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Effect of multimicronutrient mixture on fruit yield attributing characters of guava (*Psidium guajava* L.) cv. Lucknow 49

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Abstract

The research experiment entitled on 'Effect of multimicronutrient mixture on growth, yield and quality of guava (*Psidium guajava* L.) cv. Lucknow 49' was carried out during the Kharif season of 2023 and 2024 at Horticulture Research Farm, Anand Agricultural University, Anand (Gujarat). The study followed a Completely Randomized Design (CRD) with ten treatments and three replication. Application of different multimicronutrient mixture grade according to the treatments. Soil application was given at on set of monsoon and foliar application was given at fruit setting stage and 30 day after fruit setting stage. In the pooled analysis, T10 (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) recorded highest fruit length (7.70 cm), fruit diameter (7.50 cm), fruit weight (209.00 g) and fruit volume (183.73 cc), number of fruits per tree (219.89) and fruit yield per tree (34.37 kg/tree). Based on two years of research, application of multimicronutrient mixture 125 g/tree soil application of grade-V was given at on set of monsoon and 1 % foliar application of grade-IV at fruit setting stage and 30 day after fruit setting stage recorded maximum value of yield attributing characters of guava.

Keywords: Guava, Multimicronutrient mixture, Foliar application, Soil application, Grade

Introduction

Guava (*Psidium guajava* L.) also known as "apple of the tropics" or "poor man's apple". It is one of the most popular fruit crops of tropical and sub-tropical area. It belongs to the Myrtaceae family having chromosome number $2n = 22$. It is native to Tropical America, extending from Mexico to Peru (Radha and Mathew, 2007)^[10]. Presently, guava occupies an area of 2.64 lakh hectare with an annual production of 40.53 MT in India (Anonymous, 2018)^[2]. In India, varieties like Lucknow-49, Allahabad Safeda, Allahabad Surkha, Arka Mridula, Arka Amulya, Pant Prabhat, Lalit, Shweta, etc. are popular among the growers. In Gujarat, varieties like L-49, Allahabad Safeda and Bhavnagari Red are being grown by farmers. Gujarat having excellent opportunities for guava cultivation. Some major problems regarding its cultivation are slow plant growth, less fruiting, premature fruit drop, poor yield and quality of fruits. These can be controlled by improvement in agrotechniques. Micronutrients play an important role in production and deficiency leads in lowering the productivity in guava. Multimicronutrients grade contains copper, boron, zinc, manganese and iron are responsible for metabolic activities in fruit physiology. The Foliar application of macro and micro nutrients have immense important role in improving fruit set, productivity and quality of fruits. It has also beneficial role in recovery of nutritional and physiological disorder in fruit trees. Various experiments have been conducted earlier on soil application and Foliar spray of micronutrient in different fruit crops and shown significant response with improvement of yield and quality of fruits.

Materials and Methods

The present research work was conducted on 'Effect of multimicronutrient mixture on growth, yield and quality of guava (*Psidium guajava* L.) cv. Lucknow 49' was carried out during the Kharif season of 2023 and 2024 at Horticulture Research Farm, Anand Agricultural University, Anand (Gujarat). The study followed a Completely Randomized Design (CRD) with ten treatments and three replication. The experiment was comprised viz., T₁ - Control, T₂ - Foliar spray of 2 % multimicronutrient mixture grade-I, T₃ - Foliar spray of 2 % multimicronutrient mixture grade-II, T₄ - Foliar spray of 2 % multimicronutrient mixture grade-III, T₅ - Foliar spray of 2 %

