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## Evaluation of sapota cultivars for quality characters

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**ABSTRACT :** An investigation was carried out at the Department of Horticulture, Faculty of Agriculture, Annamalai University during 2014-2015 to evaluate the performance of eight sapota cultivars, viz., PKM 1, Virudhunagar, Kirthibarathi Round, Cricket Ball, CO 2, Pala, Oval and Kirthibarathi Oval was studied in two seasons viz., February to April (peak season I) and July to September (peak season II). The experiment was laid out in Randomized Block Design (RBD) in three replications. With regard to quality characters, the cultivar Virudhunagar was found to be superior followed by CO 2.

**KEY WORDS :** Sapota, Evaluation, Quality characters

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Sapota (*Manilkara sapota*), known as sapodilla or chiku, is one of the prominent fruit species belonging to the family Sapotaceae. It is a native of Mexico and Central America and is now widely cultivated in West Indies, India, Mexico and other tropical countries. Sapodilla is grown on a commercial basis in India, the Philippines, Sri Lanka, Malaysia, Mexico, Venezuela, Guatemala, and some other Central American countries. India is the largest producer of sapodilla fruit with current production area around 24,000 ha and annual production around 14, 42,000 metric tons (Bijoy Kumar *et al.*, 2011). Sapota is a minor crop but of high nutritive value. It is mainly consumed in a fresh state as a table fruit in many countries where it is produced (Kute and Shete, 1995). In general, the sapota fruit requires from 100 to 165 days to mature after anthesis, depending on the cultivar, the agro climatic location and the temperature of the environment (Sulladmath and Reddy, 2004). However, since the tree bears flowers all year round, fruits of all stages of maturity can be found on the tree at the same time, making it difficult to determine the optimum maturity date for harvesting. In addition, the

climacteric nature of sapota fruits necessitates careful postharvest handling to reduce losses, further hindering the storage and distribution of sapota fruits.

Characterization is an important aspect for documentation of the performance of the studied cultivars which subsequently will help to introduce, select and improve existing sapota varieties. Attempts have been made to evaluate the sapota germplasm for different agronomic traits so that recommendations for cultivation could be made in different areas. The preference of a particular cultivar in sapota varies based on the fruit shape, size and yield characters. In some areas, the consumers prefer oval or egg shaped fruits while in other parts of India, round and bigger sized fruits are preferred. Developmental studies in sapota under local agro climatic conditions of this region is not available. Therefore, it was decided to undertake a systematic investigation to find out suitable cultivars with higher production and better size and quality of fruits.

### RESEARCH METHODS

The experiment was carried out in Randomized

Block Design in three replications. Healthy trees of eight cultivars grown in the orchard were identified. Three trees were selected in each variety in each replication and used for the study. Biometric observations like fresh weight of pulp (g), dry weight of pulp (g), pulp percentage, peel weight (g), peel percentage, pulp: peel ratio, weight of granules (g), latex flow from fruits and biochemical traits like total soluble solids (<sup>0</sup>Brix), acidity (%), total soluble solids: acid ratio, ascorbic acid content (mg 100 g<sup>-1</sup>), total sugar content (%), reducing sugar content (%), non-reducing sugar content (%), juice content (ml) and juice percentage were taken.

### RESEARCH FINDINGS AND DISCUSSION

The data presented in Tables 1 to 6 revealed that the cultivars Virudhunagar excelled the other cultivars with regard to the physical characters like fresh weight

of pulp and dry weight of pulp in both seasons followed by CO 2 in which fruit length. The cultivar Oval got the last position among different cultivars with regard to physical characters.

Higher pulp content in the cultivar Virudhunagar was attributed to the bigger size of fruit, which might be due to the varietal character of the cultivars. The cultivar Oval had the lowest pulp content due to smaller fruit size. Similar attempts have been made to evaluate the sapota germplasm for different agronomic traits by Rekha *et al.* (2011) and Saraswathy *et al.* (2012) in sapota and which indicated great variation in fruit size, production and quality of fruits. It has been reported that a cultivar which has given better performance in one locality may not necessarily behave the same way under different agro- climatic conditions.

