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Impact of pruning on seasonal growth and fruiting behavior of guava varieties

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Abstract

The present study was conducted during 2020-2021 at Horticultural Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut (U.P.). Experiment was conducted with pruning intensity *i.e.* control (0%), 25 Percent, 50 percent, 75 percent & quality parameters were analyzed. Total 48 plants were selected. The experiment was laid out in Factorial Randomized Block Design (FRBD) and number of treatment was 12 and each replicated 4 times where each treatment consists of one plant. The results were found maximum in all the parameters *viz.*, number of flowers per tree (162.96), length of shoot (62.26 cm), fruit set (71.04%), number of fruit per tree (141.77), fruit weight (156.79gm), fruit size (7.58cm), fruit volume (152.84 cm³), fruit yield (22.22 kg/plant), fruit yield (246.86 q/ha) during first week of March with 75% of pruning intensity. The minimum values were found in control pruning (0%). In general the pruning of guava trees in first week of March with 75% of pruning intensity level was found beneficial for enhancing fruit size and quality of guava.

Keywords: Intensity, pruning, growth, guava

Introduction

Guava (*Psidium guajava* L.) is also known as "Apple of tropics" (Mehta *et al.* 2018) [5] and one of the most popular fruit trees of tropical and subtropical climate of India. It is famous as "Poor man's apple" (Tripathy *et al.* 2016) [13]. Peru is its native land (Tropical America). It's noted for having a higher productivity, toughness, adaptability, and nutritional value than other plants. It is a member of the Myrtaceae family (2n= 22) and frequently produces seedless fruits as a triploid (Jaiswal and Amin, 1992). There are at least 150 genera and over 5650 species in this genus. Guava is a small tree or shrub that can grow to a height of 3-10 meters. It has a shallow root structure and a 22 cm diameter stem covered in a smooth green to red brown bark that peels off in tiny flakes. Guava generates suckers from the roots and low drooping branches from the base. The pubescence of young twigs can be seen. The leaves have reached full maturity and are arranged in pairs, one on top of the other. The leaf blade is elliptic to oblong in shape, with a length of 5-14 cm and a width of 3-8 cm. (Orwa *et al.* 2009) [8]. India leads the globe in guava production, followed by Pakistan, Thailand, Indonesia, China, Mexico, Brazil, the Philippines, Bangladesh, and Nigeria are among the other countries that produce guava. Guava is widely grown in Uttar Pradesh, Maharashtra, Bihar, West Bengal, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, and Assam in India. Guavas of the highest grade are grown in Uttar Pradesh (Allahabad region of Uttar Pradesh produces best quality of guava in India as well as in the world). Guava is considered one of the most delicious fruits, with a total area of 260.07 thousand ha (2016-17), a production of 3826.40 thousand MT (2016-17), and a productivity of 24 MT/ha in India. With a total production of 229.78 thousand MT and a productivity of 22.0 MT/ha, Bihar is one of India's major guava producing states, followed by Andhra Pradesh and Uttar Pradesh (Anonymous, 2020) [1]. Vitamin C, minerals such as calcium, iron, and phosphorus, as well as a nice scent and flavor, are all found in the guava fruit (Ulemale and Tambe, 2015) [14]. Guava fruits are commonly consumed raw or processed into a variety of products such as jam, jelly, nectar, and other beverages (Boora, 2012) [3]. Among these, drying is one of the common and old methods to preserve and extend the shelf life of guava (Patel *et al.* 2016) [10]. Guava fruits are used to make juice, jellies, and a variety of other dishes. The leaves of the guava fruit have traditionally been used to treat diarrhea. The guava plant blooms twice or even three times a year in northern India. The spring blossoming is known as "Ambe Bahar," the monsoon flowering is known as "Mrig Bahar," and the third flowering, which occurs in October, is known as "Hasth Bahar."

Hasth Bahar fruits ripen in the spring season, which is also known as summer season crop, whereas Ambe Bahar fruits ripen from July to September and Mrig Bahar fruits ripen from November to February. At present, guava is cultivated largely through a traditional planting system, under which it is difficult to achieve desired levels of fruit production. Guava trees generate a large yield during the rainy season and a small crop throughout the winter. In guava, fertilization, irrigation, defoliation, and pruning can all be utilized to promote new growth and impact fruiting.

