



## Effectiveness of Various Crop Regulation Treatments in Guava (*Psidium guajava*) cv. L- 49

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**Crop regulation treatments in Guava viz. one leaf pair pruning, two leaf pair pruning, three leaf pair pruning, GA<sub>3</sub> sprays (100, 150 and 200ppm) at flower bud differentiation stage and NAA (600 ppm) at flowering (control) were used to regulate rainy season crop in guava cv. L-49 during the years 2008-2011. Leaf pair pruning at different levels proved to be most effective in avoiding rainy season crop whereas GA<sub>3</sub> at different concentrations seem to be ineffective as compared to control. One leaf pair pruning resulted into maximum yield reduction in rainy season with subsequent maximum yield and fruit weight in winter season during the experimental years. Plants with one leaf pruning produced better quality fruits in both the seasons and recorded maximum TSS and ascorbic acid and minimum acidity. Overall profit was also highest in one leaf pair pruning by withholding rainy season crop.**

**Key words:** Crop regulation, GA<sub>3</sub>, Guava, leaf pair pruning, NAA

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae, is native of tropical America and is one of the most important tropical and subtropical fruit. In India, it is ranked as fifth major fruit after mango, banana, citrus and apple. Its cultivation in India is as early as 17<sup>th</sup> century (Mitra and Bose, 1990).

In northern India, winter season crop is preferred because of its superior quality as compared to monsoon crop (Pandey *et al.*, 1980). The orchardists suffer considerable financial loss due to the reduction in yield of marketable fruit on account of this malady. Moreover, rainy season fruits are small in size, inferior in quality due to temperature and humidity leads to highly susceptible to pest and disease infestation. Subsequent winter season crop load is also less and delayed ripening. The best remedy to this problem would be to eliminate the rainy season crop and thereby to induce a good winter crop. There were earlier works in this line by avoiding monsoon crop through half shoot pruning, hand deblossing, foliar sprays of urea, growth regulators at full bloom and pre bloom stages which correspondingly induce a reasonably good winter season crop (Singh *et al.*, 1992; Lal *et al.*, 2000; Tiwari and Lal, 2007). Gibberellins have been widely studied for use in reducing flower numbers and to inhibit flower bud development during the inductive period (Luckwill and Silva, 1979; Moran and Southwick, 2000; Tromp, 1982; Hull and Lewis, 1959; Bradley and Crane, 1960 and Clanet and Salles, 1976). Gibberellins can be used to regulate rainy season crop of guava by interfering with flower bud induction. Till now gibberellins have not been tried for crop regulation in guava.

The present investigation was undertaken with the objective to standardize a crop regulation technique with leaf pair pruning at various intensities, sprays of NAA and GA<sub>3</sub> at flowering and flower bud differentiation stage, during, rainy season crop.

### Materials and Methods

The present study on crop regulation in guava cv. L-49 under subtropical agro climatic conditions of Jammu region was undertaken during the year 2008-2010 at Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Research Farm, Faculty of Agriculture, Udheywalla, Jammu to ascertain the effect of NAA, GA and leaf pair pruning on the elimination of rainy season crop and subsequent induction of winter season crop with yield and quality. Ten year old plants of guava cv. L-49 were selected and seven treatments namely T<sub>1</sub>: 1 leaf pair pruning, T<sub>2</sub>: 2 leaf pair pruning, T<sub>3</sub>: 3 leaf pair pruning, (Retaining one, two and three leaf pairs at the base of new shoot growth during last fortnight of April) T<sub>4</sub>: GA 100ppm, T<sub>5</sub>: GA 150ppm, T<sub>6</sub>: GA 200ppm, T<sub>7</sub>: NAA 600ppm (control) were applied in the month of April and May. NAA 600 ppm was taken as control because it had been the previously recommended method for crop regulation by SKUAST-J in Jammu sub tropics. NAA and GA were given as foliar sprays twice, at the rate of 7 litres of spray solution per plant per spray. NAA was applied twice, in the middle of April and first week of May, while GA<sub>3</sub> was applied during first week of April. Each treatment was replicated thrice with three plants per replication. All the cultural operations including weeding, irrigation, manuring and fertilization and plant protection were carried as per the package of practices of SKUAST-J. Observations

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were recorded on yield/ plant (kg), average fruit weight (g), TSS (°B), Total titrable acidity (%) (A.O.A.C., 1990) and ascorbic acid content (mg/ 100g) (A.O.A.C., 1990). Profitability of various treatments was also calculated. The experiment was laid in randomized block design. The data were subjected to analysis of variance (Panse and Sukhatme, 1967)

