Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 23(3) September-December 2025]

Pantnagar Journal of Research

(Formerly International Journal of Basic and Applied Agricultural Research ISSN : 2349-8765)

G.B. Pant University of Agriculture & Technology
Pantnagar, U.S. Nagar; Uttarakhand, Website : gbpuat.res.in/PJR

PANTNAGAR JOURNAL OF RESEARCH

Vol. 23(3) September-December, 2025

CONTENTS

Influence of nutrients on the flowering attributes of the guava cv. Sardar

RAKHI GAUTAM*, PRATIBHA and A.K. SINGH

Department of Horticulture, College of Agriculture, G. B. Pant University of Agriculture and Technology, Pantnagar-263145 (U. S. Nagar, Uttarakhand)
**Corresponding author's email id: rakhigbpant12@gmail.com*

ABSTRACT: An adequate supply of nutrients is crucial for the growth, development and flowering characteristics of guava plant. Therefore, an experiment was conducted at H.R.C., Patharchatta, G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand with ten treatment combinations of different doses of macro (N, P, K, Ca) and micronutrients (Zn, B, Fe), replicated thrice with an aim to ensure better flowering parameters which simultaneously enhances the early and qualitative crop production of guava cv. Sardar. Thus, it can be concluded from the experiment that the best results were recorded with the treatment T_5 (75% RDF+BMN+2FMN) during both the years 2022-23 and 2023-24.

Key words: Early crop, flowering, macronutrients, micronutrients

Guava (*Psidium guajava* L.), popularly known as the "Apple of the Tropics," is an economically and nutritionally important fruit crop widely cultivated in tropical and subtropical regions of India. At present, India ranks as the leading guava-producing country in the world, with a total production of 45.82 metric tonnes from an area of 3.08 ha (Anonymous, 2023a). In Uttarakhand, guava is cultivated over an area of 4.825 thousand ha, producing 38.391 thousand metric tonnes with an average productivity of 7.956 metric tonnes per hectare (Anonymous, 2023b). Balanced plant nutrition plays a pivotal role in regulating growth, flowering behaviour, productivity, and fruit quality in guava, as the crop extracts substantial quantities of nutrients from the soil. Macronutrients such as nitrogen, phosphorus, potassium and calcium (secondary macronutrient) are fundamental for vegetative growth, energy transfer and assimilate translocation, while micronutrients like zinc, boron, and iron, though required in smaller amounts, are crucial for enzymatic activity, chlorophyll synthesis, carbohydrate metabolism, pollen viability, and hormonal regulation. Deficiency or imbalance of these nutrients often leads to delayed flowering, reduced flowering intensity, poor fruit set, and lower yield (Prashar *et al*., 2022; Janaki *et al*., 2023). Soil and foliar application of nutrients (macro and micro) have been reported as an efficient approach to rapidly correct deficiencies and enhance nutrient availability during critical phenological stages. Improved flowering attributes, including increased number of flowers per shoot, higher flowering intensity, and reduced duration from bud break to full bloom, have been associated with integrated application of macro and micronutrients due to enhanced photosynthate availability and auxin synthesis. Therefore, understanding the effect of balanced macro and micronutrient application on flowering attributes of guava is essential for improving reproductive efficiency and achieving sustainable fruit production. Any imbalance may lead to nutrient toxicity or deficiency, ultimately compromising the quality and yield of fruit crops. Hence, a study is required to understand the benefits of balanced application of nutrients according to prevailing soil and plant conditions.

