



Performance of guava cv. SARDAR budded on ten different rootstocks

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Abstract : The present study was conducted in the Department of Fruit Science, Punjab Agricultural University, Ludhiana during 2004-2006. The influence of different guava rootstocks on fruit set, retention, weight, yield and quality characteristics of guava cv. SARDAR was studied. Sardar showed best performance on Portugal rootstock in terms of fruit set, retention and fruit yield. The mean maximum fruit length and breadth was recorded on Pear Shaped and Banarsi Surkha, respectively. Fruit quality in terms of fruit weight and TSS was the highest on Sindhajli followed by Portugal but vitamin C content was the highest on Chittidar during both the years. So it may be concluded that Portugal is ideal rootstock for Sardar for producing fruits of good quality with higher yields.

Key Words : Guava, Portugal, Fruit set, Yield, Quality

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INTRODUCTION

Guava (*Psidium guajava*), popularly known as 'apple of the tropics', is widely grown all over the tropics and subtropics and is the fourth most important fruit crop of India. Guava is more resistant to drought than most other fruits so can be grown successfully even under adverse situations. It is an excellent source of vitamin C, (250mg/100g of fruit pulp), pectin and minerals such as iron, calcium and phosphorus.

Fruit growers depend primarily on yield and fruit quality to determine their net income. The quality planting material is the basic requirement on which the final crop depends. The effects of rootstock genotype on fruit yield and quality and tree vigour has been well documented in many tree species especially apple (Fallahi *et al.*, 2002), peach (Kappel and Bouthillier, 1995) and citrus (Wheaton *et al.*, 1991). Not much work has been done on effect of rootstocks on fruiting characters, yield and quality of guava. Thus, present study was an effort to determine the performance of guava cv. SARDAR budded on ten different rootstocks with reference to fruit set, retention, quality and yield characteristics in guava.

MATERIALS AND METHODS

The experiment was conducted in the New Orchard, Punjab Agricultural University, Ludhiana during the year 2004-06. The experimental field was situated at 30° 40'N and 75° 48'E with an altitude of 247 m above mean sea level. The experimental plants were irrigated from the canal water as well as from tubewell and recommended fertilizer schedule and cultural practices were adopted throughout the course of this study. The scions of guava cv. SARDAR were grafted on ten rootstocks *viz.*, Pear Shaped, Chittidar, Banarsi Surkha, Portugal, Red Fleshed, Sindhajli, Behat Coconut, Annu Ishakwala, Gutaniwala and Mirjapur Seedling. The eleven years old plants were evaluated for growth and yield characteristics. The per cent fruit set was calculated by counting the total numbers of flowers from the four branches tagged in each direction before the anthesis. The total fruit set was counted from the same tagged branches after 30 days of anthesis. The per cent fruit set was calculated by dividing the number of fruits by number of flowers multiplied by 100. The per cent fruit retention was calculated by dividing the number of fruits

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retained by number of fruit set and multiplied by 100. The average fruit weight of ten randomly selected fruits in each replication was recorded by weighing the fruits on the pan balance and average fruit weight was calculated and expressed in grams per fruit. The mean fruit size (length and breadth) of ten randomly selected fruits was recorded for each replication. The fruit yield (kg/tree) was calculated by multiplying fruit number per tree with average fruit weight. Total soluble solids of juice were determined with the help of hand refractometer. The vitamin C (Ascorbic acid) was determined according to the methods outlined in AOAC (2000). The experiment was laid out in Randomized Block Design with three replications. The data for winter and rainy seasons for two years was pooled and mean was worked out. Analysis of variance (ANOVA) and the test of mean comparison according to critical difference (CD) were applied. Significance level was accepted at $P \leq 0.05$. The data of 3 replications was analyzed statistically by Randomized Block Design using CPCS1 software as a statistical analysis tool (Cheema and Singh, 1990).

RESULTS AND DISCUSSION

The data regarding fruit set (%), fruit retention (%), fruit weight (g) and fruit yield (kg/tree) are presented in Table 1. The fruit set was found to be more in winter season as compared to rainy season. Among the rootstocks, mean maximum fruit set (71.80%) was observed on Portugal which was significantly better than all the other rootstocks. Portugal rootstock improved flowering, fruit set during both the years irrespective of the seasons. Similar results were reported by El-Shammaa *et al.* (2011) in Anna Apple trees. The mean maximum fruit retention (30.54%) was recorded on Portugal which was found to be significantly more than all other rootstocks while the mean minimum fruit retention (21.86%) was recorded on Behat Coconut.

The highest mean fruit weight was recorded on Sindhajli (143.50 g) which was significantly better than all other rootstocks. Teatota and Phogat (1971) also reported the effect of rootstock on fruit size and weight of scion and recorded maximum fruit size and weight of ALLAHABAD SAFEDA budded on *P. cujavillis* rootstock in winter season. The fruit weight was

Table 1: Effect of rootstocks on fruit set, retention, weight and fruit yield of guava cv. SARDAR

