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Impact of pruning and fertilizer application on fruit quality of guava cv. sardar under Chatrapti Sambhajinagar (Aurangabad) condition of Maharashtra

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Abstract
An investigation entitles the Impact of pruning and fertilizer Application on fruit quality of guava cv. Sardar under Chatrapti Sambhajinagar (Aurangabad) condition of Maharashtra was conducted in Randomized Block Design with ten treatments comprising of three pruning levels (30 cm, 60 cm, and 90 cm) and three levels of fertilizer applications (N: P_2O_5: K_2O) replicated thrice. Results revealed that, pruning at 90 cm with N: P_2O_5: K_2O @ 1000:400:400 g/plant significantly improved fruit weight (220.05 g), length (8.09 cm), diameter (7.99 cm), and volume (225.97 ml) compared to the control. This treatment also reduced seed count (222.33) and seed weight (3.05 g) while increasing pulp weight (217 g), pulp percentage (98.60%), and the pulp-to-seed ratio (71.63). Enhanced resource allocation and nutrient mobilization were identified as key factors contributing to these improvements. The findings demonstrate the importance of optimized pruning and fertilization practices in enhancing guava yield, quality, and economic returns.

Keywords: Quantity, pruning, fertilizer, guava

Introduction
Guava (*Psidium guajava* L.), often referred to as the "Apple of the Tropics," is a prominent tropical and subtropical fruit known for its exceptional nutritional value, affordability, and adaptability. Genus Psidium, comprising over 150 species. However, only *Psidium guajava* is commercially cultivated due to its wide adaptability and economic significance.

Guava is valued for its high vitamin 'C' content, which surpasses that of many citrus fruits, as well as for its rich supply of pectin, calcium, and phosphorus. The ripe fruits, with their distinctive aroma and sweet-sour flavour, are consumed fresh or processed into value-added products such as jelly, juice, jam, and puree. The leaves are used in traditional medicine for treating diarrhoea and gastrointestinal issues.

Guava is a resilient crop, thriving under a variety of soil and climatic conditions, including drought-prone areas, which makes it accessible and profitable for farmers. Its ability to yield fruit on current season shoots underscores the importance of pruning practices to enhance productivity and fruit quality. Pruning encourages new shoot growth, facilitates better light penetration within the canopy and optimizes photosynthesis, resulting in higher yields and improved fruit size and quality.

Despite its economic importance, the potential of pruning in guava cultivation has received limited attention. Proper pruning techniques, combined with appropriate fertilization, can significantly improve the vigour, productivity, and quality of guava trees. This study aims to evaluate the "Impact of Pruning and Fertilizer Application on Guava (*Psidium guajava* L.) cv. Sardar Yield and Quality under Chatrapti Sambhajinagar (Aurangabad) condition of Maharashtra.

Material and Method
Experimental details, materials used, and methodologies followed during the study titled "Impact of pruning and fertilizer Application on fruit quality of guava cv. Sardar under Chatrapti Sambhajinagar (Aurangabad) condition of Maharashtra" as below.

Climatic Conditions

The experiment was conducted at the Fruit Research Station, Chatrapti Sambhajinagar (Aurangabad). Geographically, Aurangabad is situated at 19.8762° N latitude and 75.3433° E longitude with an elevation of 513 meters above mean sea level (MSL). The region experiences a sub-tropical climate characterized by hot summers and general dryness except during the southwest monsoon season.

Treatment Detail

Four-year-old guava orchard of the variety Sardar, planted at a spacing of 5 m × 5 m were utilised for experiment. Pruning was carried out in April. The treatments consist of four pruning levels *viz*; at 30 cm, 60 cm, 90 cm, and a control (no pruning) with soil application of N: P_2O_5: K_2O fertilizers at varying levels.

Treatment combinations are as below

Table 1: Treatment details

Sr. No.	Treatment No	Treatment Detail
1	T_0	No pruning with RDF
2	T_1	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.
3	T_2	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.
4	T_3	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.
5	T_4	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.
6	T_5	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.
7	T_6	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.
8	T_7	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.
9	T_8	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.
10	T_9	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.

Observations Recorded

Observations were recorded primarily on yield and physical characteristics of the fruit.