MATERIALS AND METHODS

Study site and environmental conditions

Experimental design and Treatment details

T_1: Control 100% *RDF in the tree basin, T_2:75% RDF + 100g zinc sulfate + 100g calcium chloride + 100g ferric sulfate + 100g boric acid /tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering; T_3: 25% RDF 100g zinc sulfate + 100g calcium chloride +100g ferric sulfate + 100g boric acid /tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering; T_4: 25% RDF 100g zinc sulfate + 100g calcium chloride +100g ferric sulfate + 100g boric acid /tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering; T_5: 75% RDF +100g zinc sulfate + 100g calcium chloride + 100g ferric sulfate +100g boric acid /tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering and 30 days later; T_6: 50% RDF + 100g zinc sulfate + 100g calcium chloride + 100g ferric sulfate + 100g boric acid /tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering and 30 days later; T_7: 25% RDF +100g zinc sulfate + 100g calcium chloride + 100g ferric sulfate + 100g boric acid / tree/year) in the tree basin + one foliar spray of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering and 30 days later; T_8: 75% RDF /tree/year in the tree basin + two foliar sprays of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric acid at just before flowering and 30 days later; T_9: 50% RDF /tree/year in the tree basin + two foliar sprays of 1% zinc sulfate+ 0.5% calcium chloride+ 0.5% ferric sulfate + 0.2% boric at just before flowering and 30 days later; T_{10}: 25% RDF /tree/year in the tree basin + two foliar sprays of 1% zinc sulfate+ 0.5% calcium chloride + 0.5% ferric sulfate + 0.2% boric acid at just before flowering and 30 days later

*RDF=Recommended dose of fertilizers (450g N, 400g P_2O_5, 300g K_2O + 50kg FYM/tree/year)

Observations recorded

Number of flowers per shoot

The number of flower buds emerged out of the four selected branches on each tree were counted in both the years and their means were presented.

Period of bud break to full bloom (days)

The period from the initiation of bud break to full flowering was calculated and reported in days.

Flowering duration (days)

The period of flowering from the date of bud break to the date of end of blooming is counted and presented in number of days. Since it is influenced by environmental conditions and nutritional status in fruit (Reddy and Kurian, 2008).

Flowering duration (Days) = Date of end of blooming - Date of bud break

Flowering intensity (%)

The percentage of flowering shoots was determined by counting those that emerged on the selected branches.

Period of full bloom to maturity (days)

The duration from the date of full bloom to the date of fruit maturity, measured in days.

RESULTS AND DISCUSSION

Effects of nutrient application on flowering

Number of flowers per shoot

The integrated nutrient management practices had a significant effect on the vegetative growth of mrig-bahar crop of guava. The data presented in Table 2 and Fig. 3 demonstrate that the number of flowers per shoot was significantly influenced by the application of different nutrient doses. Across both the experimental years (2022-23 and 2023-24) treatment 75% RDF+2FMN and 75% RDF+BMN+2FMN produced the maximum number of flowers per shoot (31.83 and 33.83), respectively. During the year 2022-23 treatment T_8 was *at par* with treatments T_5 (31.67), T_6, T_9 and T_{10} (31.50) whereas, treatment T_5 was found statistically *at par* with T_8 (33.33), T_7 (32.83), T_6 (32.83) and T_9 (32.67) during the year 2023-24. The minimum flowers per shoot i.e., 27.61 and 29.83 was observed with treatment T_1 (Control: (100% RDF) during the year 2022-23 and 2023-24, respectively. Pooled data across 2022–23 and 2023–24 revealed that treatment T_5 (75% RDF + BMN + 2FMN) produced the maximum flowers per shoot (32.75), statistically similar to T_8, T_6 and T_9, while the minimum number of flowers (29.33) occurred in T_1 (Control: 100% RDF). Treatments combining Zn, B, Fe and Ca recorded the highest flower numbers, as Zn-finger transcription factors regulate floral organ development including anthers, pollen, pistils, and secretory tissues. Macronutrients along with fym and micronutrients increased the availability of nutrients. The inclusion of FYM and micronutrients with chemical fertilizer greatly helped in improving the flower and fruit attributes. The application of nitrogen, phosphorus, potash, manures, bio-fertilizer to synthesize of amino acid act as precursor of polyamine and secondary messenger in growth characters and development of flowers (Gupta *et al*., 2019). Enhanced number of flowers per shoot were also reported by Ahmed *et al*. (2014) in pomegranate by combined application of nutrients which also simultaneously enhanced the mineral uptake by the plants.

