



Research Article

Effect of pruning levels and growth regulator application on guava (*Psidium guajava* L.) cv. Lucknow – 49 for high yield and quality

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Abstract: A field experiment to standardize the levels of pruning and growth regulator application in guava (*Psidium guajava* L.) cv. Lucknow-49 was undertaken at Horticultural College and Research Institute, Periyakulam during 2016-2017. The experiment consists of seven different levels of pruning and growth regulator application and the treatments were imposed on two years old trees. The results of the experiment revealed that, the treatment T₅ (Light pruning + Paclobutrazol application) recorded the highest mean fruit weight, fruit length, fruit circumference, fruit pulp weight. Major objective of canopy management in guava cv. Lucknow -49 under high density planting system is to maximize the yield and maintaining the optimum canopy without overlapping. In a nutshell, taking into consideration of the performance of various pruning and chemical treatments particularly yield and yield components, the treatment T₅ (Light pruning + Paclobutrazol application) in guava cv. Lucknow – 49 is best under high density planting system.

Key words: Guava, Pruning, Paclobutrazol, High density planting

Introduction

Guava (*Psidium guajava* L.) “Poor man’s fruit” and “Apple of Tropics”, is a popular tree fruit of the tropical and subtropical region and is native to Tropical America stretching from Mexico to Peru. The crop had expanded to all tropical countries and became very important fruit in India (Samson, 1980). It belongs to the family Myrtaceae (Joseph and Priya, 2011) and believed to have been introduced to India at a very early date, as mentioned by Bruton who was in India early in the 17th century.

The fruit is a good source of vitamin-C, pectin and minerals namely calcium and phosphorus. The fruits are used as fresh as well as for making jam, jelly, nectar and paste (Patra *et al.*, 2004). Guava contains four times more vitamin C than orange (Hassimotto *et al.*, 2005). Leaves also have medicinal value and could cure diarrhea, dysentery, dyeing and tanning industry. In India, guava occupies an area of 2.68 lakh hectares with annual production of 36.67 lakh tonnes and productivity of 13.7 tonnes/ha with production share of 45.1 per cent (National Horticultural Board, 2014). In India, Maharashtra, Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Punjab, Gujarat and Karnataka are the major guava producing states.

In India, guava is cultivated mainly through the traditional system where the production is less because of large trees with low productivity. Large trees take several years before they come into bearing and the cost of production per unit area is further increased because of long prebearing period.

Hence, there is overriding need to improve the existing planting system. High density planting system in guava is one of the techniques where more number of plants per unit area is accommodated compared to conventional planting system. Under high density planting system where fruiting starts from first year, a precise level of pruning is required to make the balance between vegetative and reproductive phase. In fact, guava responds well to canopy modification by pruning and training. Paclobutrazol produced most significant reduction in the length of the first internode due to reduced leaf number and thus transpiration, which in turn would have reduced the movement of paclobutrazol in the plant (Amling, 1986). With this background, a study to standardize the levels of pruning and growth regulator application in guava cv. Lucknow -49 was undertaken to observe the yield and quality parameters.

Materials and Methods

An investigation on “Effect of pruning levels and growth regulator application on guava (*Psidium guajava* L.) cv. Lucknow – 49” was undertaken in fields of Mr. Angusamy pudhur, Old Ayakudi and Palani taluk of Dindigul district during 2016-2017. The experiment was laid out in a randomized block design (RBD) having seven treatments and three replications. The trail was laid out in two years old orchard having one hundred and five trees spaced at 3 x 3 m. Each treatment unit consists of five trees.

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The treatment details are:

- T₁: Control (without pruning)
- T₂: Light pruning (Pruning level at 10cm)
- T₃: Moderate pruning (Pruning level at 20 cm)
- T₄: Heavy pruning (Pruning level at 30 cm)
- T₅: T₂ + Paclobutrazol @ 1ml/litre/tree
- T₆: T₃ + Paclobutrazol @ 1ml/litre/tree
- T₇: T₄ + Paclobutrazol @ 1ml/litre/tree

Soil application of paclobutrazol (Cultar 23% w / w and 25% W / V of Syngenta Crop Science Ltd.) @ 1ml / tree was given during the month of October, 2016 by dissolving in 2 litres of water. The solution was poured in the root zone along the drip circle.

Results and Discussion

In guava, canopy management is important due to its tendency to induce frequent flushes, especially in humid tropics. Pruning is an unavoidable necessity of all fruit crops and adopted to maintain proper physiological balance between growth and fruiting. Pruning also prevents tree from getting large size and annual pruning regulates flowering and to reshape the size of tree. Pruning reduces apical dominance and influences both growth promoting and inhibiting substances found in fruiting shoots of different stage. Brar *et al.*, (2007) observed that the increased pruning intensity in guava increased fruit set and reduced flower drop. In the present study, severity in pruning resulted in decrease in mean fruit weight, fruit length and fruit circumference. The highest mean fruit weight, length and fruit circumference were observed in the treatment T₅ (Light pruning + Paclobutrazol application). The pulp weight was highest in T₅ (Light pruning + Paclobutrazol application). Similar result was observed by Gopikrishna (1981) who recorded greater number of fruits in the winter season with mild pruning (10 cm) in Sardar guava. However, severe pruning resulted in lesser number of fruits both in the rainy and the winter season crops. Whereas in absolute control T₁ (without pruning) very less values were recorded for fruit parameters *viz.*, fruit weight (105.47 g), length (6.43cm), fruit circumference (9.45cm) and pulp weight (40.85g) Table 1.

