



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.335>

EFFECT OF FOLIAR APPLICATION OF NUTRIENTS ON YIELD AND QUALITY OF MANGO (*MANGIFERA INDICA* L.) CV. KESAR

Pardeshi S. S.^{1*}, Shinde V. N.¹, Mavinalli Santosh², Shinde M. B.¹ and Abhishek⁵

¹Department of Horticulture, College of Agriculture, Latur (VNMKV Parbhani), Maharashtra, India

²Department of Fruit Science, University of Horticultural Science, Bagalkot, Karnataka, India

³Department of Genetics and Plant Breeding, University of Horticultural Sciences, Bagalkot, Karnataka, India

*Corresponding Author E-mail: pardeshisakshi99@gmail.com

(Date of Receiving : 01-08-2025; Date of Acceptance : 05-10-2025)

ABSTRACT

Experiment conducted on Effect of foliar application of nutrients on yield and quality of mango (*Mangifera indica* L.) cv. Kesar in ten years old mango under randomized block design at College of Agriculture, Latur VNMKV Parbhani Maharashtra. The combination effect of Ca (NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% has recorded highest fruit diameter (8.13 cm), fruit length (7.48 cm), fruit weight (179.23 g), yield per tree(kg), yield per hectare (t/ha) and T.S.S (%) and significantly increased yield than the control and was superior in improving the quality mango cv. Kesar.

Keywords : Mango, Kesar, Foliar, Fruiting, Yield

Introduction

The mango, also known as the "king of fruits," is the world's most significant tropical fruit crop, second only to bananas and plantains (FAO, 2012). It is a member of the genus *Mangifera* and family Anacardiaceae. Its basic chromosome number is 10 (2n=4x=40). The fruit's great flavour, wonderful taste, appealing aroma, colour, and high nutritional value make it extremely valuable. Vitamin A (4800 IU/100g of fruit), riboflavin, ascorbic acid, niacin, and minerals including calcium, phosphorus, and iron are all abundant in it.

Both micronutrients and macronutrients are essential for a variety of plant growth, development, and physiological processes, including respiration, cell wall formation, enzymatic activity, hormone synthesis and absorption, chlorophyll synthesis, photosynthesis and nitrogen fixation. By delivering the lacking nutrients externally, either by foliar or soil application, micronutrient deficits can be readily remedied. The use of several micronutrients has the potential to significantly boost mango production and yield while also improving fruit quality (Selvaraj *et al.*, 2000). According to Zaman and Schumann (2006), foliar

treatment of micronutrients is 10–20 times more effective than soil application.

The foliar application of various nutrients has led to remarkable improvements in various fruit crops, enhancing growth, yield, and quality. Parameters such as average fruit weight, the number of fruits per tree, and yield per tree have all increased with the use of nutrients. Zinc plays a part in blooming because it is involved in the synthesis of tryptophan, an auxin precursor that promotes plant flowering (Panday and Sinha, 2006). When boron is applied to mangos, the result is high-quality product in terms of fruit weight, TSS, sugar, and colour. Calcium plays a crucial role in cells by supporting cell membranes and preserving the structure of cell walls. Additionally, it plays a role in the elongation and division of cell walls. Fruit firmness, disease tolerance, and storage-related problems are all enhanced by optimal fruit calcium concentration.

Material and Methods

An experiment was conducted in ten years old, well grown, uniform statured trees of mango cv. Kesar spaced at 10mx10m during month of January and February, 2025 at full bloom stage and pea stage at College of Agriculture, Latur VNMKV Parbhani

Maharashtra. The experiment was laid out in a randomized block design replicated thrice. The study was carried out with 8 different treatments involving different combinations of various nutrients. Treatmental trees were selected by random numbers. The fruits were harvested based on their maturity indices viz., change in colour of the fruit from dark green to yellowish green.

The chemical concentration in each tree was mixed with 6 litres of water and sprayed with the help of a manually operated sprayer. The spraying was carried out in the morning hours when there is the absence of wind. All the cultural and horticultural practices were followed as per recommendation. The material and methodology followed is listed below:

1) Diameter of fruits (mm)

The fruit diameter of the five uniformly selected fruits from each treatment was measured at the individual fruit's widest cheeks using Vernier callipers. The mean diameter is calculated from the observed values and expressed in mm.

2) Length of fruits (cm)

Five uniform-sized fruits were selected at random from each treatment for evaluation. A Standard measuring scale was used to measure the length of the fruits. The mean of the observed values was calculated and expressed in cm.