1. Number of Fruits per Plant - Total fruits per plant were counted after each picking.
2. Weight of Fruit (g) - Five fruits were randomly selected from each treatment, and their weights were averaged.
3. Yield (kg/plant) - Total fruit yield per plant was calculated by summing the weights of all harvested fruits.
4. Fruit Length (cm) - Measured from stalk to style end using a Vernier Caliper.
5. Fruit Diameter (cm) - Measured at the middle portion of the fruit using a Vernier Caliper.
6. Fruit Volume (cm^3) - Determined using the water displacement method.
7. Number of Seeds per Fruit - Counted from seeds extracted from five mature fruits per tree.
8. Seed Weight (g) - Seeds extracted from five fruits were weighed, and the average weight was calculated.
9. Pulp Weight (g) - Determined by subtracting seed weight from total fruit weight.
10. Pulp Percentage (%) - The pulp was extracted from fruit by separating the outer cover and seeds present. The weight of pulp was taken separately from each fruit. The percentage pulp is calculated by dividing actual weight of pulp by total weight of fruit multiplying by 100.
11. Pulp to Seed Ratio: - The ratio was calculated using
12. Pulp:Seed Ratio = Pulp Weight /Seed Weight
13. Days to Complete Harvesting: - Time calculated from the date of pruning to the final harvest date.

Results and Discussion

1. **Fruit Weight (g):** The data on the effect of various pruning levels and fertilizer treatments on average fruit weight are showed in Table.
   Highest Fruit Weight: Treatment T9 (Pruning at 90 cm with soil application of N: P_2O_5: K_2O @ 1000:400:400 g/plant) recorded highest fruit weight (220.05 g) and was statistically at par with T7 (215.33 g) and T8 (207 g). Lowest Fruit Weight was found in control (T0 - No pruning with RDF) which showed 132.35 g. Fruit weight was influenced by pruning likely forces trees to focus energy on fructose production rather than cellulose synthesis, improving photosynthesis efficiency and fruit development. These findings align with Ghum (2011) [5] in custard apple and Adhikari & Kandel (2015) [1] in guava.
2. **Fruit Length (cm)**
   The effect of pruning levels and fertilizers on fruit length is summarized in Table 2. Observed that Treatment T9 (Pruning at 90 cm with soil application of N: P_2O_5: K_2O @ 1000:400:400 g/plant) recorded the maximum fruit length (8.09 cm) during the rainy season.
   Having Treatment T0 (No pruning with RDF) had the smallest fruits (5.83 cm).
   This increased length of fruit can be attributed to better partitioning of assimilates, sucrose accumulation in pulp tissues, and enhanced photosynthesis. Which are consistent with findings by Singh and Dhaliwal (2004) [11] and Dubey (2001) [3] in guava.
3. **Fruit Diameter (cm)**
   Data on fruit diameter, presented in Table 2, showed significant differences among treatments due to pruning intensity and fertilizer application Treatment T9 (Pruning at 90 cm with soil application of N: P_2O_5: K_2O @ 1000:400:400 g/plant) (7.99 cm) was superior, closely followed by T7 (7.23 cm). Whereas control treatment T0 (No pruning with RDF) exhibited the smallest fruit diameter (5.75 cm).
   The increase in diameter is linked to improved nutrient absorption and translocation efficiency facilitated by pruning. Similar results have been observed by Deswal and Patil (1984) [2] in Red Delicious apple.
4. **Fruit Volume (ml)**
   Data pertaining to influence of pruning and fertilizer treatments on fruit volume is depicted in Table. Pruning at 90 cm with soil application of N: P_2O_5: K_2O @ 1000:400:400 g/plant (Treatment T9) recorded highest fruit volume (225.97 ml) and was at par to T7 (216.92

ml). Treatment T0 (No pruning with RDF) recorded the smallest fruit volume (130.68 ml).

The increased fruit volume in pruned trees is attributed to better water absorption, mobilization of minerals, and rejuvenation of productive wood. These results are supported by Rather (2006) [9] in Red Delicious apple.

