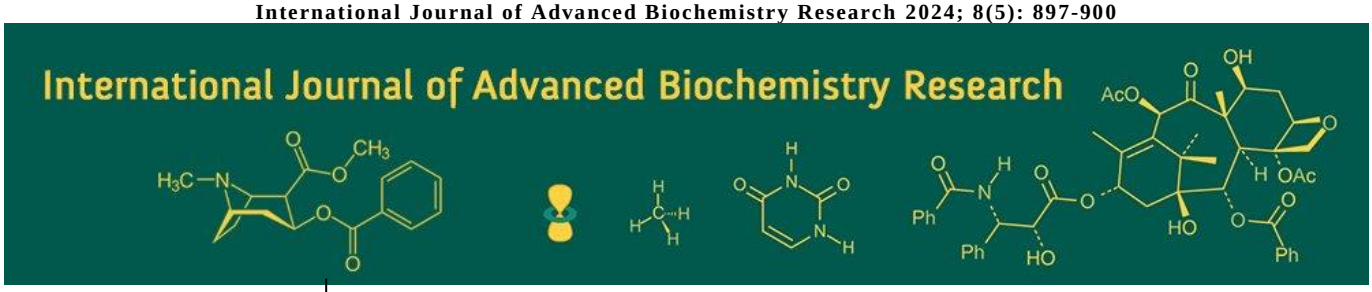

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Effect of pruning and plant growth regulators on quality of guava cv. Bihi

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Abstract
An experiment was conducted to study the effect of pruning and plant growth regulators on quality of guava at RHRS, ACH, NAU, Navsari during the year 2022-23 and 2023-24. The experiment was laid out in Completely Randomized Design with Factorial concept (FCRD) which comprising three different pruning levels *viz.,* P_1: No pruning, P_2: 30 cm of past season growth and P_3: 60 cm of past season growth which was done in September and foliar application of plant growth regulators namely, G_1: Control, G_2: GA_3 50 mgl^{-1}, G_3: GA_3 100 mgl^{-1}, G_4: NAA 50 mgl^{-1}, G_5: NAA 100 mgl^{-1}, G_6: SA 50 mgl^{-1} and G_7: SA 100 mgl^{-1} which was done immediately after pruning and 45 days after pruning. The individual effects of pruning and foliar application of plant growth regulators treatments immediately after pruning and 45 days after pruning as well as their interactions on quality of guava was recorded. Results revealed that the pruning at 30 cm of past season growth gave maximum TSS (°Brix), ascorbic acid (mg/100 g), total sugars (%), reducing sugar (%), non-reducing sugar (%), shelf life (days) and minimum acidity (%) While, foliar spray of GA_3 @100 mgl^{-1} gave maximum TSS (°Brix), ascorbic acid (mg/100 g), total sugars (%), reducing sugar (%), non-reducing sugar (%), shelf life (days) and minimum acidity (%). Interaction effect of pruning levels and foliar spray of plant growth regulators found significant for TSS (°Brix), total sugars (%), reducing sugar (%), non-reducing sugar (%) and minimum acidity (%) of guava during the period of investigation, which were the maximum when guava plants pruned at 30 cm of past season growth and foliar application of GA_3 @100 mgl^{-1}.

Keywords: Guava, pruning, plant growth regulators

Introduction
Guava (*Psidium guajava* L.) belongs to family Myrtaceae. Guava is very important sub-tropical as well as tropical fruit crop of the world and it is a potential crop of India. Due to its hardy, prolific bearing and highly remunerative nature, it surpasses many other fruit crops. Moreover, this fruit can be grown satisfactorily even in adverse soil and climatic conditions. In guava flower bears on current season's growth and flowers appear in the axils of new leaves therefore, it responds well to pruning. The rainy season crop is poor in quality and also attacked by many pests and diseases. Winter season crop is superior in quality, free from diseases and pests. Regulation of rainy season crop has been done by deblossoming, flower thinning, withholding irrigation and foliar application of chemical substances in the past. Recently, pruning has emerged as a commercial and alternative method for regulating the crop in guava (Lal *et al.,* 2000) [7]. Thus, the pruning may be helpful in reducing the tree size and improving the fruit quality as well. Also, the growth regulators like NAA, NAD, GA_3 and Salicylic acid were found successful in reducing the rainy season and increasing the winter crop under different agro climatic conditions (Chundawat *et al.,* 1975) [2]. Fruit development is a complex and tightly regulated process. Gibberellins modified fruit development in various ways and at different developmental stages. The development of a fruit can be separated into phases that include pre-pollination, pollination, fertilization and fruit set, post fruit set, ripening and senescence. The successful fertilization of the ovule is followed by cell division and cell expansion resulting in the growth of the fruit. Gibberellins are known to influence both cell division and cell enlargement (Adams *et al.,* 1975) [1]. In view of the above fact, it becomes quite clear that shoot pruning and applications of plant growth regulators are very useful not only to increasing the yield, but also to improve the quality of fruits.

