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Evaluation of sapota cultivars for growth 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. The *per se* performance of the cultivar Cricket ball excelled the other cultivars upon evaluating for growth characters like tree height, tree circumference, shoot length, shoot girth, number of leaves per shoot, leaf length and leaf breadth followed by CO 2 and Virudhunagar.

KEY WORDS : Sapota, Growth, Morphology

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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 plant height (m), stem circumference (cm), plant spread (m), plant shoot length (cm), plant shoot girth (cm), number of leaves per shoot, leaf length (cm), leaf breadth (cm).

RESEARCH FINDINGS AND DISCUSSION

The vigour of any plant is indicated by the different growth parameters such as tree height, tree spread, shoot length and number of leaves. Better crop growth is reflected through higher yield and growth is due to the interaction of the genetic constituent of the variety or hybrid and the environmental conditions under which crop is raised. When different varieties and hybrids are grown under the identical conditions it is the genetic factor that determines the morphological differences.

In the present study, significant differences were observed for vegetative characters like tree height, stem

circumference, tree spread, shoot length, shoot girth, number of leaves per shoot, leaf length and leaf breadth. It is evident from the data (Table 1) that the cultivar Cricket Ball was more vigorous compared to other cultivars. This can be illustrated by the higher plant height (10.59 m), plant spread (10.49 m in E-W and 10.05 m in E-W). The variation in plant height, plant spread in the present study may be due to genotypic differences among the cultivars which is mainly governed by genetic makeup of the plant. Chundawat and Bhuva (1982) and Shirol *et al.* (2006) also reported variation in growth characters in sapota.

There is a narrow range of difference in the length of new shoots among the cultivars. The cultivar Cricket Ball recorded maximum shoot length (25.60 cm) while the least shoot length (20.20 cm) was noticed in the cultivar Oval. Though the length of the new shoots constitutes a major component in the growth of plants, particularly to impart dwarf framework to the plant. Therefore, relatively shorter length of new shoot is desirable. The variety or hybrid having shorter new shoot length along with shorter internodal length is preferred for a dwarf statured plant. These results are in accordance with the observation of Mone (1989) who noticed

Table 1 : Mean performance of sapota cultivars for growth characters

Cultivars	Tree height (m)	Stem circumference (cm)	Tree spread (m)		Shoot length (cm)	Shoot girth (cm)	Number of leaves per shoot	Leaf length (cm)	Leaf breadth (cm)
			E-W	N-S					
PKM 1	6.65	55.33	6.20	6.13	22.07	4.12	15.00	15.60	4.85
Virudhunagar	6.58	30.00	6.42	6.45	23.00	3.15	11.87	14.42	5.35
Kirthibarthi round	7.39	42.67	7.29	7.20	24.03	3.57	13.47	14.98	4.20
Cricket ball	10.59	62.33	10.49	10.05	25.60	3.38	15.27	13.50	5.80
CO 2	9.20	47.33	9.25	9.01	23.87	2.50	12.67	14.53	4.20
Pala	6.75	30.67	6.85	6.75	20.80	3.28	12.80	11.70	3.10
Oval	6.45	65.67	6.51	6.49	20.20	2.64	14.80	13.42	5.64
Kirthibarthi oval	6.82	39.67	6.63	6.76	20.97	2.90	11.60	13.56	4.54
General mean	7.55	46.70	7.45	7.35	22.56	3.19	13.43	20.21	4.71
Range	6.45-10.59	65.67-30.00	6.96-12.76	6.83-12.63	25.60-20.20	4.12-2.50	11.60-15.27	11.70-15.60	3.10-5.80
S.E. _±	0.31	0.55	0.40	0.34	1.13	0.29	1.71	0.09	1.30
C.D. (P=0.05)	0.65	1.11	0.79	0.69	3.29	0.84	4.97	0.18	2.60

Table 2 : Morphological variations of leaf characters among cultivars of sapota

Varieties	Leaf characters			
	Shape	Colour	Margin	Apex/leaf tip
PKM 1	Lanceolate	Green	Crinkled	Acute
Virudhunagar	Elliptic lanceolate	Dark green	Entire	Acuminate
Kirthibarthi round	Lanceolate	Green	Entire	Acute
Cricket ball	Lanceolate	Green	Wavy	Obtuse
CO 2	Lanceolate	Dark green	Wavy	Obtuse
Pala	Lanceolate	Green	Wavy	Obtuse
Oval	Lanceolate	Light green	Entire	Acute
Kirthibarthi oval	Lanceolate	Dark green	Entire	Acute

Table 3 : Morphological variations of fruit characters among cultivars of sapota

Varieties	Fruit characters				
	Shape	Skin colour	Skin thickness	Sweetness	Colour of pulp
PKM 1	Oblong	Brown	Medium thick	Sweet	Brown
Virudhunagar	Round	Dark brown	Thin	Sweet	Golden
Kirthibarthi round	Round	Light brown	Thin	Very sweet	Golden
Cricket ball	Round	Round	Medium thick	Sweet	Creamy
CO 2	Oblong	Brown	Thin	Sweet	Brown
Pala	Oval	Light brown	Thin	Very sweet	Golden
Oval	Oval	Brown	Thin	Sweet	Creamy
Kirthibarthi oval	Oblong	Light brown	Thin	Sweet	Light brown

difference in the length of new shoot among the varieties of sapota and Hegde (1997) where maximum growth with respect to length of shoot was recorded in hybrid 3/13 (20.61 cm) compared to other hybrids of sapota.

Leaves are the sites of photosynthesis and their presence is an indicator of active growth and carbon assimilation by plants. In sapota, irrespective of the varieties and hybrids, leaves are born in whorls in the shoot. The present study also revealed that, mean number of leaves per shoot among the cultivars ranged from 11.60 (Kirthibarthi Oval) to 15.27 in Cricket Ball. Such variation in the number of leaves per shoot was recorded by Hedge (1997) where maximum number of leaves per shoot was observed in hybrid 12/8.

The leaf contains the chloroplast in the mesophyll layer, which converts light energy into chemical energy that is required for the growth of the plant as well as for fruit development. Larger the surface of leaf, greater is the scope for photosynthesis. In the present investigation significant differences were observed in the average leaf length and leaf breadth among the cultivars. The morphological variation among the cultivars with respect to leaf and fruit characters are tabulated in the Table 2 and 3. There was considerable variation in their morphological characters among the cultivars and the variations were due to leaf shape, leaf colour, leaf margin, leaf apex and with respect to fruit characters it was due to fruit shape, skin colour, surface smoothness, sweetness and colour of pulp.

Out of eight cultivars studied, variation due to leaf characters seven cultivars were lanceolate (leaf shape), leaf colour was in the range of green, light green to dark green, leaf margin was found to be entire, wavy and crinkled and the leaf tip was found to be acute, acuminate and obtuse. Regarding the fruit characters, the fruit shape

was found to be round, oblong and oval, skin colour was found to be in the range of light brown, brown to dark brown, skin thickness was in the range of thin to medium thick, whereas the sweetness was found to be in the range to sweet to very sweet. The colour of the pulp was found to be light brown, brown, creamy and golden brown in colour.

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