Period from bud break to full bloom (days)

The data presented in the Table 1 and Fig. 1 clearly shows that soil and foliar application of different doses of nutrients had a significant effect on period of bud break to full bloom (days). Data regarding phenological parameters during both the years of experimentation showed that the treatment T_5 (75% RDF+BMN+2FMN) recorded the minimum period of bud break to full bloom was 7.44 days followed by treatments T_6 (7.47 days) (50% RDF+BMN+2FMN) and treatments T_8 (7.52 days) (75% RDF+2FMN) during the year 2022-23. Whereas, the minimum period of bud break to full bloom (6.15 days) was recorded in the treatment T_5 which was statistically *at par* with treatments T_8 (6.23 days) and T_6 (6.31 days) during the year 2023-24. The maximum period of bud break to full bloom i.e., 9.11 days and 7.82 days was observed with treatment T_1 (Control: 100% RDF) during the year 2022-23 and 2023-24, respectively. Mean pooled analysis of both years 2022-23 and 2023-24 showed that the minimum period of bud break to full bloom (6.80 days) was observed with treatment T_5 (75% RDF+BMN+2FMN) which was statistically *at par* with treatments T_8 (6.88 days) and T_6 (6.89 days) whereas, maximum period of bud break to full bloom (8.47days) was observed with treatment T_1 (Control: 100% RDF). The significant reduction in bud break to full bloom duration highlights the synergistic effect of micronutrients with macronutrients (N, P, K, Ca), supported by the stimulatory action of foliar sprays ($ZnSO_4$, H_2BO_4, $CaCl_2$, $FeSO_4$) and soil-applied NPK, which induced favorable physiological and hormonal changes in tissues influencing flowering traits. These findings align with Nandita *et al.* (2020), who reported significant differences in period from bud break to full bloom by the application of nutrients in sweet orange. Balanced nutrient application significantly reduced the period from bud break to full bloom compared to the control. Adequate nutrient supplementation can accelerate the reproductive transition in plants by enhancing metabolic activity and floral induction pathways (Bhadarge and Singh, 2022 in guava; Dutta 2004 in mango).

Flowering duration (days)

The data presented in the Table 2 and Fig 3 clear shows that the soil and foliar application of different doses of nutrients had a significant effect on flowering duration (days). The minimum flowering duration (31.57 days) was recorded with the treatment T_5(75% RDF+BMN+2FMN) which is statistically *at par* with treatments T_6 (31.97 days)(50% RDF+BMN+2FMN) and treatments T_8 (32.24 days) (75% RDF+2FMN) during the year 2022-23 whereas, minimum flowering duration (30.23 days) was reported with T_5 which was statistically *at par* with treatments T_6 (30.63 days)(50% RDF+BMN+2FMN) and treatments T_8 (30.91 days) (75% RDF+2FMN. T_5 was also statistically *at par* with treatment T_6 (30.63 days) (50% RDF+BMN+2FMN) and T_8 (30.91 days) (75% RDF+2FMN) during the year 2023-24. The maximum flowering duration of 36.31 days and 34.97 days was observed with treatment T_1 (Control: 100% RDF) during the year 2022-23 and 2023-24 respectively. Mean pooled data analysis of both the years 2022-23 and 2023-24 showed that the minimum flowering duration (30.90 days) was observed with treatment T_5 (75% RDF+BMN+2FMN) which was statistically *at par* with treatments T_8 (31.30 days) and T_6 (31.58 days) whereas, maximum flowering duration (35.64 days) was observed with treatment T_1 (Control: 100% RDF). Balanced nutrient management not only improved yield attributes but were also associated with fewer days to flowering when compared with untreated trees (Anmol *et al*., 2023). Similarly, foliar nutrient sprays with micronutrients produced earliest flower bud initiation and reduced days to flowering compared with control treatments (Raipuriya *et al*., 2024). These findings are supported by micronutrient studies showing a reduction in days to flowering and subsequent phenological events, likely due to improved carbohydrate metabolism, enzyme activation, and hormonal balance (Bhadarge and Singh, 2022).