## Results and Discussion

Leaf pair pruning at different levels proved to be most effective in avoiding rainy season crop whereas GA<sub>3</sub> at all the concentrations seemed to be ineffective as compared to control. In all the three years, leaf pair pruning at all levels resulted in significant reduction in rainy season crop over control with one leaf pair pruning resulting in maximum yield reduction in rainy season of all the experimental years (10.46, 8.56 and 11.30 kg, respectively) crop with subsequent highest yield in winter season crop (80.56, 80.80 and 78.20 kg, respectively) followed

by two and three leaf pair pruning. GA<sub>3</sub> at all concentrations was ineffective in controlling rainy season crop and gave significantly higher yield in rainy season as compared to control, thereby giving lower yield in winter season. Tiwari and Lal (2007) also reported higher yield reduction in rainy season crop with one leaf pair pruning over NAA treatment, with subsequently higher yield in winter season. This higher yield in winter season as result of leaf pair pruning might be because of retention of vigour due to crop regulation in rainy season. In absence of crop regulation, trees get exhausted because of heavy crop load during rainy season resulting into poor yield in winter. One leaf pair pruning resulted in significantly higher average fruit weight throughout the experiment as compared to all other treatments in both rainy as well as in winter season and was followed by two leaf pair pruning, three leaf pair pruning and NAA (600ppm) except in rainy season crop of 2008 where it was at par with two pair leaf

**Table 1. Effect of various crop regulation treatments on yield (kg) and average fruit weight (gm) of guava cv. L-49**

Treatment	Yield (kg)						Average fruit weight (gm)					
	2008		2009		2010		2008		2009		2010	
	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season
T1: 1pair leaf pruning	10.46	80.56	8.56	80.80	11.30	78.20	200.55	221.20	188.90	195.30	201.34	230.29
T2: 2pair leaf pruning	17.80	70.00	15.43	69.33	19.86	66.23	202.07	214.44	179.22	181.25	186.52	205.28
T3: 3pair leaf pruning	30.67	57.37	30.53	56.36	35.03	50.76	161.25	182.67	156.50	172.19	177.19	183.34
T4: GA 100ppm	48.33	35.83	43.26	30.50	42.16	28.76	117.59	121.47	107.99	130.05	112.37	125.16
T5: GA 150ppm	52.56	30.80	50.60	32.36	50.20	30.73	135.09	129.36	115.17	125.14	106.47	120.27
T6: GA 200ppm	50.46	29.43	46.73	27.23	56.36	26.73	128.22	137.44	111.96	141.40	122.41	121.82
T7: NAA 200ppm	35.00	50.00	30.70	49.96	38.50	47.40	146.29	174.70	159.63	175.28	180.71	132.64
C.D.	02.50	02.73	02.59	4.19	02.50	03.74	4.40	3.13	2.79	4.55	3.54	2.25

pruning. GA<sub>3</sub> treatment yielded small sized fruits as compared to other treatments. These results are in conformity with the findings of Tiwari and Lal (2007), who have reported that one leaf pair shoot pruning done in the first month of May results into maximum winter season yield of superior quality fruits.

One leaf pair pruned plants produced fruits with lowest acidity in both the seasons, in all the experimental years (0.54% and 0.46 %; 0.50% and 0.50%; 0.52% and 0.48%; in rainy and winter season during 2008, 2009 and 2010, respectively)

**Table 2. Effect of various crop regulation treatments on acidity (%) and TSS (°B) of guava cv. L-49**

Treatment	Acidity (%)						TSS (°B)					
	2008		2009		2010		2008		2009		2010	
	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season
T1: 1pair leaf pruning	.54	.46	.50	.50	.52	.48	12.60	13.80	12.00	13.63	12.40	13.67
T2: 2pair leaf pruning	.57	.49	.51	.49	.57	.50	12.00	13.00	12.10	12.80	12.03	13.03
T3: 3pair leaf pruning	.60	.51	.62	.52	.63	.58	12.00	13.00	11.60	12.03	11.00	12.10
T4: GA 100ppm	.68	.58	.65	.58	.64	.59	10.90	11.70	11.20	11.80	11.20	12.00
T5: GA 150ppm	.62	.54	.68	.60	.65	.60	11.00	11.80	10.53	11.60	11.80	12.50
T6: GA 200ppm	.65	.50	.66	.61	.67	.62	10.70	12.00	10.96	11.20	11.03	12.20
T7: NAA 200ppm	.60	.50	.57	.54	.60	.56	11.40	12.80	11.80	12.30	11.70	12.90
C.D.	.03	.03	.03	.03	.04	.04	.43	.38	.34	.38	.44	.32