5. **Number of Seeds**

Low seed count is considered the favourable. The lowest seed count (222.33) seeds per fruit was observed in Treatment where plants were pruned at 90 cm with soil application of N:P_2O_5: K_2O at 1000:400:400 g/plant (Treatment T9). Treatment T7 is at par with 241.67 seeds per fruit. The highest seed count was observed in Treatment T0 (no pruning with recommended dose of fertilizer), which recorded 390.33 seeds per fruit. This difference may be attributed due to poor pollen germination on the stigma due to high temperatures, as noted by Singh and Bal.

6. **Seed Weight**

Treatment T9 (Pruning at 90 cm with soil application of N: P_2O_5: K_2O @ 1000:400:400 g/plant) recorded the lowest seed weight 3.05 g per fruit, whereas Treatment T0 (no pruning with recommended dose of fertilizer) had the highest seed weight 5.36 g per fruit. The decrease in seed weight in treatment T9 may be related to the reduced number of seeds per fruit, a similar trend was found by Saeed *et al.* (2006) [10] in kinnow fruits.

7. **Pulp Weight (g)**

Data regarding pulp weight is in Table revealed, that the maximum pulp weight 217 g was observed in Treatment T9, which involved pruning shoots at 90 cm and applying N: P_2O_5: K_2O at 1000:400:400 g/plant. Followed by T7 (211.98 g) and T8 (204.02 g), where pruning was done at 90 cm but with fertilizer applications of 900:300:300 g/plant and 800:200:200 g/plant, respectively. The minimum pulp weight 126.98 g was registered in T0, which had no pruning and only the recommended dose of fertilizer (RDF) was applied.

Potassium, while not directly incorporated into plant constituents like proteins or carbohydrates, plays a vital role in carbohydrate and protein synthesis, regulation of water relations, and resistance to plant diseases. It acts as a catalyst in forming complex substances and accelerating enzyme activity, which aids in increasing fruit size. These findings align with of Dutta (2004) [4] in guava.

8. **Pulp Percentage (%)**

Data Depicted in table showed that, the highest pulp percentage (98.60%) was recorded in T9 (pruning at 90 cm with N: P_2O_5: K_2O application at 1000:400:400 g/plant). The lowest pulp percentage (95.94%) was noted in T0 (no pruning with RDF through soil application).

This increase in pulp percentage attributed due to Potassium's role in carbohydrate and protein synthesis, water regulation, and enzyme activity contributes to increased fruit size and weight. These results are consistent with those reported by Natale *et al.* (1994) [7], Ram *et al.* (1999) [8] and Dutta (2004) [4] in guava.

Pulp: Seed

Data presented in Table indicated that, the highest pulp-to-seed ratio (71.63) was observed in T9 (pruning at 90 cm with N: P_2O_5: K_2O application at 1000:400:400 g/plant). The lowest ratio (23.85) was recorded in T0 (no pruning with RDF).

The results suggest that, pruning at 90 cm enhanced the pulp-to-seed ratio Proved due to better allocation of food reserves toward fruit development. Higher nutrient availability during fruit growth, particularly potassium, facilitates efficient translocation of assimilates toward the developing fruit. Nitrogen supports vegetative growth, phosphorus is crucial for photosynthesis and food accumulation, and potassium enhances carbohydrate and protein synthesis, water regulation, and enzyme activity. These factors contribute to a higher pulp-to-seed ratio.

Similar findings were reported by Teaotia and Singh (1971) [12] and Kundu *et al.* (2007) [6] also observed comparable results in guava.