Material and Methods

The experiment was conducted at the Horticultural Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Modipuram, Meerut (Uttar Pradesh) during 2020. The experimental material consists of 48 guava trees. Experiment was performed in 6 year old guava orchard. The plants were planted at spacing of 3 m x 3 m. Experiment was conducted with different varieties and pruning intensities i.e. 0% (control), 25%, 50%, 75%. The experiment was laid out in Factorial Randomized Block Design (FRBD) consisting of 12 treatments and 4 replications.

Treatment details

1. Factor A

V₁ = Lalit V₂ = Shweta V₃ = Dhawal

2. Factor B: Pruning intensity,

P₁ = No pruning (control) P₂ = 25% pruning
 P₃ = 50% pruning P₄ = 75% pruning

3. Treatment combinations

T₁ = V₁ P₀ T₂ = V₁ P₂₅
 T₃ = V₁ P₅₀ T₄ = V₁ P₇₅
 T₅ = V₂ P₀ T₆ = V₂ P₂₅
 T₇ = V₂ P₅₀ T₈ = V₂ P₇₅
 T₉ = V₃ P₀ T₁₀ = V₃ P₂₅
 T₁₁ = V₃ P₅₀ T₁₂ = V₃ P₇₅

Result and Discussion

Growth character

The findings clearly show (Table-1.) that pruning has a considerable impact on the number of flowers per tree of different varieties. The Average maximum number of flower per tree (154.92) was observed with variety V₃ (Dhawal) which was found significantly superior over treatment and the average minimum number of flowers per tree (151.98) was recorded with variety V₁ (Lalit). The interaction between intensity of pruning and variety showed significant variation among the treatments. However, the average maximum number of flower per tree (162.96) was recorded in pruning of 75% of the shoot length with variety Dhawal and average minimum number of flower per tree (146.01) was recorded in

variety Lalit. The above data revealed number of flower increase in different varieties of pruning intensity. Similar results shown by Kumar *et al.* (2005), Khan and Syamal (2004). Data reveal that length of shoot given showed that the several of pruning intensity influenced length of new shoot significantly in different varieties. The average largest length of shoot (56.48 cm) was obtained with the variety V₃ (Dhawal) which was obtained significantly and average smallest length of shoot (52.68 cm) was also observed with variety of V₁ (Lalit). Pruning intensity has a significant impact on the length of guava shoots. The average longest value (61.19 cm) was recorded with a 75% pruning intensity, whereas the average shortest length shoot value (48.07 cm) was reported with the control (no pruning). The interaction effect of pruning intensity and variety of pruning for length of shoot was found to be significant. Average largest length of shoot value (62.26) was obtained with 75% pruning intensity in (V₃P₇₅), while shortest length of shoot (45.95 cm) was noted with no pruning (V₁P₀). The effect of pruning intensity on the number of fruit set percentage of different varieties was calculated against the total number of fruit set on the tagged shoot, based on the data reported. Average maximum fruit set (61.55%) was recorded with the variety V₁ (Lalit) which was found significantly better more than treatment and average minimum fruit set (55.99%) was noted with the variety of V₂ (Shweta). Effect of Pruning intensity was also effective in influencing the fruit set percentage. Significantly average maximum fruit set (67.59%) was recorded with the pruning intensity of 75% whereas average minimum fruit set value (50.95%) was noted with no pruning (P₀). The interaction effect of pruning intensity and variety for fruit set percentage was found significant. Average maximum fruit set (71.04%) was observed with 75% pruning intensity in (V₃P₇₅) whereas minimum fruit set (47.93%) was noted with no pruning (V₂P₀) similar result findings Joshi *et al.* (2014), Pratibha *et al.* (2013). It is evident from the data presented influence the number fruit per plant was significantly by effect of pruning Intensity of different varieties. Average maximum number of fruit per plant (135.83) was noted with the variety V₃ (Dhawal) which was found significantly superior more than treatment and average minimum number of fruit per plant (133.88) was recorded with the variety of V₁ (Lalit). Effect of pruning intensity was also useful in influencing the number of fruit per plant was found significantly. The average maximum number of fruit per plant (140.48) was noted with the pruning intensity of 75% while average minimum (126.07) was found with no pruning (0% pruning). The interaction outcome of pruning intensity and variety on for number of fruit per plant was found significant. Average maximum length shoot (141.77) was recorded with 75% pruning intensity in (V₃P₇₅) while minimum number of fruit per plant (125.04) was found in no pruning (V₁P₀). Similar result findings by Prabhakar *et al.* (2016)^[9], Brar *et al.* (2007)^[2].