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multimicronutrient mixture grade-IV, T₆ - 250 g/tree soil application of multimicronutrient mixture grade-V, T₇ - Foliar spray of 1 % multimicronutrient mixture grade-I & 125 g/tree soil application of multimicronutrient mixture grade-V, T₈ - Foliar spray of 1 % multimicronutrient mixture grade-II & 125 g/tree soil application of multimicronutrient mixture grade-V, T₉ - Foliar spray of 1 % multimicronutrient mixture grade-III & 125 g/tree soil application of multimicronutrient mixture grade-V, T₁₀ - Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient

mixture grade-V on 5 year old guava trees of Lucknow-49 variety. The soil application was given at on set of monsoon and foliar application was given at fruit setting stage and 30 day after fruit setting stage. The mean data recorded during both years and pooled analysis on different fruit yielding characters viz., fruit length, fruit diameter, fruit weight, fruit volume, number of fruits per tree and fruit yield per tree fruit yield tons per hectare were recorded at time of harvesting and statistically analyzed using variance technique as described by Panse and Sukhatme (1967) [8].

Table 1: Composition of multimicronutrient mixture grades

Sr.no	Content (%)					
	Grade	Iron	Manganese	Zinc	Copper	Boron
For Foliar Spray						
1	Grade-I (General)	2.0	0.5	4.0	0.3	0.5
2	Grade-II (for Zn deficiency)	2.0	0.5	8.0	0.5	0.5
3	Grade -III(for Fe deficiency)	6.0	1.0	4.0	0.3	0.5
4	Grade-IV(for Zn & Fe deficiency)	4.0	1.0	6.0	0.5	0.5
For Soil Application						
5	Grade-V (Soil Application)	2.0	0.5	5.0	0.2	0.5

Results and Discussions

The results obtained from the research experiment on 'Effect of multimicronutrient mixture on growth, yield and quality of guava (*Psidium guajava* L.) cv. Lucknow 49' are presented in Table 2, 3, 4 and 5.

Fruit length (cm)

The result indicated that significantly maximum fruit length (7.68cm, 7.72cm and 7.70 cm) was recorded in T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) during the years 2023, 2024 and in pooled. It might be due to faster loading and mobilization of photo assimilates to fruits and involvement in cell division and cell expansion which ultimately reflected into more length in treated plants. These results are in conformity with the earlier report by Mondal *et al.* (2023) [6] and Mor *et al.* (2025) [7] in guava.

Fruit diameter (cm)

The data indicated that fruit diameter (7.48 cm, 7.51 cm and 7.50 cm) was recorded significantly maximum in T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) during the years 2023, 2024 and in pooled. It might be due to the particular function of boron, zinc and ferrous which resulted into the participation excess cation, buffer action, maintenance of conducting tissues which ultimately helped in absorption of active salt play in important role in vegetative and reproductive phases and indispensable for final yield. Similar results have been reported by Kundu and Mitra (1989) [5] observed in spraying of Cu + B

+ Zn were most effective in increasing size of guava. Similar results finding by Ambaliya and Masu (2018) [1] in aonla, Kacha *et al.* (2021) [4] in mango and Savdhariya *et al.* (2024) [11] in sapota.

Fruit weight (g)

The data shows that significantly maximum fruit weight (208.37 g, 209.62 g and 209.00 g) was recorded in T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) during the years 2023, 2024 and in pooled. It might be due to increase in fruit weight might be due to the micronutrients application

like zinc which plays a vital role to promote starch formation, iron required to suitable cell enlargement and cell division and boron actively involved in the transportation of carbohydrates in plants. The cumulative effect of mixture of micronutrients might have resulted in higher fruit weight by the faster loading and mobilization of photo assimilates to fruit and involvement in cell division and cell expansion which ultimately reflected into more weight of fruit in treated plants. These results are in conformity with the earlier report by Mondal *et al.* (2023) [6] and Mor *et al.* (2025) [7] in guava.

Fruit volume (cc)

The data observations that significantly maximum fruit volume (182.33 cc, 185.13 cc and 183.73 cc) was registered with treatment T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) during both the years as well as pooled analysis. It might be due to highest fruit volume was found with application of multimicronutrient might be due to an application of micronutrients (0.5 % zinc sulphate + 0.5 % ferrous sulphate + 0.3 % borax) appear to have indirect role in hastening the processing of cell division and cell elongation due to which, fruit volume would have improved. The results are in close conformity with those reported by Arora and Singh (1972) [3]. Similar results were also obtained by Shukla *et al.* (2022) [12] in guava.