3) Weight of fruits (g)

Five uniformly selected fruits from each treatment were weighed individually using an electronic weighing balance and the average mean value is calculated and expressed in g.

4) Fruit yield per tree (kg)

The weight of the harvested fruits at each picking was recorded from each experimental tree. The values at each picking were summed and recorded as the final yield which is expressed in kg/tree.

5) Fruit yield per hectare (t/ha)

The yield per hectare was calculated by multiplying the value of yield/tree (kg) by the total number of plants/hectare and dividing the result by 1000 and recorded as yield per hectare in tonnes.

6) Total Soluble Solids (TSS) (%)

All fruits from each treatment were crushed to create a uniform sample, from which the juice was then extracted using muslin cloth. This extract was utilized to determine Total soluble solids (T.S.S.) in percentage using a handheld refractometer. A few drops of juice

were carefully applied to the prism's surface, followed by placing the hinged part back in position. The refractometer was then positioned against sunlight and the reading was recorded by adjusting the eyepiece rotation at room temperature

Statistical analysis

The data recorded on yield and quality attributing parameters of mango fruits were tabulated and statistically analyzed by adopting randomized block design with suggested by Panse and Sukhatme (1967). The differences among the treatment means were tested for significance by F value at 5% level. The critical difference values were calculated at

0.05 levels where ever the treatment mean differences were found to be significant.

Results and Discussion

The data furnished in tables clearly indicate that treated plants with various nutrients foliar spray performed significantly increased the yield and quality of fruit.

Diameter of fruit (mm)

The effect of nutrients on fruit diameter in mango cv. Kesar was presented in the table 1. Significant differences were observed in combined effect of various nutrients on fruit. The maximum diameter of fruits was observed from the treatment T₇ (81.33 mm) Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% per tree. The least diameter of fruits (60.70 mm) was recorded from the control (T₈).

The increase in fruit diameter is due to applying calcium that promotes consistent cell expansion and ensures integrity, boron strengthens cell walls and promotes the growth of fruit tissue, and zinc aids in cell expansion, which results in larger fruits. The results are similar to Sarrwy *et al.* (2012), Kulkarni and Yewale. (2012), Bhowmick *et al.* (2012).

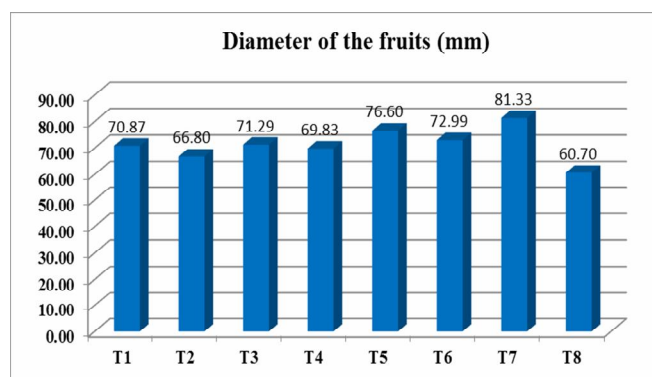


Fig. 1: Effect of foliar application of nutrients on the diameter of fruits (mm)

Length of fruit (cm)

The effect of various nutrients on fruit length in mango cv. Kesar was presented in the table 1. Significant differences were observed in combined action of various nutrients on fruit length in mango.

Maximum fruit length was recorded in the treatment T₇ (9.02 cm) Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% per tree. The least length of fruits (6.79 cm) was recorded from the control (T₈).

In the present investigation, combination effect of Ca (NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% found almost equally effective in influencing the fruit length in mango cv. Kesar. The increase in fruit length influenced by calcium that keeps fruit firm, zinc encourages cell elongation and fruit enlargement (Singh *et al.*, 2015) and boron aids in the transport of carbohydrates for fruit development.

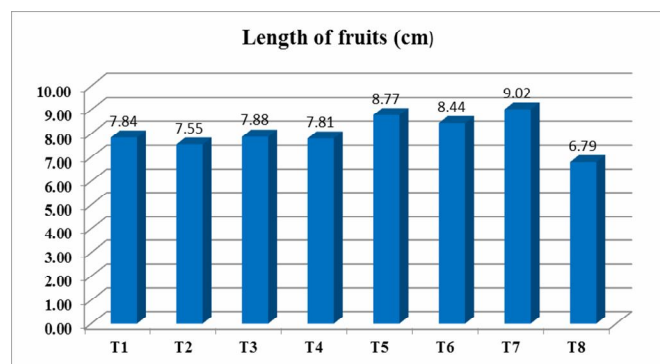


Fig. 2: Effect of foliar application of nutrients on the length of fruits (cm)

Weight of Fruit (g)

The effect of foliar application of various nutrients on fruit weight in mango cv. Kesar was presented in the table 1. The maximum fruit weight was noticed in T₇ (280.23 g) Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% per tree. The least weight of fruit (177.51 g) was recorded from the control (T₈).