In the present investigation, significant differences

**Table 1 : Mean performance of sapota cultivars for pulp weight (g) and pulp percentage**

Cultivars	Fresh weight of pulp (g)		Dry weight of pulp (g)		Pulp percentage	
	Peak season I	Peak season II	Peak season I	Peak season I	Peak season I	Peak season II
PKM 1	63.53	58.73	30.56	30.16	74.02	73.78
Virudhunagar	149.27	146.70	69.72	63.41	74.48	72.38
Kirthibarathi round	77.93	72.90	34.00	29.90	75.66	74.82
Cricket ball	73.17	68.43	35.30	31.10	72.20	71.65
CO 2	125.60	120.51	60.17	59.27	82.27	81.17
Pala	50.73	49.63	20.16	19.86	73.70	71.95
Oval	66.46	65.50	29.50	27.40	76.98	76.00
Kirthibarathi oval	85.12	67.23	36.36	31.16	80.07	79.05
General mean	86.47	80.45	39.47	31.91	76.67	75.10
Range	50.73-149.27	49.63-146.70	20.16-69.72	19.86-63.41	72.20- 80.27	71.65-81.17
S.E. <sub>±</sub>	0.29	0.27	0.27	0.25	0.23	0.21
C.D. (P = 0.05)	0.58	0.54	0.54	0.50	0.46	0.40

**Table 2 : Mean performance of sapota cultivars for peel weight (g), peel percentage and pulp to peel ratio**

Cultivars	Peel weight (g)		Peel percentage		Pulp to peel ratio	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	13.76	13.20	16.36	16.00	4.62	4.44
Virudhunagar	23.13	22.86	11.53	11.29	6.43	6.41
Kirthibarathi round	15.86	15.73	15.39	15.14	4.91	4.63
Cricket ball	12.96	12.23	12.78	12.60	5.67	5.59
CO 2	18.60	16.00	12.18	11.21	6.75	6.53
Pala	9.43	8.23	13.70	12.48	5.45	5.23
Oval	11.36	10.36	13.15	12.20	6.45	6.32
Kirthibarathi oval	10.56	9.30	10.42	9.55	8.06	7.23
General mean	14.49	13.48	13.18	12.55	6.04	5.79
Range	9.43-23.13	8.22-32.86	10.42-16.36	9.55- 16.00	4.62-8.06	4.44-7.23
S.E. <sub>±</sub>	0.21	0.20	0.20	0.19	0.25	0.23
CD (P = 0.05)	0.43	0.40	0.40	0.39	0.50	0.46

have been recorded in the qualitative characters viz., TSS, acidity, TSS: acid ratio, ascorbic acid content, total sugar content, reducing sugar content, non-reducing sugar content and juice content among the eight cultivars. The cultivar Virudhunagar registered the highest values of TSS (19.86 °Brix in season I and 19.80 °Brix in season II and ascorbic acid content (0.20 mg/ 100g and 0.19 mg/100g in both seasons). The lowest TSS content of 18.80 °Brix and 18.73 °Brix in season I and II, respectively was noticed in Pala (Fig. 6). The variation in TSS content in different varieties might be due to their genetic makeup and nature of variety which govern the chemical composition of the fruits (Meena *et al.*, 2010). Highest TSS: acid ratio was recorded in Virudhunagar (97.30 and 94.96), while the least was recorded in PKM 1 (61.29 and 57.23) in both seasons. The brix content is a good indicator of the sugar content of fruits. However

sweetness sensation depends also on the acid content. The brix: acid ratio always influences the taste of the fruit. However, the amount can vary from geographical location, horticultural practices, season and cultivar. Highest total sugars, reducing sugars and non-reducing sugars was recorded in the cultivar Virudhunagar followed by CO 2. Among the evaluated cultivars, Virudhunagar showed its superiority in terms of juice content (68.33% and 67.00%) in both seasons.

The qualitative characteristics of fruits varied among the varieties probably due to genetic composition of the varieties. Wide variation in physico-chemical quality of fruits was observed from comparative evaluation by Saraswathy *et al.* (2012) in sapota and Kaur *et al.* (2011) in guava.

The results of the present study indicated that the cultivars CO 2 and Cricket Ball have clearly emerged

**Table 3 : Mean performance of sapota cultivars for weight of granules (g) and latex flow (drops per fruit)**

Cultivars	Weight of granules (g)		Latex flow from fruits (drops per fruit)	
	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	0.19	0.18	8.66	8.00
Virudhunagar	0.23	0.21	9.33	9.00
Kirthibarthi round	0.21	0.20	8.33	8.00
Cricket ball	0.22	0.19	8.66	8.06
CO 2	0.19	0.18	8.33	8.00
Pala	0.20	0.19	5.66	5.33
Oval	0.12	0.11	4.33	4.00
Kirthibarthi oval	0.11	0.10	4.66	4.06
General mean	0.18	0.17	7.25	7.12
Range	0.11-0.23	0.10-0.21	4.33-9.33	4.00-9.00
S.E. <sub>±</sub>	0.01	0.005	0.46	0.44
C.D. (P = 0.05)	0.02	0.010	0.66	0.62