Flowering intensity (%)

Table 2 shows that varying doses of soil and foliar-applied nutrients significantly influenced flowering intensity (%). The maximum flowering intensity (15.92) was recorded with the treatment T_8 (75% RDF+2FMN) which was statistically *at par* with treatments T_5 (15.83), T_6 (15.75), T_9 (15.75) and T_{10} (15.75) during the year 2022-23 whereas, maximum flowering intensity (16.92) was recorded with the treatment T_5 (75% RDF+BMN+2FMN). It was statistically similar to T_8 (16.67), T_6, and T_7 (16.42) in the year 2023–24. The minimum flowering intensity (14.42 and 14.92) during the year 2022-23 and 2023-24, respectively with treatment T_1 (Control: 100% RDF). Mean pooled analysis of both the years 2022-23 and 2023-24 showed that the maximum flowering intensity (16.38) was observed with treatment T_5 (75% RDF+BMN+2FMN) followed by treatments T_8 (16.29), T_6 (16.08), T_9 (16.04) and T_{10} (16.00), respectively. Whereas, minimum flowering intensity (14.67) was observed with treatment T_1 (Control: 100% RDF). Along with NPK, micronutrients like Fe, Zn, Ca, and B improve flowering intensity, fruit set, and yield. Their role in photosynthesis and hormone metabolism enhances auxin synthesis, while boron aids pollen germination, pollen tube elongation, nectar sugar modification, and pollination, leading to higher fruit set and reduced fruit drop. Foliar or soil application of Zn and B, either alone or combined with other nutrients, improve vegetative vigor and reproductive attributes, indicating that micronutrient-enriched nutrition contributes to stronger floral expression and shoot productivity. Similarly, Singh and Maurya (2004) demonstrated that foliar sprays of $ZnSO_4$ (0.4%), $FeSO_4$ (0.4%), $MnSO_4$ (0.2%), and H_2BO_4 (0.2%), alone or in combination, significantly improved flowering in mango cv. Mallika. Comparable results were documented by several researchers such as Rajkumar *et al.* (2014) in guava cv. Pant Prabhat, Kumar *et al.* (2009) in guava and

Table 1: Effect of soil and foliar application of nutrients on period from bud break to full bloom and period from full bloom to maturity of guava cv. Sardar

Treatments	Period from bud break to full bloom (days)			Period from full bloom to maturity (days)		
	2022-23	2023-24	Mean	2022-23	2023-24	Mean
T_1	9.11	7.82	8.47	129.80	124.9	127.35
T_2	8.78	7.49	8.14	128.92	124.10	126.51
T_3	8.75	7.46	8.11	127.59	123.49	125.54
T_4	8.54	7.25	7.90	125.54	122.11	123.83
T_5	7.44	6.15	6.80	117.80	115.71	116.76
T_6	7.47	6.31	6.89	119.59	115.83	118.02
T_7	8.32	7.03	7.68	121.14	117.05	119.10
T_8	7.52	6.23	6.88	119.88	116.15	117.71
T_9	8.31	7.02	7.67	121.86	119.09	120.48
T_{10}	8.46	7.17	7.82	121.53	119.44	120.49
SE(±m)	0.07	0.07	0.07	1.26	0.98	1.12
C.D. (5%)	0.20	0.21	0.21	2.76	2.12	2.44

T_1: (100% *RDF), T_2: (75% RDF+**BMN+1FMN), T_3: (50% RDF+BMN+1***FMN), T_4: (25% RDF+BMN+1FMN), T_5: (75% RDF+BMN+2FMN), T_6: (50% RDF+BMN+2FMN), T_7: (25% RDF+BMN+2FMN), T_8: (75% RDF+2FMN), T_9: (50% RDF +2FMN), T_{10}: (25% RDF+ 2FMN) *RDF=Recommended dose of fertilizers (450g N 400g P_2O_5 300g K_2O + 50kg FYM/tree/ year)**BMN=Basal application of micronutrients (Zn, B, Ca, Fe)***FMN=Foliar application of micronutrients (Zn, B, Ca, Fe)

Yadav *et al*. (2014) in ber.