Table 1: Impact of pruning on different observations of Guava

Treatment	No of flowers per tree	Length of shoot in cm	Fruit set (%)	Number of fruits per tree	Fruit size in cm	Fruit weight gm	Fruit volume	Fruit yield kg per tree	Fruit yield quintal per ha
Variety									
V ₁	151.01	52.68	61.55	133.88	6.27	134.73	136.26	18.10	201.17
V ₂	153.56	54.47	55.99	134.84	6.45	138.97	138.41	18.80	208.87
V ₃	154.92	56.48	60.35	135.83	6.65	142.22	141.30	19.37	215.27
SE(m)±	0.704	0.226	0.365	0.785	0.115	2.046	0.562	0.305	3.389
CD(0.05)	2.035	0.652	1.055	2.254	0.332	5.913	1.624	0.882	9.794
Intensity of pruning									

P ₁	147.37	48.07	50.95	126.07	5.64	123.41	129.01	15.56	172.87
P ₂	151.67	52.18	56.35	135.36	6.10	131.49	133.82	17.81	197.86
P ₃	154.80	56.75	62.30	137.49	6.73	144.82	142.34	19.91	221.28
P ₄	160.10	61.19	67.59	140.48	7.35	154.84	149.46	21.75	241.74
SE(m)±	0.813	0.261	0.421	0.907	0.133	2.363	0.649	0.352	3.913
CD(0.05)	2.350	0.753	1.055	2.620	0.385	6.828	1.875	0.018	11.309
Interaction (V x P)									
V ₁ P ₀	146.01	45.95	54.92	125.04	5.50	120.27	127.11	15.05	167.20
V ₁ P ₂₅	150.40	50.20	59.25	134.52	5.95	126.43	132.05	17.01	188.99
V ₁ P ₅₀	153.81	54.35	64.06	136.45	6.49	140.31	140.79	19.16	212.89
V ₁ P ₇₅	157.70	60.24	67.98	139.51	7.16	151.91	145.12	21.20	235.62
V ₂ P ₀	147.37	48.89	47.93	126.34	5.61	122.74	128.78	15.50	172.22
V ₂ P ₂₅	151.82	52.16	53.70	135.71	6.11	132.58	133.17	17.99	199.95
V ₂ P ₅₀	154.96	55.79	58.59	137.14	6.75	144.72	141.27	19.85	220.38
V ₂ P ₇₅	159.96	61.06	63.74	140.16	7.32	155.83	150.41	21.84	242.73
V ₃ P ₀	148.28	49.37	50.00	126.83	5.81	127.22	131.15	16.12	179.19
V ₃ P ₂₅	152.80	54.17	56.12	135.85	6.25	135.45	136.25	18.42	204.65
V ₃ P ₅₀	155.64	60.13	64.22	138.87	6.95	149.43	144.97	20.73	230.38
V ₃ P ₇₅	162.96	62.26	71.04	141.77	7.58	156.79	152.84	22.22	246.86
SE(m)±	1.408	0.451	0.730	1.570	0.230	4.092	1.124	0.610	6.778
CD(0.05)	4.053	1.304	2.109	4.518	0.663	11.777	3.237	1.756	19.507