(0.67% and 0.62% in rainy and winter season, respectively). Highest TSS was recorded in fruits growing on 1 leaf pair pruned plants (12.60 and 13.80 °B ; 12.00 and 13.63 °B ; 12.40 and 13.67 °B during rainy and winter season of 2008, 2009 and 2010, respectively) and values were at par with two leaf pair pruning except in winter season of 2008 and 2010, where it was significantly higher in one

leaf pair pruning and was closely followed by three leaf pair pruning. GA<sub>3</sub> at all the concentrations resulted into fruits with lower TSS as compared to control as well as leaf pair pruning. During rainy season of 2008 and 2010, GA<sub>3</sub> 150 ppm treated plants were at par with control plants in respect of TSS value of fruits. One leaf pair pruned plants were also found to be superior in terms of ascorbic

**Table 3. Effect of various crop growth regulation treatments on ascorbic acid content (mg/100gm) and Gross income of guava cv. L-49**

Treatment	Ascorbic acid content (mg/100gm)					
	2008		2009		2010	
	Rainy season	Winter season	Rainy season	Winter season	Rainy season	Winter season
T1: 1pair leaf pruning	245.93	301.82	230.36	297.38	260.29	301.27
T2: 2pair leaf pruning	212.43	286.47	216.04	255.96	235.50	292.13
T3: 3pair leaf pruning	201.09	249.82	201.34	222.12	218.32	245.93
T4: GA 100ppm	198.28	220.97	191.09	215.41	202.04	226.36
T5: GA 150ppm	182.95	229.08	198.33	200.99	190.42	220.30
T6: GA 200ppm	195.12	225.13	202.04	208.96	191.85	216.14
T7: NAA 200ppm	201.21	261.29	203.82	227.03	212.43	252.06
C.D.	8.72	8.62	9.69	11.15	8.52	9.74

acid content of fruits (245.937 and 301.823 mg/100g; 236.360 and 297.387 mg/100 g; 260.293 and 301.270 mg/ 100g during rainy and winter season crops of 2008, 2009 and 2010, respectively). GA treated plants at all concentrations exhibited lower ascorbic acid contents throughout the experiment.

Three leaf pair pruned plants were at par with control during all the experimental years except in winter season of 2008 where NAA 600 ppm recorded higher ascorbic acid content (261.293mg/ 100 g) than three leaf pair pruning (249.820 mg/ 100 gm). GA treated plants yielded more gross income during

**Table 4. cost of various crop growth regulation treatments in guava cv. L-49**

Treatment	Gross income									Cost of crop regulation (Rs.)	Net profit (Rs.)		
	2008			2009			2010				2008	2009	2010
	Rainy season	Winter season	Total	Rainy season	Winter season	Total	Rainy season	Winter season	Total				
T1: 1pair leaf pruning	261.50	2416.80	2678.30	214.00	2424.00	2638.00	282.50	2346.00	2628.50	42	249	317.4	189.7
T2: 2pair leaf pruning	445.00	2100.00	2545.00	385.75	2079.90	2465.65	496.50	1986.90	2483.40	42	115.7	145.05	44.6
T3: 3pair leaf pruning	766.75	1721.10	2487.85	763.25	1690.80	2454.05	875.75	1522.80	2398.55	42	58.55	133.45	-40.25
T4: GA 100ppm	1208.25	1074.90	2283.15	1081.50	915.00	1996.50	1054.00	862.80	1916.80	15.20	-92.55	-270.5	-468.4
T5: GA 150ppm	1314.00	924.00	2238.00	1265.00	970.80	2235.80	1255.00	921.90	2176.90	19.05	-145.4	-38.9	-216
T6: GA 200ppm	1261.25	882.90	2144.40	1168.25	816.90	1985.15	1409.00	801.90	2210.90	22.90	-246.7	-297.25	-189.7
T7: NAA 200ppm	875.00	1500.00	2375.00	767.50	1498.80	2266.30	962.50	1422.00	2384.50	14.85	-	-	-

rainy season but total gross income was highest in one leaf pair pruned plants. Highest total gross income of Rs 2678.30, 2638.00 and 2628.50 in 2008, 2009 and 2010, respectively, was obtained in one leaf pair pruned plants followed by two leaf pair pruning (Rs. 2545.00, 2465.65 and 2483.40 in 2008, 2009 and 2010, respectively), three leaf pair pruning (Rs. 2487.85, 2454.05 and 2398.55 in 2008, 2009 and 2010, respectively) and control (Rs. 2375.00, 2266.30 and 2384.50 in 2008, 2009 and 2010, respectively).

A net profit of Rs. 249.00, 317.40 and 189.70 was obtained in one leaf pair pruning during 2008, 2009 and 2010, respectively and was followed by two leaf pair pruning (Rs. 115.7, 145.05 and 44.6 in 2008, 2009 and 2010, respectively). GA<sub>3</sub> treated plants in all the experimental years and three leaf pair pruning during 2010 and recorded a loss of income over control. Similar results were reported by Tiwari and Lal (2007). It is concluded that one leaf pair pruning can be profitably used to regulate rainy season crop in guava.

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