Number of fruits per tree

The data shows that significantly maximum number of fruits per tree (217.43, 222.35 and 219.89) was observed in T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) treatment during the years 2023, 2024 and in pooled. It might be due to Zinc responsible for auxin synthesis and boron involve in translocation of starch to fruit resulted into better photosynthesis and accumulation of starch in fruits. The balance of auxin in plant also regulates the fruits drop or retention in plants, which ultimately increased the total number of fruits per tree. The role of boron is also reported in fruit setting, which ultimately increase the number of fruits per tree. The present results are in conformity with the findings of Shukla *et al.* (2022) [12] in guava.

Fruit Yield (Kg/tree)

The data regarding total fruit yield per tree reveals that significantly maximum fruit yield (34.11 kg/tree, 34.62 kg/tree and 34.37 kg/tree) was found in T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree soil application of multimicronutrient mixture grade-V) during the years 2023, 2024 and in the pooled. It might be due to micronutrients helps in reduce flower drop and increase the fruit retention (Zn), chlorophyll production (Fe), flower development and pollen germination, pollen tube growth, flower fertilization, fruit set (B) and early fruit development (Peryea, 2002) [9], photosynthesis process (Cu and Mn). Corresponding results were found by Shukla *et al.* (2022) [12], Mondal *et al.* (2023) [6] and Mor *et al.* (2025) [7] in guava.

Fruit Yield (t/ha)

The significantly maximum fruit yield (t/ha) (13.64 t/ha, 13.85 t/ha and 13.75 t/ha) was registered with treatment T₁₀ (Foliar spray of 1 % multimicronutrient mixture grade-IV & 125 g/tree

soil application of multimicronutrient mixture grade-V) during both the years and in pooled analysis. It might be due to the direct or indirect involvement of nutrients which provide better mobilization of nutrients and metabolites for the growth and development of fruit by increase in metabolic activities and better cellular pathways. These activities improve their size, weight and volume, number of fruit and thereby synergistically increased the total fruit yield. The results were in accordance with Shukla *et al.* (2022) [12], Mondal *et al.* (2023) [6] and Mor *et al.* (2025) [7] in guava.

Conclusion

The result obtained from two year research experiment, it can be concluded that soil application of 125 g/tree multimicronutrient mixture grade-V at on set of monsoon and foliar spray of 1 % multimicronutrient mixture grade-IV at fruit setting stage and 30 day after fruit setting stage has significant impact on fruit yield attributing characters. It was found significantly highest result as compared to other treatments.

Table 2: Effect of multimicronutrient mixture on fruit length and fruit diameter in guava cv. Lucknow 49.

Treat. No.	Treatments details	Fruit length (cm)			Fruit diameter (cm)		
		2023	2024	Pooled	2023	2024	Pooled
T ₁	Control	6.31	6.34	6.33	6.20	6.22	6.21
T ₂	Foliar spray of 2 % multimicronutrient mixture Grade-I	6.36	6.40	6.38	6.28	6.32	6.30
T ₃	Foliar spray of 2 % multimicronutrient mixture Grade-II	6.39	6.41	6.40	6.38	6.33	6.36
T ₄	Foliar spray of 2 % multimicronutrient mixture Grade-III	6.52	6.58	6.55	6.53	6.44	6.48
T ₅	Foliar spray of 2 % multimicronutrient mixture Grade-IV	7.32	7.37	7.35	7.18	7.44	7.31
T ₆	250 g/tree Soil application of multimicronutrient mixture Grade-V	6.85	6.98	6.92	6.75	6.67	6.71
T ₇	Foliar spray of 1 % multimicronutrient mixture Grade-I & 125 g/tree Soil application of multimicronutrient mixture Grade-V	6.64	6.68	6.66	6.61	6.55	6.58
T ₈	Foliar spray of 1 % multimicronutrient mixture Grade-II & 125 g/tree Soil application of multimicronutrient mixture Grade-V	6.78	6.82	6.80	6.70	6.60	6.65
T ₉	Foliar spray of 1 % multimicronutrient mixture Grade-III & 125 g/tree Soil application of multimicronutrient mixture Grade-V	6.80	6.90	6.85	6.72	6.63	6.68
T ₁₀	Foliar spray of 1 % multimicronutrient mixture Grade-IV & 125 g/tree Soil application of multimicronutrient mixture Grade-V	7.68	7.72	7.70	7.48	7.51	7.50
T	S.Em ±	0.25	0.24	0.17	0.24	0.28	0.18
	C. D. (P =0.05)	0.73	0.70	0.49	0.71	0.82	0.52
Y	S.Em ±	-	-	0.08	-	-	0.08
	C. D. (P =0.05)	-	-	NS	-	-	NS
YXT	S.Em ±	-	-	0.30	-	-	0.32
	C. D. (P =0.05)	-	-	NS	-	-	NS
	C.V. %	6.32	6.03	6.17	6.22	7.19	6.72