However, no attempt yet seems to have been made on these aspects in guava under South Gujarat conditions.

Materials and Methods

The present experiment was conducted at Regional Horticultural Research Station, ASPEE College of Horticulture, Navsari Agricultural University, Navsari during the year 2022-23 and 2023-24. The experiment was laid out in Completely Randomized Design with Factorial concept (FCRD) which included twenty one treatment combinations comprising three different pruning levels *viz.*, P_1: No pruning, P_2: 30 cm of past season growth and P_3: 60 cm of past season growth which was done in September and foliar application of plant growth regulators namely, G_1: Control, G_2: GA_3 50 mgl^{-1}, G_3: GA_3 100 mgl^{-1}, G_4: NAA 50 mgl^{-1}, G_5: NAA 100 mgl^{-1}, G_6: SA 50 mgl^{-1} and G_7: SA 100 mgl^{-1} which was done immediately after pruning and 45 days after pruning. After completion of treatment recorded quality characters and their interactions in guava fruits. The significance levels of generated data were decided using method of Panse and Sukathme (1985) [11].

Results and Discussions

Effect of pruning

A perusal of data presented in Table 1 clearly revealed that, the quality characters *viz.*, TSS (°Brix), total sugars (%), reducing sugar (%) and non reducing sugar (%) were observed maximum in P_2 treatment (30 cm of past season growth). It might be due to pruning promotes better air circulation and sunlight penetration into the lower parts of the tree, facilitating photosynthesis and increasing sugar production. Similar results were found. The quality data presented in Table 2 revealed that there were maximum ascorbic acid (mg/100 g), shelf life (days) and minimum acidity (%) found in P_2 treatment (30 cm of past season growth). It might be due to pruning can enhances photosynthesis which is crucial for producing carbohydrates and other metabolic compounds that include ascorbic acid and acidity (Lakpathi *et al.*, 2013) [5]. Increased in shelf life probably due to retardation of moisture loss, rotting and shrinkage, pruning helps in maintaining a manageable size for ease of care and harvesting, resulting in healthier trees and longer-lasting fruits with an extended shelf life (Meena *et al.*, 2016) [9]. The results are corresponded with the findings of Mohammed *et al.* (2005) [10] and Sarkar *et al.* (2005) [12] in guava.

Effect of plant growth regulators

A perusal of data presented in Table 1 clearly revealed that, the quality characters *viz.*, TSS (°Brix), total sugars (%), reducing sugar (%) and non reducing sugar (%) were observed maximum in G_3 treatment (GA_3 @100 mgl^{-1}). It might be due to gibberellins stimulate the expression of genes responsible for enhancing sugar accumulation during fruit development (Jayalakshmi and Shakila, 2018) [4]. The results are corresponded with the findings of Lal *et al.* (2013) [6] and Maurya *et al.* (2018) [8] in guava. The quality data presented in Table 2 revealed that there were maximum ascorbic acid (mg/100 g), shelf life (days) and minimum acidity (%) found in G_3 treatment (GA_3 @100 mgl^{-1}). Increased in ascorbic acid in G_3 treatment might be due to GA_3 promoting cell division and development in fruits, leading to increased synthesis of ascorbic acid (Dabhi *et al.*, 2023) [3]. Increased in shelf life in G_3 treatment might be due to GA_3 acting as a preservative by inhibiting the growth of spoilage-causing microorganisms such as bacteria and fungi. It also prevents the oxidation of lipids and proteins, thus reducing the likelihood of rancidity and maintaining the overall quality of guava (Dabhi *et al.*, 2023) [3]. Similar findings were recorded by Maurya *et al.* (2018) [8] in guava.