**Table 4 : Mean performance of sapota cultivars for TSS (°Brix), acidity (%) and TSS : acid ratio**

Cultivars	TSS (°Brix)		Acidity (%)		TSS : acid ratio	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	19.00	18.96	0.31	0.30	61.29	57.23
Virudhunagar	19.86	19.80	0.20	0.19	97.30	94.96
Kirthibarthi round	18.93	18.86	0.23	0.23	84.80	81.16
Cricket ball	19.53	19.49	0.23	0.22	89.53	87.66
CO 2	19.79	19.72	0.21	0.20	90.42	90.27
Pala	18.80	18.73	0.27	0.25	69.70	62.83
Oval	18.96	18.90	0.24	0.24	79.63	77.93
Kirthibarthi oval	19.53	19.33	0.27	0.24	81.46	78.80
General mean	19.30	19.22	0.26	0.25	79.97	76.25
Range	18.80- 19.86	18.73-19.80	0.20- 0.31	0.19-0.30	61.29- 97.30	57.23-94.96
S.E. <sub>±</sub>	0.22	0.20	0.01	0.01	0.32	0.30
C.D. (P = 0.05)	0.44	0.41	0.02	0.02	0.61	0.60

as leading cultivars for yield attributes. However, with regard to quality attributes, the cultivar Virudhunagar was found to be promising. Ranking of study material will further enable us to use the accessions for their further genetic upgradation, wherein promising cultivars lagging in one or few traits can be improved by breeding. In the present investigation, CO 2 and Cricket Ball possessed good yield attributes, but needs further upgradation for quality parameters. With respect to over all traits studied in eight sapota cultivars, Virudhunagar was found to be promising in terms of pulp content and TSS.

In the present study, sapota fruits harvested in two peak seasons *viz.*, February-April and July-September were evaluated for identifying a superior cultivar for this region. Significantly higher quality traits were observed during season I than season II, irrespective of the

cultivars. This variability may be attributed to the climatic differences during the two seasons and also possibly due to the previous crop load affecting the following cropping levels.

In the present investigation, it was observed that the fruits harvested in season I had better quality traits when compared to the fruits of season II. The variation in quality characters cannot be wholly attributed to season as it might be due to genotypic characteristics. These results are in concurrence with the findings of Prasad and Rao (1989) and Vahora *et al.* (2010) in sapota. Kumar *et al.* (2011) reported that the sapota fruits produced during summer season were bigger than fruits produced during the monsoon season under Gujarat conditions.

**Table 5 : Mean performance of sapota cultivars for sugar content**

Cultivars	Reducing sugar content (%)		Non reducing sugar content (%)		Total sugar content (%)	
	Peak season I	Peak season II	Peak season I	Peak season II	Peak season I	Peak season II
PKM 1	5.76	5.62	4.10	4.06	10.86	10.80
Virudhunagar	7.00	6.93	5.03	4.86	12.03	11.80
Kirthibarthi round	6.60	6.30	4.20	4.13	10.83	10.26
Cricket ball	5.86	5.73	4.06	3.93	9.80	9.60
CO 2	6.63	6.43	4.86	4.83	11.46	11.13
Pala	4.33	4.20	3.36	3.00	7.16	7.00
Oval	4.78	4.76	3.85	3.76	8.16	8.06
Kirthibarthi oval	5.08	5.06	3.86	3.63	8.70	8.60
General mean	5.74	5.60	4.26	4.16	9.97	9.73
Range	4.33-7.00	4.20-6.93	3.36-5.03	3.00-4.86	7.16-12.03	7.00-11.80
S.E. <sub>±</sub>	0.05	0.13	0.07	0.04	0.10	0.14
C.D. (P = 0.05)	0.07	0.18	0.09	0.06	0.20	0.28

**Table 6 : Mean performance of sapota cultivars for juice content**

Cultivars	Juice content (ml)		Juice percentage	
	Peak Season I	Peak Season II	Peak Season I	Peak Season II
PKM 1	42.66	40.33	54.03	49.00
Virudhunagar	68.33	67.00	75.93	70.66
Kirthibarthi round	57.66	55.66	59.20	57.20
Cricket ball	65.66	65.00	64.76	63.53
CO 2	55.33	54.33	53.86	50.90
Pala	19.66	19.33	29.33	29.00
Oval	14.00	13.66	18.43	17.33
Kirthibarthi oval	15.66	15.33	19.60	18.46
General mean	42.37	41.33	46.89	44.51
Range	14.00-68.33	13.66- 67.00	18.43-75.93	17.33-70.66
S.E. <sub>±</sub>	0.49	0.47	0.23	0.21
C.D. (P = 0.05)	0.87	0.83	0.45	0.40

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