Table 3: Effect of multimicronutrient mixture on fruit weight and fruit volume in guava cv. Lucknow 49.

Treat. No.	Treatments details	Fruit weight (g)			Fruit volume (cc)		
		2023	2024	Pooled	2023	2024	Pooled
T ₁	Control	179.57	180.16	179.87	156.88	157.94	157.41
T ₂	Foliar spray of 2 % multimicronutrient mixture Grade-I	181.30	182.05	181.67	158.64	159.34	158.99
T ₃	Foliar spray of 2 % multimicronutrient mixture Grade-II	185.08	185.91	185.50	159.32	162.04	160.68
T ₄	Foliar spray of 2 % multimicronutrient mixture Grade-III	187.22	188.25	187.74	162.80	163.52	163.16
T ₅	Foliar spray of 2 % multimicronutrient mixture Grade-IV	204.21	206.13	205.17	175.83	176.14	175.98
T ₆	250 g/tree Soil application of multimicronutrient mixture Grade-V	188.22	190.00	189.11	166.46	168.52	167.49
T ₇	Foliar spray of 1 % multimicronutrient mixture Grade-I & 125 g/tree Soil application of multimicronutrient mixture Grade-V	187.33	186.25	186.79	162.75	163.19	162.97
T ₈	Foliar spray of 1 % multimicronutrient mixture Grade-II & 125 g/tree Soil application of multimicronutrient mixture Grade-V	187.41	187.40	187.40	163.64	164.87	164.26
T ₉	Foliar spray of 1 % multimicronutrient mixture Grade-III & 125 g/tree Soil application of multimicronutrient mixture Grade-V	188.18	188.28	188.23	164.81	166.47	165.64
T ₁₀	Foliar spray of 1 % multimicronutrient mixture Grade-IV & 125 g/tree Soil application of multimicronutrient mixture Grade-V	208.37	209.62	209.00	182.33	185.13	183.73
T	S.Em ±	5.75	6.04	4.17	5.04	5.20	3.62
	C. D. (P =0.05)	16.96	17.82	11.92	14.87	15.33	10.35
Y	S.Em ±	-	-	1.86	-	-	1.62
	C. D. (P =0.05)	-	-	NS	-	-	NS
YXT	S.Em ±	-	-	7.22	-	-	6.72
	C. D. (P =0.05)	-	-	NS	-	-	NS
	C.V. %	5.25	5.50	5.37	5.28	5.40	5.34

Table 4: Effect of multimicronutrient mixture on number of fruits per tree and fruit yield in guava cv. Lucknow 49.

