

Analyzing the Effect of Different Levels of Pruning on Growth, Yield and Quality of *Psidium guajava* L. Cv. Lalit (Guava)

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Authors' contributions

This work was carried out in collaboration among all authors. Author AK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author AK guided about my project work. Author AK managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation entitled „Effect of different levels of pruning on growth, yield and quality of guava. (*Psidium guajava* L.) Cv. Lalit” guava plant at the Horticulture Research Field, Department of Horticulture, SHUATS, Naini, Prayagraj agro-climatic condition during 2019-20. The data had been statistically analyzed by using Randomized Block Design. In this experiment, seven pruning treatments (control, 10 cm, 20 cm, 30 cm, 40 cm, 50 cm and 60 cm) significantly influenced cropping pattern of guava viz. plant height (30, 60, 90, 120, 150 DAP), No. of flowers / tree, Fruit set (%), Days to first fruit harvest, Number of fruit per tree, Fruit weight (gm.), Fruit diameter (cm), Yield (Kg/Plant), Yield (t/ha.), TSS (%), Acidity (%). The maximum fruit yield was recorded in T4 (30 cm pruning) (13.33 kg) per plant and the minimum yield was recorded in T1 (Control) (8.19 kg) per plant.

Keywords: Guava (*Psidium guajava* L.); different levels pruning; growth characters; fruit yield and fruit quality.

1. INTRODUCTION

Guava (*Psidium guajava* L.) is “Poor man’s fruit” and “Apple of tropics”. It is a popular fruit tree of tropical and subtropical climate and is native to Tropical America stretching from Mexico to Peru. It belongs to family Myrtaceae [1-3]. The guava is classified under genus *Psidium* that contains 150 species but only *Psidium guajava* is exploited commercially. The common guava is diploid ($2n=22$). Guava is one of the most common and major fruits of India and is considered as the fifth most important fruit in respect of its area and production after mango, citrus, banana and apple [4-6]. According to N.H.B. the total area under cultivation of guava in India in the year 2016-17 is 2,59,000 ha and production is 4,11,9000 MT. The most important guava growing states in India are Uttar Pradesh, Bihar, Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh etc [7-9].

Poor quality fruit production in the rainy season and failure to manipulate production periods are common problems for guava production in India [10-12]. The pruning of guava tree is highly desirable to maintain the vigour and productivity as well as to improve fruit size and quality. The guava fruit is borne in the axial of young growing shoots of the current year and hence the trees require regular annual pruning to replace the old unproductive wood with new one [13-15]. As in unpruned tree growth becomes weak and the fruit size, yield and quality of guava is reduced. Beneficial effects of pruning on yield and fruit quality of guava. Properly pruned guava trees produce excellent quality fruits.

Pruning refers to removal of parts of tree specially shoots, roots, limbs, buds or nipping away of terminal parts. It is practiced to make a tree more productive and bear quality fruits. Some fruit trees bear on current season shoots while others do so on the past season growth [16-18]. Pruning is one of the oldest cultural practices, which is practiced in sub-tropical and temperate fruit crops to bring a balance between vegetative and reproductive growth in the plant. In guava, the flowers and fruits are born on current season growth. A light annual pruning considered necessary to encourage new shoots after the harvest. Better light distribution within canopy, increases the number of well illuminated leaves. It also promotes the rate of photosynthesis that leads to high yield per unit area [19]. A better understanding of the effect of pruning is the need of an hour. The pruning of guava has not received much attention, when we observed its economic importance.

Hence, for improving the growth, yield and quality of guava, pruning provides exact and correct removal of plant parts in term of length (distance) instead of percentage. In order to generate the research based information on this aspect the present investigation “Effect of Different Levels of Pruning on Growth, Yield and Quality of Guava (*Psidium guajava* L.) Cv. Lalit.