Treatment No	Treatment Detail	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit volume (ml)	Number of seed	Seed weight (g)	Pulp weight (g)	Pulp percentage	Pulp: Seed ratio
T_0	No pruning with RDF	132.35	5.83	5.75	130.68	390.33	5.36	126.98	95.94 (67.00)	23.85
T_1	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.	165.04	6.76	6.71	164.34	311	4.28	160.76	97.40 (80.74)	37.69
T_2	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.	153.36	6.50	6.45	153.23	326.00	4.61	148.75	96.98 (80.00)	32.32
T_3	Pruning of shoot at 30 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.	173.83	6.95	6.88	170.56	299.33	4.12	169.71	97.63 (81.15)	41.34
T_4	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.	185.32	7.37	7.23	186.55	268.33	3.72	181.60	97.99 (81.86)	49.13
T_5	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.	179.76	7.24	7.12	179.74	285	3.92	175.84	97.81 (81.51)	45.05
T_6	Pruning of shoot at 60 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.	191.44	7.45	7.33	191.59	261.33	3.59	187.84	98.11 (82.13)	52.57
T_7	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 900: 300: 300g/plant.	215.33	7.89	7.80	216.92	241.67	3.35	211.98	98.43 (82.82)	63.91
T_8	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 800: 200: 200g/plant.	207.47	7.70	7.61	209.79	250.67	3.45	204.02	98.32 (82.59)	59.68
T_9	Pruning of shoot at 90 cm with Soil application of N: P_2O_5: K_2O @ 1000: 400: 400g/plant.	220.05	8.09	7.99	225.97	222.33	3.05	217	98.60 (83.23)	71.63
	SE(m)±	4.54	0.04	0.04	5.21	7.68	0.11	4.54	0.08 (3.64)	2.18
	CD at 5%	13.50	0.13	0.13	15.47	22.83	0.33	13.48	0.25 (10.81)	6.48

Conclusion

From the present study on the impact of pruning and fertilization on guava (*Psidium guajava* L.) yield reveals significant insights into agricultural sustainability and

profitability pertaining to fruit quality.

Pruning and fertilizer applications significantly influenced fruit quality. The treatment involving pruning at 90 cm combined with N: P_2O_5: K_2O application at 1000:400:400 g/plant (T9) proved most effective, resulting in the highest fruit weight, length, diameter, volume, and pulp-to-seed ratio. This highlights the importance of adopting appropriate pruning techniques and balanced fertilizer regimes to optimize resource utilization and maximize returns in guava cultivation.

References

1. Adhikari S, Kandel TP. Effect of time and level of pruning on vegetative growth, flowering, yield, and quality of guava. International Journal of Fruit Science. 2015;15:290-301.
2. Deswal IS, Patil VK. Effects of N, P, and K on the fruit of watermelon. Journal of Maharashtra Agricultural University. 1984;9(3):308-309.
3. Dubey AK, Singh DB, Dubey N. Deblossoming of summer season flowering of guava (*Psidium guajava* L.) by shoot pruning. Progress in Horticulture. 2001;33:165-168.
4. Dutta P, Maji SB, Das BC. Studies on the response of biofertilizers on growth and productivity of guava. Indian Journal of Horticulture. 2009;66(1):39-42.
5. Ghum SS. Effect of time and pruning intensities on growth, yield, and quality of custard apple. M.Sc. (Agri.) Thesis. M.P.K.V., Rahuri; c2011.
6. Kundu S. Effect of high-density planting on growth, flowering, and fruiting of guava (*Psidium guajava* L.). Acta Horticulturae. 2007;735:267-270.
7. Natale WG, Goutinho-ELW, Boaretto AE, Perana FM. Nitrogen fertilization of guava. Fruit Research. 1994;49(3):205-210.
8. Ram RA, Rajput MS, Bhriguvanshi SR. Effect of controlled-release fertilizers on growth, yield, and fruit quality of guava Cv. Sardar in Ustochrepts. Indian Journal of Horticulture. 1999;56(2):104-111.
9. Rather GH. Combined influence of pruning regimes and fertilizer application on production and quality of apple (*Malus* × *domestica* Borkh.) cv. Red Delicious. Ph.D. Thesis, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, India; c2006.
10. Saeed A, Zia AC, Nasir MA, Aziz A, Naveed AV, Khan AR. Effect of pruning on the yield and quality of kinnow fruit. Journal of Agriculture and Social Sciences. 2006;2(1):51-53.
11. Singh G, Dhaliwal GS. Effect of different pruning levels on fruit yield and quality of guava (*Psidium guajava* L.) cv. Sardar. Haryana Journal of Horticultural Sciences. 2004;33(1&2):83-84.
12. Teaotia SS, Singh RD. The effect of training on growth, cropping, and physiochemical properties of guava cv. Allahabad Sufeda. Progress in Horticulture. 1971;2:5-20.