Table 1: Effect of pruning and plant growth regulators on quality parameters of guava (Mean of two years)

Treatments	TSS (°Brix)	Total sugars (%)	Reducing Sugar (%)	Non reducing Sugar (%)
Pruning (P)				
P_1: No pruning	9.49	5.68	3.38	2.30
P_2: 30 cm of past season	11.48	6.54	3.72	2.82
P_3: 60 cm of past season	10.24	6.04	3.54	2.50
S.Em. ±	0.08	0.02	0.02	0.02
C.D. at 5%	0.23	0.06	0.05	0.04
Plant growth regulators (G)				
G_1: Control	9.86	5.83	3.47	2.37
G_2: GA_3 50 mgl^{-1}	10.83	6.23	3.63	2.61
G_3: GA_3 100 mgl^{-1}	10.95	6.37	3.67	2.70
G_4: NAA 50 mgl^{-1}	10.20	6.04	3.52	2.53
G_5: NAA 100 mgl^{-1}	9.99	5.97	3.48	2.49
G_6: SA 50 mgl^{-1}	10.40	6.10	3.55	2.55
G_7: SA 100 mgl^{-1}	10.64	6.14	3.57	2.58
S.Em. ±	0.12	0.03	0.03	0.02
C.D. at 5%	0.35	0.09	0.08	0.07
Interaction (P × G)				
S.Em. ±	0.21	0.06	0.05	0.04
C.D. at 5%	0.61	0.16	0.14	0.11
CV %	5.07	2.37	3.49	4.01

Table 2: Effect of pruning and plant growth regulators on quality parameters of guava (Mean of two years)

Treatments	Ascorbic acid (mg/100 g)	Shelf life (days)	Acidity (%)
Pruning (P)			
P_1: No pruning	198.40	7.30	0.44
P_2: 30 cm of past season	227.86	8.03	0.40
P_3: 60 cm of past season	210.52	7.72	0.41
S.Em. ±	2.48	0.06	0.003
C.D. at 5%	6.98	0.18	0.009
Plant growth regulators (G)			
G_1: Control	197.03	7.39	0.44
G_2: GA_3 50 mgl^{-1}	219.29	7.88	0.41
G_3: GA_3 100 mgl^{-1}	224.52	7.98	0.40
G_4: NAA 50 mgl^{-1}	210.08	7.62	0.42
G_5: NAA 100 mgl^{-1}	207.76	7.45	0.43
G_6: SA 50 mgl^{-1}	212.95	7.74	0.42
G_7: SA 100 mgl^{-1}	214.18	7.77	0.41
S.Em. ±	3.79	0.09	0.005
C.D. at 5%	10.66	0.27	0.01
Interaction (P × G)			
S.Em. ±	6.56	0.17	0.008
C.D. at 5%	NS	NS	0.02
CV %	7.58	5.42	4.69

Interaction effect

Data illustrated in Table 3 clearly indicated that the maximum quality characters *i.e.,* TSS (°Brix), total sugars (%), reducing sugar (%), non-reducing sugar (%), and minimum acidity (%) were noted P_2G_3 treatment combination (30 cm of past season growth and GA_3 @100 mgl^{-1}) in guava.

Table 3: Interaction between pruning and plant growth regulators on quality parameters of guava (Mean of two years)

Treatment combinations	TSS (°Brix)	Total sugars (%)	Reducing Sugar (%)	Non reducing Sugar (%)	Acidity (%)
P_1G_1	9.11	5.21	3.22	1.98	0.49
P_1G_2	9.62	5.84	3.46	2.39	0.44
P_1G_3	9.87	5.84	3.44	2.40	0.42
P_1G_4	9.23	5.74	3.39	2.36	0.46
P_1G_5	9.33	5.48	3.23	2.27	0.48
P_1G_6	9.47	5.83	3.47	2.36	0.44
P_1G_7	9.87	5.89	3.52	2.38	0.44
P_2G_1	10.36	6.37	3.64	2.73	0.41
P_2G_2	12.27	6.68	3.78	2.91	0.40
P_2G_3	12.58	6.86	3.96	2.92	0.38
P_2G_4	11.21	6.43	3.65	2.79	0.41
P_2G_5	10.80	6.47	3.68	2.80	0.41
P_2G_6	11.43	6.51	3.69	2.82	0.41
P_2G_7	11.72	6.54	3.69	2.85	0.40
P_3G_1	9.88	5.93	3.53	2.40	0.44
P_3G_2	10.29	6.18	3.64	2.55	0.42
P_3G_3	10.72	6.41	3.62	2.79	0.43
P_3G_4	10.16	5.95	3.52	2.43	0.42
P_3G_5	10.07	5.94	3.53	2.41	0.42
P_3G_6	10.31	5.96	3.50	2.47	0.42
P_3G_7	10.33	6.01	3.51	2.50	0.42
S.Em. ±	0.21	0.06	0.05	0.04	0.008
C.D. at 5%	0.61	0.16	0.14	0.11	0.02
CV %	5.07	2.37	3.49	4.01	4.69

Conclusion

The results of present study of two years inferred that guava cv. VNR Bihi pruned at 30 cm of past seasons growth and foliar spray of GA_3 @100 mgl^{-1} immediately after pruning and 45 days after pruning were found to be resulted in improvement of quality parameters.

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