Physical characters

It is clear from the data presented in pruning intensity was found significant with the value of fruit size in different varieties. Average maximum fruit size (6.65cm) was recorded with the variety V₃ (Dhawal) was found significantly superior over treatment and average minimum fruit size (6.27cm) was recorded with the variety of V₁ (Lalit). The effect of pruning intensity on the length of fruit size was also significant. The average maximum fruit size (7.35cm) was showed with the pruning intensity of 75% whereas average minimum fruit length (5.64cm) was found with no pruning. The interaction effect of pruning intensity and variety on fruit size was found in significant. The Average maximum length of fruit (7.58cm) was recorded with 75% pruning intensity in (V₃P₇₅) whereas minimum fruit size (5.50cm) was noted with no pruning (V₁P₀) similar result findings by Singh and Jain (2007) [12], Suryanarayan (2011). Data gathered on fruit weight have been portrayed in pruning intensity was found significant within fruit weight in different varieties. The Average maximum fruit weight of value (142.22g) was noted with the variety V₃ (Dhawal) which was found significantly superior more than treatment and the average minimum fruit weight (134.73g) was observed with the variety of V₁ (Lalit). Effect of pruning intensity was also significantly influenced the fruit weight. The average fruit weight (154.84g) was observed with the pruning intensity 75% while the average minimum fruit weight (123.41g) was noted with no pruning (0% pruning). The interaction between pruning and variety for the fruit weight was found significant. The Average maximum fruit weight (156.79g) was noted with 75% pruning intensity in (V₃P₇₅) whereas minimum fruit weight (120.27g) was measured in control (V₁P₀). Data on the fruit of volume was significantly influenced by pruning intensity in different varieties have been presented. Average maximum fruit volume (141.30cm³) was recorded with the variety V₃ (Dhawal) which was found significantly better quality more than treatment and average minimum fruit volume (136.26cm³) was obtained with the variety of V₁ (Lalit). Effect of pruning intensity was also significantly influenced the fruit volume. Average highest fruit volume (149.46cm³) was recorded with the pruning intensity of 75% whereas average lowest fruit volume (129.01cm³) was found with no pruning in (0% pruning). The interaction effect of pruning intensity

and variety for fruit volume was found significant. The Average maximum fruit volume (152.84 cm³) was observed with 75% pruning intensity (V₃P₇₅), while minimum fruit volume (127.11cm³) was noted with no pruning (V₁P₀). It is clear from the data presented in pruning intensity significantly influenced the fruit yield kg per plant indifferent varieties. Average maximum fruit yield per plant of (19.37kg) was recorded with the variety V₃ (Dhawal) was found significantly superior over treatment and average minimum fruit yield per tree (18.10 kg) was recorded with variety of V₁ (Lalit). Effect of pruning intensity was also useful in influencing the fruit yield. The maximum average fruit yield kg/plant (21.75kg) was recorded with the pruning intensity of 75% while average the minimum length fruit yield per plant (15.56kg) was recorded with no pruning (0% pruning). The interaction between pruning intensity and variety for fruit yield was found significant. The Average maximum fruit yield per tree (22.22kg) was observed with 75% pruning intensity with V₃P₇₅ and while minimum number of fruit yield per tree (15.05kg) was measured with no pruning (V₁P₀) Similar results findings by Meena *et al.* (2016) [6]. The variation in levels of pruning intensity have significant achieve on fruit yield q/ha in different varieties. The Average maximum fruit yield quintal per hectare (215.27q/ha) was recorded with the variety V₃ (Dhawal) was found significantly better more than treatment and average minimum fruit yield per hectare of (201.17q/ha) was recorded with variety of V₁ (Lalit). Effect of pruning intensity was also significantly influenced the fruit yield q/ha. Significantly average maximum of yield per hectare (241.74q/ha) was recorded with the pruning in of 75% whereas average minimum fruit yield q/ha of (172.87q/ha) was found with no pruning (0% pruning). The interaction between pruning intensity and variety for fruit yield q/ha was found significant. Average maximum fruit yield per hectare (246.86q/ha) was measured with 75% pruning intensity with (V₃P₇₅) while minimum fruit yield per hectare (167.20q/ha) was noted with no pruning (V₁P₀). The present findings support from of Mehta *et al.* (2012) [7], Singh *et al.* (2001) [11].

Conclusion

Based on the whole investigation, it can be concluded that there was significant effect of pruning on growth, flowering and fruiting in different varieties. Pruning intensity in

different varieties of guava all results (number of flowers per tree, length of shoot in cm, fruit set percentage, number of fruits per tree, fruit size in cm, fruit weight, fruit volume in ml, fruit yield kg per tree and fruit yield quintal per hectare) best found in pruning of 75% and their combination may be suggested for getting higher fruit yield of guava per unit area with much difference in quality and fruits.

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