Period from full bloom to maturity (days)

The results presented in Table 1 and Fig. 2 demonstrate that the soil and foliar application of varying nutrient doses significantly affected the flowering-to-maturity period (days). In 2022–23, the shortest interval from full bloom to fruit maturity (117.80 days) was observed in treatment T_5 (75% RDF + BMN + 2FMN), which was statistically *at par* with T_6 (119.59 days) (50% RDF + BMN + 2FMN) and T_8 (119.88 days) (75% RDF + 2FMN). During 2023–24, T_5 again recorded the minimum duration (115.71 days), statistically *at par* with T_6 (115.83 days), T_8 (116.15 days) and T_7 (117.05 days). In contrast, the maximum flowering-to-maturity period was noted in the control T_1 (100% RDF), with values of 129.80 days and 124.90 days for 2022–23 and 2023–24, respectively. Pooled analysis over both years indicated that T_5 (75% RDF + BMN + 2FMN) recorded the shortest mean period (116.76 days), statistically similar to T_8 (117.71 days) (75% RDF + 2FMN), T_6 (118.02 days) (50% RDF + BMN + 2FMN), and T_7 (119.10 days) (25% RDF + BMN + 2FMN), while the longest mean duration (127.35 days) occurred in T_1 (Control: 100% RDF). This might be due to stimulation effect of zinc sulphate, boric acid and copper sulphate along with the foliar application of primary macronutrients (NPK) that causes the physiological and harmonal changes in the tissues which ultimately influences the flowering characteristics. This result may be due to the soil and foliar application of macro and micronutrients that boosts the photosynthetic chemicals inside the plant tissue, which reduces leaf loss and strengthens the plant's ability to persevere. Decrease in flowering-to-maturity period of guava fruit with application of both macro and micronutrients might be because of increased efficiency of primary nutrient due to catalysing effect of micronutrients (Kumar and Singh, 2019). The results of present investigation were also in conformity with findings by Saha *et al.* (2019) who observed that application of both $FeSO_4$ and $ZnSO_4$ significantly enhanced vegetative growth and flowering attributes of strawberry. Further supported by Deshwal *et al.* (2024) in strawberry; Dutta (2004) in mango, and Sarolia *et al.* (2007) in guava confirming the consistent positive influence of macro and micronutrients on flowering attributes across diverse fruit crops.

CONCLUSION

The study revealed that treatment T_5 significantly improved flowering attributes by recording the

Table 2: Effect of soil and foliar application of nutrients on number of flowers/ shoot and flowering duration of guava cv. Sardar

Treatments	Number of flowers/ shoot			Flowering intensity (%)			Flowering duration (days)		
	2022-23	2023-24	Mean	2022-23	2023-24	Mean	2022-23	2023-24	Mean
T_1	28.83	29.83	29.33	14.42	14.92	14.67	36.31	34.97	35.64
T_2	29.67	31.67	30.67	14.83	15.83	15.33	35.65	34.32	34.99
T_3	29.83	31.67	30.75	14.92	15.83	15.38	34.53	33.19	33.86
T_4	30.67	32.33	31.50	15.33	16.17	15.75	34.06	32.73	33.40
T_5	31.67	33.83	32.75	15.83	16.92	16.38	31.57	30.23	30.90
T_6	31.50	32.83	32.17	15.75	16.42	16.08	31.97	30.63	31.58
T_7	30.33	32.83	31.58	15.17	16.42	15.79	32.76	31.43	32.10
T_8	31.83	33.33	32.58	15.92	16.67	16.29	32.24	30.91	31.30
T_9	31.50	32.67	32.08	15.75	16.33	16.04	33.50	32.17	32.84
T_{10}	31.50	32.50	32.00	15.75	16.25	16.00	33.69	32.36	33.03
SE(±m)	0.45	0.63	0.54	1.57	7.33	4.45	0.36	0.36	0.36
C.D. (5%)	1.34	1.88	1.61	0.37	0.41	0.39	1.07	1.07	1.07