The present investigation revealed that Zinc, which is essential for promoting starch formation, cell enlargement, and cell division, and boron, which is actively involved in the transportation of carbohydrates in plants, may be the cause of the increased fruit weight, its spray seem to have benefited all those activities which resulted in more photosynthates being available for fruit development. This synergy is supported by earlier research in mango by Nehete *et al.* (2011), Bhatt *et al.* (2012).

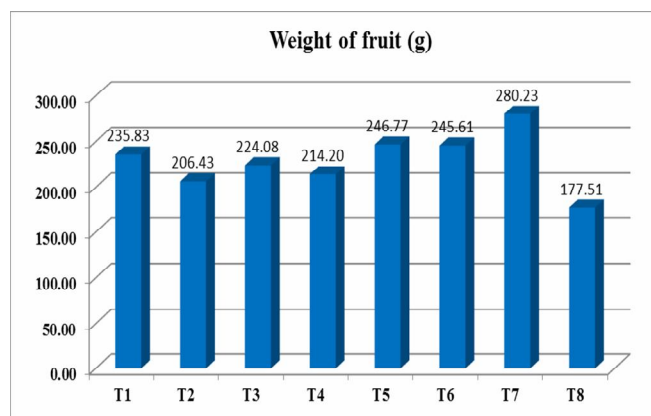


Fig. 3: Effect of foliar application of nutrients on the weight of the fruits (g)

Yield per tree (kg)

The effect of foliar spray of nutrients on yield per tree in mango cv. Mango was presented in the table 1. Maximum yield per tree was recorded in treatment T₇ (77.26 kg) Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% per tree. The least fruit yield per tree (31.08 kg) was recorded from the control (T₈).

According to reports, boron plays a part in fruit setting, which eventually results in more fruits per tree. Auxin production depends on zinc and the total number of fruits per tree is eventually boosted by the balance of auxin in plants, which also controls fruit retention or drop. Foliar application of nutrients had a significant effect on fruit set, fruit retention and yield of mango (Gujar *et al.*, 2015). The findings are similar to Dutta *et al.* (2004), Banik *et al.* (2011), Bhatt *et al.* (2012), and Yadav *et al.* (2018) in mango.

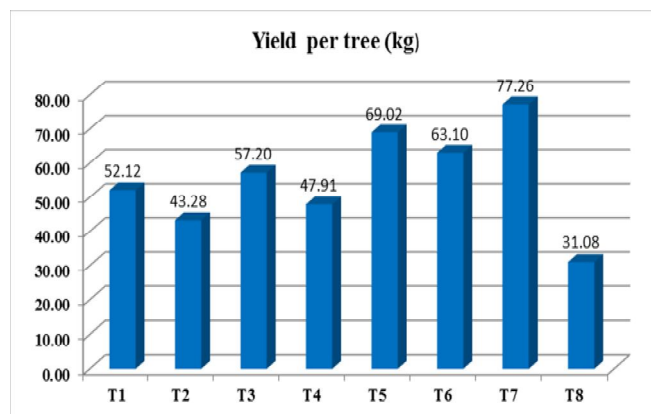


Fig.4: Effect of foliar application of nutrients on the fruit yield per tree (kg)

Yield per hectare (t/ha)

The maximum yield per hectare (t/ha) was observed in treatment T₇ (13.33 t/ha) Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% per tree and

the least fruit yield per hectare (t/ha) (4.67 t/ha) was recorded from the control (T_8).

Foliar application of micronutrients such as zinc, boron, and calcium significantly improves mango fruit yield (t/ha) by enhancing fruit set, reducing fruit drop, improving fruit retention and size of fruits. The findings are similar to Singh *et al.* (2015) in mango cv. Amrapali, Raut *et al.* (2018) in mango cv. Amrapali, Yadav *et al.* (2018) in mango cv. Mallika.