2. MATERIALS AND METHODS

This study was carried out on “Effect of different levels of pruning on growth, yield and quality of guava (*Psidium guajava* L.) Cv. Lalit under Prayagraj agro-climatic condition. The successive seasons (2019 - 2020) on 10 years old seedy guava (*Psidium guajava* L.) trees planted at 5x5 meters surface irrigation and subjected to the same agriculture practices apart at the University Central Field, Dep. Of Horticulture, SHUATS, Prayagraj year 2019-20. The pruning was done 1st week of September 2019 and treatment consist of 7 pruning levels, i.e. pruning at 10 cm, pruning at 20 cm, pruning at 30 cm, pruning at 40 cm, pruning at 50 cm, pruning at 60 cm and no pruning (control). And observations on growth and quality were recorded at monthly interval in randomly selected uniform healthy plants which were labelled. The different time and level of pruning were used are given below. The observation like period required for number of shoots per branch, days required for flowering and plant spread were recorded on randomly selected plant. The other observations like, plant height, number of flower per plant, fruit set %, number of fruit plant-1, average weight of fruit, fruit diameter, days to first fruit harvest and yield kg. per plant. The T.S.S. measured by using Erma hand refractrometer, titrable acidity by titration were recorded from randomly selected fruit. The statistical analysis using RBD (Randomized Block Design) as per the method of “Analysis of variance [20]” technique.

3. RESULTS AND DISCUSSION

The data presented in Table 1. Depicted in respect of plant height recorded at 30, 60, 90, 120 and 150 days after pruning.

Plant height at 30 DAP was in the range of 334.43 cm to 413.66 cm. The highest plant height was recorded in T4 (413.66 cm) which was significantly superior over all the other cultivars and was followed by T3 (393.93 cm). The cultivar T1 (334.43 cm) recorded the lowest plant height.

At 60 DAP plant height was in the range of 337.43 cm to 416.86 cm. The highest plant height was recorded in T4 (416.86 cm) which was significantly superior over all the other cultivars and was followed by T3 (396.33 cm). Among the various cultivars studied recorded the lowest plant height T1 (337.43 cm).

At 90 DAP plant height was in the range of 339.76 cm to 419.56 cm. The highest plant height was recorded in T4 (419.56 cm) which was significantly superior over all the other cultivars and was followed by T3 (398.73 cm). Among the various cultivars studied recorded the lowest plant height T1 (339.76 cm).

Plant height at 120 DAP was in the range of 342.03 cm to 421.60 cm. The highest plant height was recorded in T4 (421.60 cm) which was significantly superior over all the other cultivars and was followed by T3 (400.56 cm). The cultivar T1 (342.03 cm) recorded the lowest plant height.

Plant height at 150 DAP was in the range of 344.20cm to 423.40cm. The highest plant height was recorded in T4 (423.40 cm) which was significantly superior over all the other cultivars and was followed by T3 (402.90 cm). The cultivar T1 (342.03 cm) recorded the lowest plant height. Similar results have also been reported by Sah et al. (2018).

The total number of flowers per plant recorded as affected by different levels of pruning has been given in table.1. It was in the range of 82.67 to 95.66. The highest number of flowers were recorded in T4 (95.66) which was at followed by T3 (91.67) whereas cultivar T1 (82.67) recorded the lowest number of flowers. Similar results have also been reported by Ghavale et al. [21].

The total number of fruit set (%) per plant was recorded as affected by different levels of pruning has been given in table 1. indicated that difference level to various treatment were significant. The total no. of fruit set (%) per treatment varied significantly. It was in the range of 64.45 to 72.46 %. The highest fruit set (%) were recorded in T4 (72.46%) which was at followed by T4 (69.43%) whereas cultivar T1 recorded the lowest number of fruit set (%) (64.45%). Similar results have also been reported by Sharma (2014).

The effect of pruning levels on days required for first fruit harvesting was significant. From the data presented in Table number 1. Observed that the

days taken to the first fruit harvesting was recorded maximum in control treatment T1 (137.33 days). While it was found minimum (125 days) in the treatment T4 (pruning at 30 cm) which was at followed by T3 (pruning at 20 cm) (127.66 days). Similar results have also been reported by Vinay et al. (2015).