Guava generally produces few flowers but fruit setting per cent used to be always higher compared to mango. Subsequently during the developmental stage, the flowers get dropped due to many reasons and finally very limited number of fruits is carried to full maturity. Hence, knowledge on the fruit setting ability is highly essential under crop management practices. In the present investigation, the maximum per cent fruit set was noticed in T₅ (Light pruning + Paclobutrazol application) (93.93) followed by T₆ (Moderate pruning + Paclobutrazol application) (92.40). However, the per cent fruit set

was the least in Un- pruned control T₁ (Control without pruning) (69.04). Poor fruit set per cent was found in severe pruning treatments due to removal of the potential food synthesizing young shoots through pruning otherwise lesser availability of assimilates in the severe pruning treatments (Table 2).

In the present study, the number of fruits per tree and yield per tree during of experiment were generally higher in the T₅ light pruning + paclobutrazol application (40.56) and moderate pruning + paclobutrazol application treatments (37.95) than the trees subjected to T₇ -heavy pruning (31.89). This clearly indicated that the severe pruning has the depressive effect on the yield of fruit. Higher fruit yield per tree and fruit yield per hectare was recorded in the treatment T₅- light pruning + paclobutrazol application (17.59 kg/tree and 19.54 t /ha respectively) than the trees subject to severe pruning (14.57 kg /tree and 16.18 t/ha). The reason for more fruit yield in light pruning is due to the retention of more number of past season shoots as against removal of many such shoots in the severely pruned treatments. In guava, Kumar and Rattanpal (2010) reported total fruit yield in both rainy and winter season was higher in pruned trees that is 50 per cent removal of past season vegetative growth at 6 x 4 m spacing. Sheikh and Hulmani (1993) in guava also had similar results. Moreover, as this study was conducted on young guava trees of two years old, the number of new shoots produced consequent to pruning treatments and its flowering potential were found to be significant. Similar result was observed by Serrano *et al.*, (2008). Bisla *et al.*, (1991) also supported the above view as pruning influences yield.

Pruning not only regulates the canopy size but also ensure quality, size and appearance of fruit through better exposure of branches and fruit. Any management practice system, besides increasing the productivity, should aim at the production of better-quality fruit. This is truer in the case of canopy management practices, wherein the main objective is to permit better aeration and light to fall on the inner parts of the plant, so that the developing fruits attain better colour and quality. In the present study, the highest total soluble solids, total sugars of the fruit were observed in T₇ (Heavy pruning + Paclobutrazol application) where the light penetration was at its maximum. The lowest acidity content was observed in T₁ (Control without pruning), while highest acidity was recorded in heavy pruning + paclobutrazol application. Similar result was observed in Kinnow by Ahmad *et al.*, (2006) and in mango by Singh *et al.*, (2010) and Gopu (2011).

Table 1: Effect of pruning and chemical treatments on fruit characters in guava cv. Lucknow - 49

Treatment	Fruit weight (g)	Fruit length (cm)	Fruit circumference (cm)	Pulp weight (g)
T ₁	105.47	6.43	9.45	40.85
T ₂	183.93	6.69	11.61	49.87
T ₃	142.33	6.61	10.74	48.62
T ₄	134.22	6.54	10.68	48.24
T ₅	239.81	8.49	11.74	91.89
T ₆	238.81	7.71	11.31	73.26
T ₇	183.40	7.67	11.28	64.68
Mean	175.43	7.16	10.97	97.35
S.ED	17.092	0.220	0.285	14.838
C.D (0.05)	37.240*	0.478*	0.621*	32.330

** Highly significant * Significant – Non-significant

Table 2: Effect of pruning and chemical treatments on per cent fruit set, number of fruits per tree, yield per tree (kg) and yield per hectare guava cv. Lucknow - 49

Treatment	Per cent fruit set	Number of fruits per tree	Fruit yield per tree (kg/tree)	Yield (t/ha)
T ₁	69.04	22.47	9.04	10.04
T ₂	92.22	36.12	16.78	18.64
T ₃	79.11	28.46	13.84	15.37
T ₄	77.23	25.98	10.28	11.42
T ₅	93.93	40.56	17.59	19.54
T ₆	92.40	37.95	16.90	18.77
T ₇	86.44	31.89	14.57	16.18
Mean	84.34	36.39	13.65	15.84
S.ED	0.776	2.307	0.285	0.342
C.D (0.05)	1.690*	5.543**	0.620*	0.736*

** Highly significant * Significant – Non-significant

Table 3: Effect of pruning and chemical treatments on quality parameters of guava cv. Lucknow - 49

Treatment	Total soluble solids (%brix)	Total sugars (%)	Ascorbic acid (%)
T ₁	69.04	22.47	9.04
T ₂	92.22	36.12	16.78
T ₃	79.11	28.46	13.84
T ₄	77.23	25.98	10.28
T ₅	93.93	40.56	17.59
T ₆	92.40	37.95	16.90
T ₇	86.44	31.89	14.57
Mean	84.34	36.39	13.65
S.ED	0.776	2.307	0.285
C.D (0.05)	1.690*	5.543**	0.620*

** Highly significant * Significant – Non-significant

Conclusion

An experiment on “Effect of pruning levels and growth regulator application in guava cv. Lucknow – 49” was undertaken at Mr. Agusamy’s field, in Dindigul district during 2016-2017. The parameters viz., fruit weight, fruit length, fruit circumference, pulp weight, per cent fruit set, number of fruits per tree, yield, TSS, total sugar, ascorbic acid were studied. The results of the study show that, when the guava trees subjected to pruning and paclobutrazol application, the treatment T₅ (Light pruning + Paclobutrazol application) recorded the maximum yield in the winter crop. This is being the first of its kind, the result obtained are to be validated through subsequent trails for conformation.

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