Rootstocks	Fruit set			Fruit retention			Fruit weight			Fruit yield		
	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean
Pear Shaped	59.09	53.84	56.47	27.42	23.42	25.42	131.75	121.17	126.46	45.34	36.38	40.86
Red Fleshed	57.50	56.00	56.75	22.90	22.52	22.71	117.68	110.71	114.20	45.27	38.04	41.66
Sindhajli	58.70	58.92	58.81	29.52	26.95	28.24	149.67	137.33	143.50	68.51	50.57	59.54
Behat Coconut	56.84	55.34	56.09	21.80	21.92	21.86	122.04	109.71	115.88	46.62	36.59	41.61
Portugal	71.59	72.00	71.80	33.50	27.57	30.54	147.67	133.17	140.42	83.89	68.65	76.27
Mirjapur seedling	58.84	55.57	57.21	28.10	25.38	26.74	131.92	122.17	127.05	55.03	44.88	49.96
Chittidar	60.83	63.59	62.21	30.17	24.59	27.38	135.05	121.78	128.42	66.78	53.90	60.34
Gutaniwala	60.84	60.09	60.47	29.17	25.02	27.10	135.87	129.25	132.56	66.43	57.92	62.18
Banarsi Surkha	63.34	59.67	61.51	27.07	23.77	25.42	140.50	125.96	133.23	55.22	45.36	50.29
Annu Ishakwala	57.67	55.83	56.75	27.72	25.59	26.66	139.54	122.20	130.87	58.82	45.06	51.94
C.D. = 0.05	1.26	1.57	0.97	0.98	0.52	0.54	2.93	2.55	1.87	3.61	3.00	2.27
	Rootstock x scion: 1.37			Rootstock x scion: 0.76			Rootstock x scion: 2.66			Rootstock x scion: 3.21		

Table 2: Effect of rootstocks on fruit length, breadth, TSS and vitamin C of guava cv. SARDAR

Rootstocks	Fruit length			Fruit breadth			TSS			Vitamin C		
	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean	Winter season	Rainy season	Mean
Pear Shaped	6.29	5.95	6.12	6.00	5.70	5.85	9.07	8.77	8.92	124.19	105.23	114.71
Red Fleshed	5.92	5.54	5.73	6.12	5.80	5.96	9.47	9.04	9.26	117.81	100.89	109.35
Sindhajli	6.25	5.89	6.07	5.92	5.59	5.76	10.14	9.80	9.97	144.28	112.80	128.54
Behat Coconut	6.15	5.78	5.97	5.86	5.51	5.69	9.62	9.40	9.51	102.21	75.48	88.85
Portugal	6.22	5.85	6.04	5.85	5.55	5.70	9.77	9.54	9.66	156.03	127.03	141.53
Mirjapur seedling	6.10	5.70	5.90	5.80	5.44	5.62	9.10	8.98	9.04	113.65	82.64	98.15
Chittidar	6.05	5.63	5.84	6.01	5.58	5.80	9.15	8.98	9.07	167.44	137.97	152.71
Gutaniwala	6.12	5.74	5.93	5.83	5.53	5.68	8.67	8.52	8.60	120.71	95.02	107.87
Banarsi Surkha	5.83	5.67	5.75	6.20	5.84	6.02	9.28	9.07	9.18	123.88	103.07	113.48
Annu Ishakwala	5.96	5.56	5.76	5.68	5.33	5.51	8.90	8.80	8.85	154.01	121.00	137.51
C.D. = 0.05	0.05	0.04	0.03	0.04	0.05	0.03	0.13	0.11	0.08	6.25	5.64	4.06
	Rootstock x scion: 0.039			Rootstock x scion: 0.043			Rootstock x scion: 0.116			Rootstock x scion: 5.75		

more in winter season as compared to rainy season. Similar results were recorded by Rathore (1976) who observed that the vegetative growth being at standstill during winter season leading to diversion of the most of the food reserved to the fruits and hence increased fruit weight of guava during winter season.

The Portugal rootstock produced mean maximum fruit yield (76.27 kg per tree) which was significantly better than all the other rootstocks. The lowest fruit yield was recorded on Pear Shaped (40.86 kg per tree). During rainy season, similar trend was observed as in winter season. The significantly lower fruit yield was observed on Red Fleshed (41.66 kg/tree) and Behat Coconut (41.61 kg/tree) rootstocks which may be attributed to the formation of bud union crease and wilt symptoms in these combinations resulting in the hindered translocation of metabolites from source to sink. Similar results were reported by Chohan *et al.* (1978) and Chohan *et al.* (2000) in citrus.

The data regarding fruit length, breadth, TSS and vitamin C (Table 2) showed that the rootstocks had significant effect on the fruit length and fruit breadth. The mean maximum fruit length (6.12 cm) was recorded on Pear Shaped followed by Sindhajli and Portugal. These results are in agreement with findings of Singh (2004) who also reported the maximum fruit length on Pear Shaped rootstock for Sardar and Allahabad Safeda scion cultivars. The mean maximum fruit breadth (6.02cm) was recorded on Banarsi Surkha followed by Chittidar and Pear Shaped.

The Sindhajli rootstock produced the fruits with mean maximum total soluble solids (9.97 per cent) which were significantly higher than all other rootstocks. The low TSS content was recorded on Gutaniwala (9.07 per cent). These results are in agreement with the findings of Jat (2003) who reported higher total soluble solids contents on Sindhajli rootstock. Further, the TSS content was registered higher in the fruits harvested during the winter season than during rainy season. This was probably the effect of low temperature during the phase III of fruit development which prolonged its duration resulting into more accumulation of assimilates leading to increased TSS.

The fruits harvested on Chittidar rootstock synthesized mean maximum vitamin C content to the tune of 152.71 mg/100g and this was found to be significantly higher than all other rootstocks. The lowest mean vitamin C content was synthesized by fruits on Behat Coconut rootstock (88.85 mg/100g). These studies are in agreement with findings of Teatitia and Phogat (1971), who also reported the effect of rootstock on vitamin C content and recorded higher vitamin C content in *P. cujavillis*. Further, higher vitamin C content was recorded in fruits from winter season as compared to rainy season which may be ascribed to the effect of low temperature as also been observed by Rathore (1979), who reported that temperature governs the enzymatic system involved in biogenesis and catabolism of ascorbic acid. Sidhu (1992) reported that the presence of more moisture in the rainy season fruits might have diluted the various constituents and caused reduction in vitamin C. The results corroborated by the findings of Sachan and Pandey (1969) and Singh (2002).

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