The effect of different levels of pruning treatments on number of fruits per plant are presented in Table 1. The perusal of data revealed that number of fruits per plant was significantly affected due to various treatments. It is evident from data in Table 1. That the treatment T4 (pruning at 30 cm) recorded maximum number of fruits per plant (69.33) however it remained at par with the treatment T3 (63.66). While, minimum number of fruits per plant (53.33) was in the treatment T1 (control). Similar results have also been reported by Sahar and Hameed [22].

Result pertaining to the effect of different levels of pruning treatments on average fruit weight is presented in Table 1. The perusal of the data revealed that average fruit weight was significantly affected due to various treatments.

It is evident from the data in Table 1. that the treatment T4 (pruning at 30 cm) recorded significantly higher average fruit weight (192.20 g) as compared to control and it remained at par with treatment T3 (184.93 g) and T5 (183.40 g). While lower average fruit weight (153.4 g) was recorded in the treatment T1 (control). Similar results have also been reported by Kumar et al. (2014).

The fruit diameter was recorded as affected by different levels of pruning has been given in Table 1. indicated that difference level to various treatment were significant. It was in the range of 5.96 cm to 7.80 cm. The highest fruit diameter was recorded in T4 (7.80 cm) followed by T3 (7.10 cm). The minimum fruit diameter was recorded in T1 (5.96 cm). Similar results have also been reported by Dushyant et al. [23].

The data revealed that fruit yield per tree was significantly influenced due to different levels of pruning. It is clear from data in Table 1. That the maximum fruit yield per plant (13.33 kg) was recorded in the treatment T4 (pruning at 30 cm) which is remained at par with the treatment T3 (11.77 kg) and T1 (control) recorded minimum fruit yield per plant (8.19 kg). Similar results have also been reported by Adhikari and Kandel [24].

Table 1. Effect of different levels of pruning on growth, yield and quality of guava (*Psidium guajava* L.) Cv. Lalit

Treatment Symbol	Treatment Details	Plant height (cm)					NOFI/ P	FS (%)	DFF H	NOF/ P	FW (gm)	FD (cm)	Y/P (kg)
		30 D	60 D	90 D	120 D	150 D							
T1	No pruning	334.43	337.43	339.76	342.03	344.20	82.67	64.45	137.33	53.33	153.40	5.97	8.19
T2	10 cm pruning	349.80	352.10	354.50	357.20	359.26	86.33	67.13	134.33	58.00	167.83	6.13	9.77
T3	20 cm pruning	393.93	396.33	398.73	400.56	402.90	91.67	69.43	127.66	63.66	184.93	7.10	11.77
T4	30 cm pruning	413.66	416.86	419.56	421.60	423.40	95.66	72.46	125.00	69.33	192.20	7.80	13.37
T5	40 cm pruning	370.16	372.43	375.07	377.16	379.16	85.67	68.86	128.33	59.00	183.40	7.03	10.81
T6	50 cm pruning	369.40	372.46	374.50	377.00	379.36	91.00	68.48	129.00	62.33	173.20	6.77	10.80
T7	60 cm pruning	375.86	377.90	379.80	381.83	384.03	91.66	69.09	128.67	63.33	171.33	6.73	10.85
C.D. (P = 0.05)		4.735	5.124	5.095	5.12	5.311	3.303	3.049	3.264	2.333	4.24	0.561	0.511
S.Ed. (\pm)		2.15	2.326	2.313	2.324	2.411	1.50	1.384	1.482	1.059	1.925	0.255	0.232
f-test		S	S	S	S	S	S	S	S	S	S	S	S

Keywords: D = Day, NOFI/P = No. of flowers per plant, FS = Fruit set %, DFFH = Days to first fruit harvest, NOF/P = No. of fruits per plant, FW = fruit weight, FD = Fruit diameter, Y/P = Yield per plant.

