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Effect of Pruning on Guava CV. Sardar Under Ultra High Density Orchardling System

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An experiment was conducted during 2009-10 and 2010-11 at ICAR RCER, Research Centre, Ranchi to standardize time and level of pruning of guava plants planted under ultra high density orcharding in eastern plateau and hill conditions. Treatments on different time of pruning (pruning once in May, Pruning once in October and pruning thrice a year in March, May and October) and different levels of pruning (pruning to 60% of canopy height, pruning to 80% of canopy height and pruning to 50% shoot length) were imposed on three year old guava plants of cultivar Sardar planted under ultra high density orcharding (at a spacing of 1mx2m). In case of control, no pruning were done. A total of six treatment combinations were imposed in four replications with 12 plants per replication. Pruning thrice a year to 50% of shoot length resulted in maximum yield of summer season, winter season crop and total yield per ha (34.88 t/ha and 37.24 t/ha during 2009-10 and 2010-11, respectively). With respect to gross income per ha, the maximum gross return was also obtained in case of pruning thrice a year to 50% of shoot length. Hence keeping in view yield and Gross income, pruning of guava plants thrice a year viz. March, May and October to 50% of shoot length can be recommended for maximization of income from Ultra-high density guava orchard of cv. Sardar growing under eastern plateau and hill conditions.

Key words: Guava, Ultra high density orcharding, yield, income

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INTRODUCTION

Guava (*Psidium guajava*) is an important fruit crop which is successfully grown over a range of climatic conditions due to its wide adaptability. The Chotanagpur region of Eastern plateau and hills agro-climatic zone has been a traditional guava growing region. The guava produced in this region is known for its high TSS and long keeping quality. However low productivity of guava plants owing to low soil fertility, makes guava orcharding unprofitable under traditional system (planted at a spacing of 5 x 5m accommodating 400 plants per ha).

Pruning is one of the most effective strategies for the improvement of yield and control of plant size of this crop. Beneficial effects of pruning on yield and fruit quality of guava have been reported by various workers (Jadhao *et al.* 1998, Mishra and Pathak, 1998, Dhaliwal *et al.* 2000, Singh and Singh, 2001, Jadhav *et al.* 2002, Dhaliwal and Kaur, 2003, Dhaliwal and Singh, 2004). Guava, being a current season bearing plant, responds favourably to different pruning practices. This growth behaviour of guava provides opportunity for planting more number of plants per unit area and harvesting maximum yield per unit area by means of control of plant

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Table 1. Effect of pruning on trunk girth and rate of photosynthesis of guava plants of cv. Sardar under ultra-high density planting system

Treatment no.	Treatment	Trunk girth (mm)		Photosynthesis (μ mol CO ₂ /sec/m ²)	
		2009-2010	2010-2011	2009-2010	2010-2011
T1	No pruning	23.23	42.48	4.90	10.11
T2	80% pruning in May	23.72	42.78	3.63	10.63
T3	60% pruning in May	23.58	42.08	3.19	6.63
T4	80% pruning in October	24.17	42.15	3.52	8.44
T5	60% pruning in October	22.96	40.87	3.53	8.05
T6	pruning three times in a year	24.20	40.63	2.56	9.15
	SEm	0.94	1.27	1.24	2.17
	CD at 5%	ns	ns	ns	ns

Table-2. Effect of pruning on average weight and TSS of guava fruits of cv. Sardar under ultra-high density planting system

Treatment no.	Treatment	Average fruit weight (gm)						TSS (⁰ B)					
		Summer season		Rainy season		Winter season		Summer season		Rainy season		Winter season	
		2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011
T1	No pruning	119.76	102.06	113.72	99.22	126.68	108.25	10.13	15.88	8.41	9.28	10.44	9.38
T2	80% pruning in May	130.51	108.82	117.50	107.12	157.66	122.32	10.09	15.06	8.88	10.18	11.37	9.71
T3	60% pruning in May	131.85	110.02	119.32	105.36	142.03	119.45	10.72	14.48	8.89	10.18	11.55	9.80
T4	80% pruning in October	128.59	103.36	120.21	110.20	153.57	129.94	10.01	15.21	8.89	10.15	10.99	9.45
T5	60% pruning in October	131.38	106.77	118.40	115.23	150.74	130.01	10.52	15.75	9.30	10.24	10.46	9.43
T6	pruning three times in a year	135.15	117.06	117.21	105.03	106.68	110.60	10.25	14.18	8.70	10.50	9.93	8.93
	SEm	4.72	7.72	2.54	6.07	8.17	3.72	0.89	1.12	0.34	0.44	0.55	0.45
	CD at 5%	ns	ns	ns	ns	19.86	9.04	ns	ns	ns	ns	ns	ns

vigor by different pruning treatments. The system of orcharding having more number of plants per unit area than that is planted under traditional system of planting is called high density orcharding. Increased yield with high density orcharding in guava have been reported by many workers (Bal and Dhaliwal, 2003, Rajput *et al.* 2004). Ultra-high density orcharding is a system of planting the plants at a closer spacing (1m × 2m) in order to accommodate relatively larger number of plants per unit area (5000 plants/ha). High density/Ultra high density planting is an effective way to maximize productivity as well as profitability of fruit orchards by efficient utilization of land, water and sunlight. No work has been reported on effect of pruning in guava under Ultra high density

planting under eastern plateau and hill conditions. Keeping this in view, an experiment was conducted to standardise time and level of pruning of guava plants planted under ultra high density orcharding in eastern plateau and hill conditions.