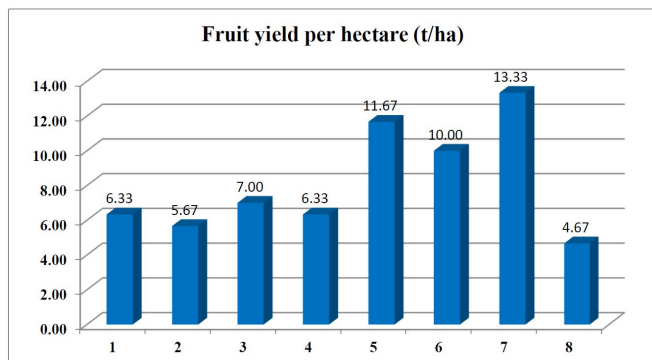


Fig. 5: Effect of foliar application of nutrients on the fruit yield per hectare (t/ha)

T.S.S (%)

The effect of foliar application of nutrients on T.S.S (%) in mango cv. Kesar was presented in the table 1. Maximum T.S.S was recorded in treatment T_7 (21.71 %) $\text{Ca}(\text{NO}_3)_2$ @ 2.0% + H_3BO_3 @ 0.2% +

ZnSO_4 @ 0.8% per tree. The least TSS (%) of fruit (15.65 %) was recorded from the control (T_8).

An increase in TSS might be due to zinc increase the synthesis of auxin and carbohydrates that attributed to better nutrient translocation while boron helps in maintaining physiological maturity and sugar accumulation and calcium helps in membrane stability and delays senescence, improving fruit quality. The combined effect of nutrients resulted in increased concentration of zinc sulphate caused increase in TSS of mango (Anees *et al.*, 2011). The results are accordance with Vajendla *et al.* (2008), Stino *et al.* (2011) in mango cv. Amrapali, Bhushan and Panda (2015) in mango, Manivannan *et al.* (2015) in guava.

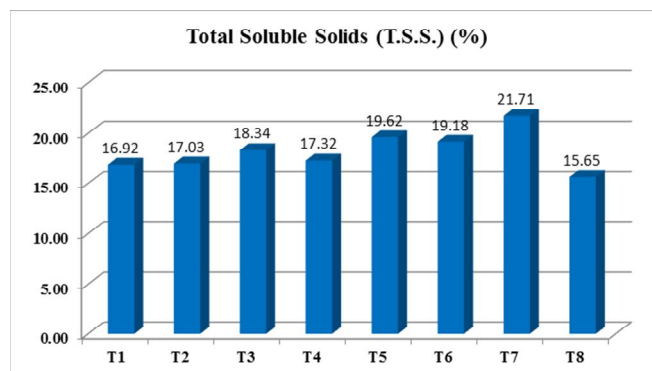


Fig.6: Effect of foliar application of nutrients on the T.S.S of fruits

Table 1: Effect foliar application of nutrients on diameter of fruits, length of fruits, weight of fruits, yield per tree, yield per hectare and T.S.S of fruit of mango cv. Kesar

Sr. no	Treatment combinations	Diameter of fruit (mm)	Length of fruit (cm)	Weight of Fruit (g)	Yield per tree (kg)	Fruit yield per hectare (t/ha)	T.S.S (%)
T ₁	$\text{Ca}(\text{NO}_3)_2$ @ 2.0%	70.87	7.84	253.83	52.12	6.33	16.92
T ₂	H_3BO_3 @ 0.2%	66.80	7.55	206.43	43.28	5.67	17.03
T ₃	ZnSO_4 @ 0.8%	71.29	7.88	224.08	57.20	7.00	18.34
T ₄	$\text{Ca}(\text{NO}_3)_2$ @ 2.0% + H_3BO_3 @ 0.2%	69.83	7.81	214.20	47.91	6.44	17.32
T ₅	H_3BO_3 @ 0.2% + ZnSO_4 @ 0.8%	76.60	8.77	246.77	69.02	11.67	19.62
T ₆	ZnSO_4 @ 0.8% + $\text{Ca}(\text{NO}_3)_2$ @ 2.0%	72.99	8.44	245.61	63.10	10.00	19.18
T ₇	$\text{Ca}(\text{NO}_3)_2$ @ 2.0% + H_3BO_3 @ 0.2% + ZnSO_4 @ 0.8%	81.33	9.02	280.23	77.26	13.33	21.71
T ₈	Control	60.70	6.79	177.51	31.08	4.67	15.65
	SE (m) ±	3.51	0.38	11.79	4.20	1.21	1.14
	CD at 5%	10.28	1.11	34.50	12.92	3.53	3.33

Conclusion

Keeping in view the results summarized above, T₇ Ca(NO₃)₂ @ 2.0% + H₃BO₃ @ 0.2% + ZnSO₄ @ 0.8% has recorded significantly maximum fruit weight, fruit diameter and fruit length as well as is the best treatment to improve the yield i.e., yield per tree, yield per hectare and T.S.S of Mango cv. Kesar.