The Total Soluble Solids (°Brix) was recorded as affected by different levels of pruning has been given in Table 2. Indicated that difference levels to various treatments were significant it was in the range of 9.30°B to 11.63°Brix. The highest

TSS (°Brix) was recorded in T4 (30 cm pruning) (11.63°B) followed by T3 (11.03°B). The minimum TSS (°Brix) was recorded in T1 (control) (9.30°B). Similar results have also been reported by Jayaswal et al. (2017).

The fruit acidity was recorded as affected by different levels of pruning has been given in Table 2. Indicated that difference levels to various treatments were significant it was in the range of 0.20% to 0.37%. The highest Acidity (%) was recorded in T1 (control) (0.37%). The minimum Acidity (%) was recorded in T4 (30 cm pruning) (0.20%). Similar results have also been reported by Bhagawati et al. [25].

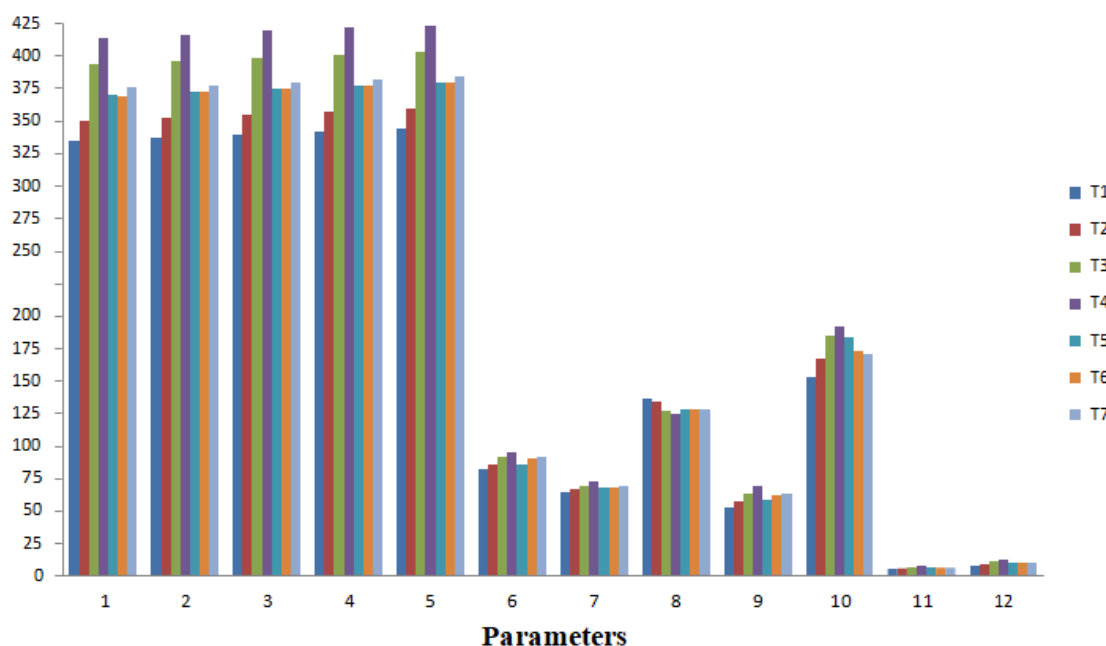


Fig. 1. Effect of different levels of pruning on growth, yield and quality of guava (*Psidium guajava L.*) Cv. Lalit

Keywords: No. 1 = 30 Days plant height (cm), No. 2 = 60 Days plant height, No. 3 = 90 Days plant height, No. 4 = 120 Days plant height, No. 5 = 150 Days plant height, No. 6= No. of flowers per plant, No. 7 = Fruit set %, No. 8 = Days to first fruit harvest, No. 9 = No. of fruits per plant, No. 10 = fruit weight (gm.), No. 11 = Fruit diameter (cm.), No. 12 = Yield per plant (kg)

