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EFFECT OF DIFFERENT LEVELS OF PRUNING ON GROWTH AND YIELD OF GUAVA (*Psidium guajava* L.) CV. THAI GUAVA

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ABSTRACT

Crop regulation is the most important aspects in guava (*Psidium guajava* L.) production. Regulation of crop has been done by deblossiming, flower thinning, foliar application of NAA and withholding of irrigation in the past. Recently, pruning has emerged as commercial and alternative method for regulating the crop in guava. Pruning had significant effect on the number of fruits per shoot, number of fruits per plant, fruit weight and fruit yield per plant. Seven different forms of pruning (one leaf pair retaining , 25 per cent shoot retaining , 50 per cent shoot retaining , 75 per cent shoot retaining, terminal leaf pair shoot pruning, removal of all leaves and flower buds by hand) were studied along with control. Fruit yield per acre (13.03 t), total fruit weight per plant (29.34 kg), number of fruits per plant (71.67) and number of fruits per shoot (4.92) were found highest with the treatment T_2 (25per cent shoot retainin

INTRODUCTION:

Guava (*Psidium guajava* L.) the "apple of the tropics" is one of the most popular fruit crop belonging to Myrtaceae family (Radha and Mathew, 2007). It is a favoured crop among the fruit growers due to its wide adaptability and higher return per unit area. It is the third richest source of vitamin C (299 mg/100g) after Barbados cherry (1000-4000 mg/100 g pulp) and aonla (600 mg/100g of pulp) and it contains 2 to 5 times more vitamin C than oranges and 10 times more than tomato. The increasing importance of guava as a commercial tropical fruit crop, both for table purposes and processing, demands its wide spread cultivation by ensuring regular cropping and higher production. Guava has more than one bearing season (Singh & Kumar, 1993). Guava flowers in three seasons in Andhra Pradesh and the flowers are always borne on newly emerging vegetative shoots (Rathore & Singh, 1974.) which makes guava unique, that it can be pruned as severely as temperate fruit tree (Lotter, 1990). Several workers reported the beneficial effects of pruning on growth and yield of guava (Jadhav *et al.,* 1998; Dhaliwal & Kaur, 2003; Dhaliwal & Singh, 2004).

In Andhra Pradesh region of India, recently many farmers are showing interest in growing of new variety i.e Thai guava due to big size fruits. In India, three flowering seasons are very common, *viz.* January-February (Ambe bahar), July-August (Mrig bahar) and October-November (Hastha Bahar). The production is being maximum during the Mrig bahar.

If the guava trees are left unpruned, they tend to prolong the vegetative growth, reduce the bearing area, thus leading to decrease in fruit size, quality and Yield. Hence, to get a good balance between the vegetative and reproductive growth, pruning becomes essential. Pruning can also be used for crop regulation (Lal, 1992). Pruning has its physiological effects, basically due to changes in the partitioning of the reserves. Pruning on bearing trees include the formation of new shoots, avoid overcrowding of branches, removal of criss-cross branches, diseased branches as well as water sprouts and root suckers. Earlier findings on crop regulation of guava by using chemicals and growth regulators such as Urea, NAA, etc. were not much effective. Pruning helps to regulate crop (Kindo, 2005) and also manage canopy in high density planting (Kaur & Dhaliwal, 2001).

MATERIALS AND METHODS:

The experiment was carried out at Horticultural Research Station, Anantharajupeta, Kadapa district, Andhra Pradesh, which is situated at an altitude of 162

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meters (531 feet) above mean sea level and at 13.99° North latitude and 79.30° East longitude, which falls under tropical zone with a normal rainfall of 966.1 mm. The study was conducted during 2017 on four years old Thai guava trees spread at 3 x 3 m. The soil of the orchard selected is a red sandy loam with a pH of 7.2 and electrical conductivity of 0.43 dSm^{-1}. Soil contains 0.41 per cent, 158 kg ha^{-1}, 7.8 kg ha^{-1}, and 381 kg ha^{-1} of organic carbon, available Nitrogen, phosphorus and potassium contents, respectively.

The experiment consisted seven treatment (T1- One leaf pair retaining; T2 -25per cent shoot pruning; T3- 50per cent shoot pruning; T4- 75per cent shoot pruning; T5- Terminal leaf pair shoot pruning; T6- Removal of all leaves and flower buds by hand and T7- Control (No pruning)) laid out in Randomized Block Design (RBD) with three replications.

The guava trees were pruned according to the treatment during the month of December and the cut ends were smeared with a paste of Copper Oxy Chloride in vegetable oil (crude palm oil). The data on growth parameters and yield was recorded from five uniform trees from each replication details.

The data was analysed by using standard statistical procedure (Panse and Sukhatme, 1985).

RESULTS AND DISCUSSION:

Tree height was significantly affected by various pruning methods. The mean tree height (158.30 cm) was found maximum in control trees and was minimum in pruning by removal of all leaves and flower buds by hand. It might be due to the fact that the pruned trees were unable to make up the loss of growth caused by severe pruning during short period (Hau, *et al,* 2019). Similar results of pruning was observed in ber by Kumar (2002), and Bal *et al*. (2004).