T_1: (100% *RDF); T_2: (75% RDF+**BMN+1FMN), T_3: (50% RDF+BMN+1***FMN), T_4: (25% RDF+BMN+1FMN), T_5: (75% RDF+BMN+2FMN), T_6: (50% RDF+BMN+2FMN), T_7: (25% RDF+BMN+2FMN), T_8: (75% RDF+2FMN), T_9: (50% RDF +2FMN), T_{10}: (25% RDF+ 2FMN) *RDF=Recommended dose of fertilizers (450g N 400g P_2O_5 300g K_2O + 50kg FYM/tree/ year)**BMN=Basal application of micronutrients (Zn, B, Ca, Fe)***FMN=Foliar application of micronutrients (Zn, B, Ca, Fe) highest number of flowers per shoot and flowering intensity, along with the shortest duration from bud break to full bloom, flowering period and full bloom to maturity during both the years 2022-23 and 2023-24. The integrated application of 75% RDF supplemented with soil and foliar application of Zn, Ca, Fe and B proved most effective in enhancing flowering behaviour and early production of quality guava fruits. This nutrient strategy highlights the potential of partial fertilizer reduction combined with micronutrient supplementation for sustainable guava production. Future studies should validate these findings across different agro-climatic regions, cultivars and soil types to develop region-specific nutrient recommendations.

ACKNOWLEDGMENTS

The authors sincerely acknowledge the support and facilities provided by the Directorate of Research, Department of Horticulture and Horticulture Research Centre, G. B. Pant University of Agriculture and Technology, Pantnagar, which greatly assisted in the successful conduct of the experiment.

REFERENCES

Ahmed, F.F., Mohamed, M.M., Abou El- Khashab, A.M.A. and Aeed, S.H.A. (2014). Controlling fruit splitting and improving productivity of manfalouty pomegranate trees by using salicylic acid and some nutrients. *World Rural Observations*, 6(1): 87-93.

Anmol, Singh, V., Kapadnis, V. and Ekka, S. (2023). Effect of integrated nutrient management on physical characteristics of guava (*Psidium guajava*) cv. Allahabad Safeda under meadow orcharding. *International Journal of Environment and Climate Change*, 13(8): 1615-1623.

Annonymous, (2023a). National Horticulture Board (NHB). Indian Production of Guava: 1st Advance Estimate 2021-22. 2022. Available online: https://agriexchange. apeda.gov.in/India%20Production/India_Productions.aspx?cat=fruit&hscode=1046 (accessed on 28 December 2023).

Annonymous, (2023b). State agriculture statistics data: Area productivity yield estimates. Department of Agriculture Uttarakhand, Government of Uttarakhand, 2023-24. Pp. 1-22. https://agriculture.uk.gov.in/document-category/state-agriculture-statistics-data/

Bhadarge, S. and Singh, D. (2022). Effect of different levels of micronutrients on growth and flowering attributes of guava (*Psidium Guajava* L.) fruit in meadow orchard. *The Pharma Innovation Journal*, 11(6): 2158-2161.

Deshwal, A., Tiwari, A., Singh, J., Rathi, M.S., Singh, S. K. and Singh, A. V. (2024). Impact of micronutrients on growth, flowering and yield of strawberry *(Fragaria × ananassa Duch.) cv. Chandler* in Western Uttar Pradesh, India. *Plant Archives*, 24: 476-482.