References

- Anees, M., Taher, F.M, shahzad, J. and Mahmood, N. (2011). Effect of foliar application of micronutrients on the quality of mango. *Mycopathology*, **9**(1), 25-28.
- Bhatt A, Mishra NK, Mishra DS and Singh CP. (2012). Foliar application of potassium, calcium, zinc and boron enhanced yield, quality and shelf life of mango, *HortFlora Research Spectrum*, **1**(4), 300-305.
- Bhowmick N, Banik BC, Hasan MA and Ghosh B. (2012). Response of pre-harvest foliar application of zinc and boron on mango cv. Amrapali under new Alluvial zone of West Bengal, *Indian Journal of Horticulture*, **69**(3), 428-431.
- Bhowmick, N. and Banik, B.C. (2011). Influence of pre-harvest foliar application of growth regulators and micronutrients on mango cv. Himsagar, *Indian Journal of Horticulture*, **68**(1), 103-107.
- Bhusan, L.P. and Panda, C. (2015). Effect of pre-harvest chemical treatments and mulching on quality of mango, *Mangifera indica* L cv Amrapali. *International Journal of Farm Sciences*, **5**(4), 132-138.
- Dutta P. (2004). Effect of foliar boron application on panicle growth, fruit retention and physiochemical characters of mango cv. Himsagar, *Indian Journal of Horticulture*, **61**(3), 265-266.
- FAO, (2012). Food and Agriculture Organization of the United Nations Food and Agricultural Organization Statistics.
- Gurjar, T., Patel, N. L., Panchal, B. and Chaudhari, D., (2015), Effect of foliar spray of micronutrients on flowering and fruiting of Alphonso mango (*Mangifera indica* L.). *Int. Quarterly J. Life Sci.*, **10**(3), 1053-1056.
- Kulkarni, S.S. and Yewale, P.H. (2012). Effect of mulching and chemicals for improving yield and quality of mango cv. Kesar. *International Journal of Forestry and Crop Improvement*, **3**(2), 137-139.
- Manivannan, M.I., Irulandi, S. and Thingalmaniyan, K.S. (2015). Studies on the effect of pre-harvest application of plant growth regulators and chemicals on yield and quality of guava (*Psidium guajava* L.) cv. L.-49. *International Journal of Agricultural Sciences*, **11**(1), 138-140.
- Nehete, D.S., Padhiar, B.V., Shah, N.I., Bhalero, P.P., Kolambe, B.N. and Bhalero, R.R. (2011). Influence of micronutrient spray on flowering, yield, quality and nutrient in leaf of mango cv. Kesar. *The Asian Journal of Horticulture*, **6**(1), 63-67.
- Pandey, S. N. and Sinha, B. K. (2006), *Plant Physiology*, (4th edition) Vikas Publishing House Pvt. Ltd., New Delhi, 120-139.
- Panse, V. G. and Sukhatme, P. V. 1996. Statistical methods for Agricultural workers, *I.C.A.R. Publication*, New Delhi, 381.
- Sarrwy, S. M. A., Gadalla, E.G. and Mostafa, E. A. M. (2012). Effect of calcium nitrate and boric acid sprays on fruit set, yield and fruit quality of cv. amhat date palm. *World Journal of Agricultural Sciences*, **8** (5), 506-515.
- Selvaraj Y. (2000). Biochemical studies on internal breakdown-a ripening disorder in mango fruits, *Indian Journal of Horticulture*, **57**(3), 183-188.
- Singh A, Singh CP and Singh AK. (2015). Flowering behaviour of mango genotypes under tarai conditions of Uttarakhand, *International Journal of Basic and Agricultural Research*, **13**(3), 400-406.
- Stino RG, Abd El-Wahab SM, Habashy SA and Kelani RA. (2011). Productivity and Fruit quality of three mango cultivars in Relation to foliar sprays of calcium, zinc, boron or potassium, *Journal of Horticulture Science & Ornamental Plants*, **3**(2), 91-98.
- Vejendla, V., Maity P. K. and Banik, B. C. (2008). Effect of chemicals and growth regulators on fruit retention, yield and quality of mango Cv. Amrapali. *Journal of Crop And Weed*, **4**(2), 45- 46.
- Yadav V, Singh PN and Yadav P. (2018). Effect of foliar fertilization of boron, zinc and iron on fruit growth and yield of mango cv. Amrapali, *International Journal of Science and Research*, **3**(8), 1-6.
- Zaman, Q.U. and Schumann, A.W. (2006). Nutrient management zones for citrus based on variation in soil properties and tree performance *International Journal of Science and Research*, **7**, 45-63.