Regarding, number of new shoots, the treatment terminal leaf pair shoot pruning (T5) recorded highest number (5.33) which was at par with 25 per cent shoot retaining (4.86) and 50 per cent shoot retaining (4.03). Highest length of new shoot (50.08 cm) was observed in50 per cent shoot retaining which stood at par with 75 per cent shoot retaining.

In guava flowers are always borne on newly emerging vegetative shoots irrespective of the time of year (Rathore & Singh, 1974), due to which it is suitable for pruning for different purposes. Decapitation causes growth of one or more of the lateral buds due to removal of apical dominance. The various extent of new shoot emergence depends on the fact that how many lateral buds were present after pruning, which depends upon the severity of pruning (Tiwari, 1985; Lal, 1992). Apical dominance mainly associated with vertical growth. When apical dominance disturbed by anything , then plant corrects the change (Acquaah, 2002) and leads to change in tree canopy size due to new shoot emergence. The treatments 50 per cent shoot retaining produced new shoots from leaf axils (if fruits were not there) which resulted in more lateral growth. Pruning forced the axillary buds, present on old shoots, to sprout and grow, as it was reported previously by Chandra & Govind (1995), Jadhav *et al.* (1998) and Kaur & Dhaliwal (2001).

The impact of pruning on percentage of flowering at different nodes was not significantly different. However, it was observed that the flowering was more at 3rd node (57 to 65 per cent) followed by at 4th node (20 to 23 per cent), at 2nd node (9 to 16 per cent) and 2 to 5 per cent at other nodes. The highest number of fruits per plant (71.67) was recorded with 25 per cent shoot retaining (T2). The reduction in number of fruits per plant was because of the consequence of pruning which reduced the fruiting area and promoted the vegetative growth at the expense of reproductive growth (Kumar and Rattanpal, 2010). The average fruit weight (471.29 g) was more in control. But the total fruit weight per plant (29.34kg), total fruit yield per acre (13.03 t) were found highest with the treatment 25 per cent shoot retaining (T2) which might be due to more number of fruits per pruned shoot. Pruning is known to cause the partitioning of the photo-assimilates through modification in source-sink relationship (Thakre *et al.,* 2016).

Actively growing plant parts are strong sinks (Wolstenholme, 1990). Fruit is commonly a strong sink for assimilates, as it is the final growth stage of a reproductive organ, at the expense of vegetative growth (Bollard, 1970). Once fruits start to develop, both the direction and pathway of assimilate transport change in favour of fruit growth (Ho & Hewett, 1986). Pruning -

leads to generation of more shoots as well as more leaves which leads to more photosynthetic activity by more leaf area. It can be concluded from the study that 25 per cent shoot retaining leads to more number of fruits per plant and more fruit weight per plant which in turn caused more fruit yield per acre compared to other pruning methods.

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Table 1. Different levels of pruning on growth, and yield parameters of Thai guava.

Treatment Details	Plant Height (cm)	Number of new shoots	Length of new shoot (cm)	Number of fruits per shoot	Number of fruits per plant	Average fruit weight (g)	Fruit weight per plant (Kg)	Fruit yield Per acre (t)
T1: One leaf pair retaining	147.38	0.86	15.22	1.39	38.33	439.60	16.85	7.48
T2: 25 per cent shoot retaining	149.79	4.86	34.67	4.92	71.67	409.37	29.34	13.03
T3: 50 per cent shoot retaining	150.38	4.03	50.08	4.33	67	392.53	27.30	12.12
T4: 75 per cent shoot retaining	151.10	3.39	43.61	3.22	60.2	423.25	25.48	11.31
T5: Terminal leaf pair shoot pruning	152.54	5.33	25.48	4.19	56.33	403.69	22.74	10.10
T6: Removal of all leaves and flower buds by hand	145.87	2.28	8.39	0.48	6.33	358.60	2.27	1.01
T7: Control	158.30	3.27	18.74	2.43	42.67	471.29	20.11	8.93
S.E m ±	2.09	0.513	3.723	0.357	0.7552	8.19	0.66	0.29
C.D @ 5 per cent	6.34	1.556	11.299	1.083	2.2909	24.87	2.045	0.914

Table 2. Different levels of pruning on percentage of flowering in Thai guava.

Treatment Details	Percentage of flowering at different nodes			
	3rd node	4th node	2nd node	Other nodes
T1: One leaf pair retaining	62.5	20.33	15	2.17
T2: 25 per cent shoot retaining	65.38	25.5	7.7	1.42
T3: 50 per cent shoot retaining	63.94	23.63	9.47	2.96
T4: 75 per cent shoot retaining	62.5	20.18	14.32	3
T5: Terminal leaf pair shoot pruning	63.94	23.58	10.08	2.4
T6: Removal of all leaves and flower buds by hand	63.46	22.46	11.63	2.45
T7: Control	57.46	21.46	16.16	4.92
S.Em±	3.32	2.22	3.84	1.31
C.D @5per cent	NS	NS	NS	NS