Dutta, P. (2004). Effect of foliar boron application on panicle growth, fruit retention and physico-chemical characters of mango cv. Himsagar. *Indian Journal of Horticulture*, 61(3): 265-266.

Gupta, P., Singh, D., Prasad, V. M. and Kumar, V. (2019). Effect of integrated nutrient management on growth and yield of guava (*Psidium guajava* L.) cv. Allahabad safeda under high density planting. *Journal of Pharmacognosy and Phytochemistry,* 8(1): 1233-1236.

Janaki, D., Kumar, S. and Rajammal, T. S. J. (2023). Effect of micronutrients on yield and quality of guava cv Lucknow 49 in sodic soil. *Journal of Soil Salinity and Water Quality*, 15(2): 174-177.

Kumar, D., Pandey, V., Anjaneyulu, K. and Nath, V. (2009). Optimization of major nutrients for guava yield and quality under east coastal conditions. *Indian Journal of Horticulture,* 66(1): 18-21.

Kumar, P. and Singh, A. K. (2019). Effect of soil and foliar application of macro and micronutrients on flowering, fruit set and yield of mango cv. Dashehari *Agricultural*

Science Digest, 39(1): 63-66.

Nandita, K., Kundu, M., Rani, R., Khatoon, F. and Kumar, D. (2020). Foliar feeding of micronutrients: An essential tool to improve growth, yield and fruit quality of sweet orange (*Citrus sinensis* (L.) Osbeck) cv. mosambi under non-traditional citrus growing track. *International Journal of Current Microbiology and Applied Sciences,* 9(3): 473-483.

Prashar, N., Bakshi, M., Chandrakant, S. and Ughareja, A. (2022). Role of micro-nutrients in fruit production: A review. *The Pharma Innovation Journal*, 11(6): 1158-1164.

Raipuriya, S., Sharma, T. R., Sharma, R., Ramakrishnan, R. S. and Pandey, C. S. (2024). Effect of foliar feeding of plant growth regulator and nutrients on phenological attributes of guava *(Psidium guajava L.)* cv Apple Colour. *Journal of Scientific Research and Reports*, 30(7): 175-182.

Rajkumar, Tiwari, J. P. and Lal, S. (2014). Effect of foliar application of zinc and boron on fruit yield and quality of winter season guava (*Psidium guajava*) cv. Pant Prabhat. *Annals of Agri-bio Research,* 19(1):105-108.

Reddy, Y. T. N. and Kurien, R. M. (2008). Cumulative and residual effects of paclobutrazol on growth, yield and fruit quality of alphonso mango. *Journal of Horticultural Sciences*, 3: 119-122.

Saha, T., Ghosh, B., Debnath, S. and Bhattacharjee, A. (2019). Effect of micronutrients on growth, yield and quality of strawberry (Fragaria × ananassa Duch.) cv. Winter Dawn in the Gangetic Alluvial Region of West Bengal. *Journal of Crop and Weed*, 15(1): 92-95.

Sarolia, D. K., Rathore, N. S. and Rathore, R. S. (2007). Response of zinc sulphate and iron sulphate sprays on growth and productivity of guava cv. Sardar. *Current Agriculture*, 31(1-2): 73-77.

Singh, J. and Maurya, A. N. (2004). Effect of micronutrients on bearing of mango (*Mangifera indica*) cv. Mallika. *Progressive Agriculture*, 4(1): 47-50.

Yadav, R. K., Ram, R.B., Kumar, V., Meena, M. L. and Singh, H. D. (2014). Impact of micronutrients on fruit set and fruit drop of winter season guava (*Psidium guajava* L.) cv. Allahabad Safeda. *Indian Journal of Science and Technology*, 7(9): 1451-1453.

Received: December 15, 2025
Accepted: December 20, 2025