Treat. No.	Treatments details	Number of fruits per tree			Fruit Yield (kg/tree)		
		2023	2024	Pooled	2023	2024	Pooled
T ₁	Control	183.68	184.12	183.90	28.12	28.40	28.26
T ₂	Foliar spray of 2 % multimicronutrient mixture Grade-I	185.07	186.17	185.62	28.37	28.78	28.57
T ₃	Foliar spray of 2 % multimicronutrient mixture Grade-II	188.84	189.69	189.26	28.65	29.34	29.00
T ₄	Foliar spray of 2 % multimicronutrient mixture Grade-III	190.42	191.34	190.88	29.48	30.25	29.87
T ₅	Foliar spray of 2 % multimicronutrient mixture Grade-IV	210.05	212.27	211.16	32.75	33.14	32.95
T ₆	250 g/tree Soil application of multimicronutrient mixture Grade-V	209.15	211.55	210.35	30.57	31.06	30.81
T ₇	Foliar spray of 1 % multimicronutrient mixture Grade-I & 125 g/tree Soil application of multimicronutrient mixture Grade-V	194.85	198.63	196.74	29.50	30.42	29.96
T ₈	Foliar spray of 1 % multimicronutrient mixture Grade-II & 125 g/tree Soil application of multimicronutrient mixture Grade-V	195.68	200.87	198.27	29.57	30.74	30.15
T ₉	Foliar spray of 1 % multimicronutrient mixture Grade-III & 125 g/tree Soil application of multimicronutrient mixture Grade-V	196.50	201.22	198.86	29.97	30.84	30.40
T ₁₀	Foliar spray of 1 % multimicronutrient mixture Grade-IV & 125 g/tree Soil application of multimicronutrient mixture Grade-V	217.43	222.35	219.89	34.11	34.62	34.37
T	S.Em ±	6.60	6.98	4.81	1.09	1.07	0.76
	C. D. (P =0.05)	19.48	20.60	13.74	3.21	3.15	2.18
Y	S.Em ±	-	-	2.15	-	-	0.34
	C. D. (P =0.05)	-	-	NS	-	-	NS
YXT	S.Em ±	-	-	8.32	-	-	1.32
	C. D. (P =0.05)	-	-	NS	-	-	NS
C.V. %		5.80	6.05	5.93	6.25	6.01	6.13

Table 5: Effect of multimicronutrient mixture on fruit yield (t/ha) in guava cv. Lucknow 49

Treat. No.	Treatments details	Fruit yield (t/ha)		
		2023	2024	Pooled
T ₁	Control	11.25	11.36	11.30
T ₂	Foliar spray of 2 % multimicronutrient mixture Grade-I	11.35	11.51	11.43
T ₃	Foliar spray of 2 % multimicronutrient mixture Grade-II	11.46	11.74	11.60
T ₄	Foliar spray of 2 % multimicronutrient mixture Grade-III	11.79	12.10	11.95
T ₅	Foliar spray of 2 % multimicronutrient mixture Grade-IV	13.10	13.26	13.18
T ₆	250 g/tree Soil application of multimicronutrient mixture Grade-V	12.23	12.42	12.33
T ₇	Foliar spray of 1 % multimicronutrient mixture Grade-I & 125 g/tree Soil application of multimicronutrient mixture Grade-V	11.80	12.17	11.98
T ₈	Foliar spray of 1 % multimicronutrient mixture Grade-II & 125 g/tree Soil application of multimicronutrient mixture Grade-V	11.83	12.30	12.06
T ₉	Foliar spray of 1 % multimicronutrient mixture Grade-III & 125 g/tree Soil application of multimicronutrient mixture Grade-V	11.99	12.33	12.16
T ₁₀	Foliar spray of 1 % multimicronutrient mixture Grade-IV & 125 g/tree Soil application of multimicronutrient mixture Grade-V	13.64	13.85	13.75
T	S.Em ±	0.43	0.43	0.30
	C. D. (P =0.05)	1.28	1.26	0.87
Y	S.Em ±	-	-	0.14
	C. D. (P =0.05)	-	-	NS
YXT	S.Em ±	-	-	0.53
	C. D. (P =0.05)	-	-	NS
C.V. %		6.25	6.01	6.13

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