66 |
| $T_8$ | 56.13 | 56.33 | 56.70 | 57.20 | 57.36 | 57.56 | 57.83 | 58.03 |
| $T_9$ | 59.60 | 60.06 | 60.49 | 61.16 | 61.30 | 62.10 | 62.30 | 63.06 |
| $T_{10}$ | 56.50 | 56.73 | 57.10 | 57.16 | 57.30 | 57.46 | 57.66 | 57.86 |
| $T_{11}$ | 58.96 | 59.36 | 59.90 | 60.06 | 60.26 | 60.66 | 60.90 | 61.13 |
| $T_{12}$ | 55.33 | 56.83 | 57.03 | 57.50 | 57.66 | 57.93 | 58.23 | 58.46 |
| $T_{13}$ | 64.33 | 64.66 | 65.66 | 66.83 | 67.00 | 67.23 | 68.10 | 68.30 |
| $T_{14}$ | 46.63 | 47.83 | 48.45 | 49.12 | 49.70 | 49.86 | 50.03 | 50.23 |
| SEm ± | 2.64 | 2.43 | 2.18 | 1.99 | 1.98 | 1.90 | 1.92 | 1.91 |
| CD at 5% | 7.69 | 7.07 | 6.36 | 5.79 | 5.76 | 5.53 | 5.59 | 5.56 |

of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded the maximum trunk girth (64.33 mm), which was significantly on par with $T_9$ (59.60 mm), $T_{11}$ (58.96 mm). The minimum trunk girth (46.63 mm) was observed in control ($T_{14}$), where the plants provided with RDF + foliar spray of Zn + DAP @ 0.5% at 30 days after foliar spray. At 60 days after foliar spray the maximum trunk girth was observed in $T_{13}$ (64.66 mm), which was significantly on par with $T_9$ (60.06 mm), $T_{11}$ (59.36 mm), whereas, the minimum trunk girth (47.83 mm) was recorded in control treatment ($T_{14}$). At 90 days after foliar spray the trunk girth was significantly higher (65.66 mm) with the application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) which was significantly on par with $T_9$ (60.49 mm) and $T_{11}$ (59.90 mm), whereas, minimum trunk girth (48.45 mm) was recorded in control ($T_{14}$). At 120 days after foliar spray, the trunk girth was significantly higher (66.83 mm) with the application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), which was significantly on par with $T_9$ (61.16 mm). Whereas, minimum trunk girth (49.12 mm) was recorded in control ($T_{14}$).

At 150 days after foliar spray the maximum trunk girth was observed in $T_{13}$ (67.00 mm), which was significantly on par with $T_9$ (61.30 mm). Whereas, the minimum trunk girth (49.70 mm) was recorded in control treatment ($T_{14}$). At 180 days after foliar spray the maximum trunk girth was observed in $T_{13}$ (67.23 mm), which was significantly on par with $T_9$ (62.10 mm), whereas, the minimum trunk girth (49.86 mm) was recorded in control treatment ($T_{14}$). At 210 days after foliar spray the maximum trunk girth was observed in $T_{13}$ (68.10 mm), which was followed by $T_9$ (62.30 mm). Whereas, the minimum trunk girth (50.03 mm) was recorded in control treatment ($T_{14}$). The application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$), registered the maximum trunk girth (68.30 mm) which was significantly on par with $T_9$ (63.06 mm), while minimum trunk girth (50.23 mm) was recorded in control ($T_{14}$) at 240 days after foliar spray. At 30 to 90 days after spray $T_1$, $T_2$, $T_3$, $T_4$, $T_5$, $T_6$, $T_7$, $T_8$, $T_{10}$ and $T_{12}$, at 120 to 150 days after spray $T_1$, $T_2$, $T_3$, $T_4$, $T_5$, $T_6$, $T_7$, $T_8$, $T_{10}$, $T_{11}$ and $T_{12}$, at 180 days after spray $T_3$, $T_5$, $T_6$, $T_7$, $T_8$, $T_{10}$, $T_{11}$ and $T_{12}$, at 210 days after spray $T_2$, $T_3$, $T_4$, $T_5$, $T_6$, $T_7$, $T_8$, $T_{10}$, $T_{11}$ and $T_{12}$, at 240 days after spray $T_6$, $T_7$, $T_8$, $T_{10}$, $T_{11}$ and $T_{12}$ were at par with RDF + foliar spray of Zn + Mg + Mn @ 0.75% along with Cu + Fe @ 0.5%.

The shoot diameter and trunk girth differed significantly among the treatments. The application of RDF + foliar spray of Zn + Mg + Mn @ 0.75% + Cu + Fe @ 0.5% + MAP 0.5% ($T_{13}$) recorded the maximum trunk girth (68.30 mm) at 240 days after foliar spray. Whereas, minimum trunk girth (50.23 mm) was recorded in ($T_{14}$) RDF + foliar spray of Zn + DAP @ 0.5% at 240 days after foliar spray respectively.

The results obtained in present investigation revealed that the increased shoot length, shoot diameter and trunk girth 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. Further, application of proper dose of micronutrients, play an important functional role in chlorophyll synthesis and development of cells in meristemetic tissues (Shekar et al. 2010) in papaya.

**References**

Jayabaskaran KJ, Pandey SD (2008) Effect of foliar spray of micronutrients in banana under high soil pH condition. Ind J Hort 65 (1) : 102—105.

Pedapati A, Tiwari RB (2014) Effect of different osmotic pre-treatments on weight loss, yield and moisture loss in osmotically dehydrated guava. J Agric Search 1 (1) : 49—54.

Shamashad K, Singh HK, Vishwanath Bhanu P (2009) Impact of foliar application of micro-nutrients and thiourea on growth, fruit yield and quality of aonla. Ann Hort 2 (1) : 83—85.

Shekar C, Yadav AL, Singh HK, Singh MK (2010) Influence of micronutrients on plant growth, yield and quality of papaya fruit (*Carica papaya* L.) cv Washington. Asian J Hort 5 (2) : 326—329.

Yadav MK, Patel NL, Parmar BR, Kirtibarthan, Singh P (2010) Effect of micronutrients on growth and crop duration of banana cv Grand Naine. Prog Hort 42 (2) : 162—164.