MATERIALS AND METHODS

The experiment was undertaken at ICAR, Research Complex for Eastern Region, Research Center, Ranchi during 2009-10 and 2010-11. Treatments on different time of pruning (pruning once in May, Pruning once in October and pruning thrice a year in March, May and October) and different levels of pruning (pruning to 60% of canopy height, pruning to 80% of canopy height and pruning to 50% shoot length)

Table 3. Effect of pruning on number of flowers and yield of different season crop of guava cv. Sardar under ultra-high density planting system

Treatment no.	Treatment	No of flowers						Yield (t/ha)								Gross income (lakh/ha)	
		Summer season		Rainy season		Winter season		Summer season		Rainy season		Winter season		Total yield		2009-2010	2010-2011
		2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011	2009-2010	2010-2011		
T1	No pruning	104.44	45.00	97.31	56.63	14.25	48.75	1.76	2.92	17.08	3.29	6.92	22.06	25.76	28.26	3.19	4.37
T2	80% pruning in May	72.85	22.42	90.59	28.65	17.63	32.76	1.56	5.01	12.71	2.91	10.12	22.56	24.39	30.48	3.18	4.93
T3	60% pruning in May	74.60	25.69	102.42	23.39	18.39	32.86	1.34	4.09	9.21	3.07	10.29	20.58	20.83	27.73	2.80	4.42
T4	80% pruning in October	93.67	21.74	101.99	25.78	11.26	28.06	1.69	5.60	17.56	4.61	6.48	12.11	25.73	22.32	3.15	3.68
T5	60% pruning in October	85.63	15.85	100.35	14.56	7.72	18.42	1.37	3.55	16.86	3.18	5.62	9.25	23.85	15.98	2.87	2.59
T6	pruning three times in a year	93.38	15.75	99.94	33.25	20.13	33.88	3.73	9.07	16.48	4.92	5.03	23.26	34.88	37.24	3.33	6.25
	SEm	15.40	8.28	20.27	13.55	3.40	7.85	0.61	1.26	1.62	0.90	0.46	1.26	2.53	1.82	0.29	0.35
	CD at 5%	ns	ns	ns	ns	8.26	ns	1.49	3.06	3.95	ns	1.13	3.06	6.14	4.43	ns	0.86

were imposed guava plants of cultivar Sardar planted under ultra high density orcharding (at a spacing of 1 m x 2m). The treatments were imposed during both the years of experimentation. In case of control, no pruning were done. A total of six treatment combinations were imposed in four replications with 12 plants per replication. Data were recorded on trunk girth, no of flowers per plant in different seasons, number of fruits per plant in different season, yield per plant in different seasons, total yield per ha, total gross income, average fruit weight, TSS and rate of photosynthesis. The data on rate of photosynthesis was recorded during 1st week of May with the help of Infra Red Gas Analyzer. The data were subjected to analysis of variance.

RESULTS AND DISCUSSION

Data on effect of pruning on trunk girth and rate of photosynthesis is given in table 1. As evident in the table, the different treatments did not differ significantly with respect to their effect on trunk girth and rate of photosynthesis. However, an in-general increase in the value of trunk girth and net photosynthesis could be recorded during 2010-11 over that of 2009-10.

Data on fruit weight and TSS during different seasons is given in table 2. As evident from the table, the treatments did not differ significant with respect to their effect on fruit weight of summer and rainy season crop during both the years and winter season crop of 2010-11. During winter of 2009-10, pruning to 80% of canopy height in May resulted in maxi-

mum average fruit weight and the minimum fruit weight was recorded in case of pruning thrice a year to 50% of shoot length. During both the years the treatments did not differ significantly with respect to their effects on TSS.

Data on number of flowers, yield and gross income is presented in table 3. As evident from the table significant effect of different treatments on total number of flowers per plant in different season could be recorded only in case of winter season in 2009-10. Pruning three times a year resulted in maximum number of flowers per plant (20.13) whereas pruning to 80% of canopy in October resulted in minimum number of flowers per plant (7.72) during winter season of 2009-10. With respect to yield, significant effects of different treatments could be recorded in case of yield of summer season crop during both the years. During both the years, the maximum yield of summer season crop was recorded in case of pruning thrice a year to 50% of shoot length. With respect to yield of rainy season crop, significant effects of different treatments could only be recorded during 2009-10. Pruning to 80% of canopy in October resulted in the maximum yield of rainy season crop. Pruning in May resulted in significant reduction of rainy season crop. An in general decline in yield of rainy season crop could be recorded in case of 2010-11 which can be attributed to extremely low rainfall in the rainy season of 2010-11. Significant effects of different treatments could be recorded on yield of winter season crop during both the years. Pruning to 60% of plant height resulted in the maximum yield of winter season crop during 2009-10, whereas

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pruning thrice a year to 50% of shoot length resulted in the maximum yield of winter season crop during 2010-11. Mishra and Pathak (1998) reported that under Uttar Pradesh conditions, for obtaining the winter crop, 50% pruning in May produced the highest fruit yield. In the present experiment, during both the years, the treatmental effects were significant with respect to total yield. During both the years, the maximum total yield was recorded in case of pruning thrice a year to 50% shoot length (34.88 t/ha and 37.24 t/ha during 2009-10 and 2010-11, respectively). Jadhao *et al.* (1998) had reported highest fruit yield of guava cv. Sardar with single pruning 60 cm from the tip on 25 April. With respect to gross income per ha, the different treatments differed significantly only during 2010-11. However, during both the years, the maximum gross return was obtained in case of pruning thrice a year to 50% of shoot length.

Hence keeping in view yield and Gross income, pruning of guava plants thrice a year viz. March, May and October to 50% of shoot length can be recommended for maximization of income from Ultra-high density guava orchard of cv Sardar growing under eastern plateau and hill conditions. In case of presence of flowers or fruits in the region above the 50% shoot length, the pruning should be done above the fruited portion of the shoot.

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