Table 2. Effect of different levels of pruning on Physico-chemical properties of guava (*Psidium guajava L.*) Cv. Lalit

Treatment Symbol	Treatment Details	TSS (°Brix)	Acidity (%)
T1	No pruning	9.30	0.37
T2	10 cm pruning	9.50	0.30
T3	20 cm pruning	11.03	0.23
T4	30 cm pruning	11.63	0.20
T5	40 cm pruning	10.03	0.27
T6	50 cm pruning	10.43	0.26
T7	60 cm pruning	10.10	0.30
C.D. (P = 0.05)		0.245	0.073
S.Ed. (±)		0.111	0.033
f-test		S	S

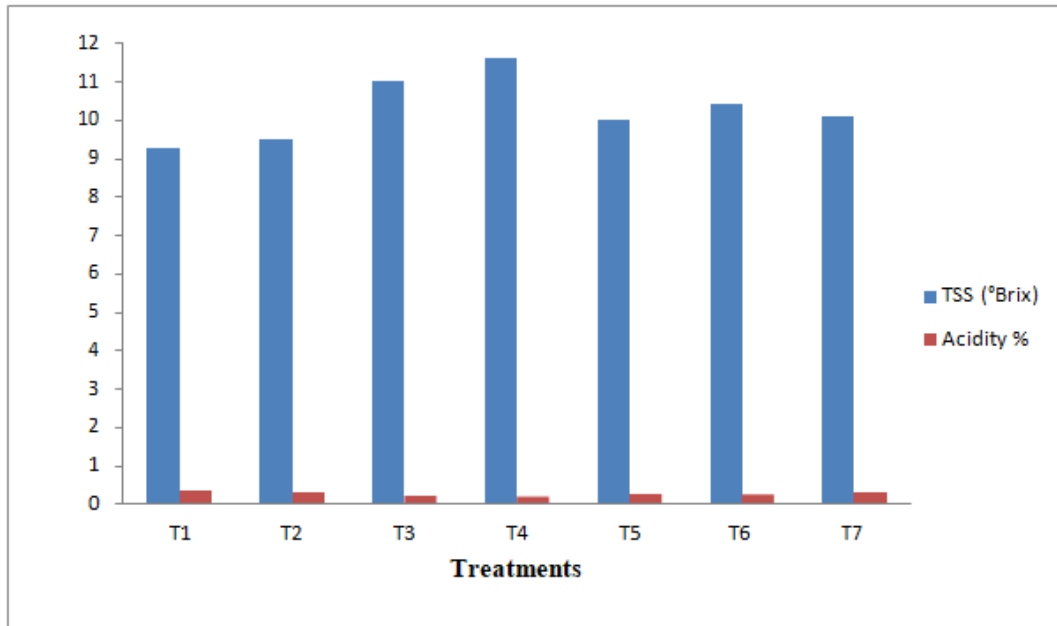


Fig. 2. Effect of different levels of pruning on Physico-chemical properties of guava (*Psidium guajava* L.) Cv. Lalit

4. CONCLUSION

By considering all aspects of results obtained from this investigation. It can be concluded that pruning at 30 cm level on plant shoots after harvesting of previous crop is beneficial for improving higher yield and quality of guava “Cv. Lalit” these finding are based on one season data. Based on the present investigation it is concluded that the treatment T4 maximum plant height, maximum Number of flowers, maximum Fruit set percent (%), minimum Days to first fruit harvest, maximum Number of fruit per tree, maximum Fruit weight (gm.), maximum Fruit diameter (cm), maximum Yield (Kg/Plant), maximum Yield (t/ha.), maximum TSS %, and minimum Acidity (%) was recorded in treatment T4 and maximum Days to first fruit harvest, and maximum Acidity (%) was recorded in treatment T1. In terms of the maximum Cost Benefit Ratio was recorded in treatment T4 (30 cm pruning).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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