



Maturity and biochemical composition of fruits of sapota cultivars

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Abstract : Experiment conducted with 12 sapota cultivars at Horticultural College and Research Institute, Periyakulam during 1997-1998 revealed that the fruits took 195 - 235 days for maturity from fruitset. Arrest of latex flow and yellowish brown colour (potato colour) of the fruit are the morphological indices of the maturity besides the fruit attaining maximum size. Sapota fruits start ripening from second day onwards after maturity and attain 80% ripening within 5-6 days. Biochemical composition of sapota fruits varied among cultivars. PKM 1 registered the higher TSS (24.5%), total sugars (20.8%) and ascorbic acid content (4.85 mg/100 g).

Key words : Sapota fruits, Maturity, Ripening, Biochemical composition.

Introduction

Sapota is a hardy tropical fruit crop largely cultivated in Tamil Nadu. The farmers have accepted the crop owing to its wide range of adaptability, low production cost and high economic return (Chadha, 1992). Post harvest losses of sapota is mostly due to the uneven ripening resulting due to harvest of immature fruits. This is because of lack of awareness among farmers about the maturity standards of sapota (Bhanja and Lenka, 1994). Therefore, the present investigation was undertaken to standardise maturity, to understand the ripening behaviour and screening for high sugar content among fruits of sapota cultivars.

Materials and Methods

The present investigation was carried out at Horticultural College and Research Institute, Periyakulam during 1997-98 with 12 sapota cultivars i.e. PKM 1, PKM 2, PKM 3, CO 1, CO 2, Oval, Cricket ball, Guthi, Thagrampudi, Virudhunagar, Kirthibarthi and Pala. The flowers were tagged at flower bud initiation and the days taken from bud initiation to flowering, flowering to fruit set and fruit set to maturity were observed. The fruit colour at maturity stage was recorded as visual grading. Six fruits were harvested from each variety at maturity and were weighed. The fruits were allowed to ripen under ambient conditions and the number of ripened fruits were counted daily. The fruits were again weighed at 80% ripening and the

loss in weight of fruits due to ripening was expressed in terms of Physiological Loss in Weight (PLW). The biochemical attributes viz., TSS, total sugars, acidity and ascorbic acid were analysed in ripened fruits as per the methods suggested by Ranganna (1964). The tannin content of the fruits was also analysed (Sankaran, 1966) and the data were statistically analysed.

Results and Discussion

It was revealed from the data (Table 1) that the time taken for flower bud initiation to flowering ranges from 53 to 62 days. PKM 2 took 53 days, whereas Guthi, the longest period of 62 days. Wide variation could be noticed among cultivars with respect to time taken from flowering to fruit set and from fruit set to fruit maturity. The shortest period of 195 days was for Pala; whereas the Cricket ball has registered the longest period of 253 days for fruit set to maturity. Lakshminarayanan and Subramaniyan (1966) also observed that sapota fruit took 8 to 9 months from fruit set to maturity. The fruit weight as well as colour at maturity also varied among the cultivars. Pala recorded the lowest fruit weight (49.5 g) and Cricket ball, the highest fruit weight (236.5 g). The colour of the fruit ranged from light yellow to yellowish brown (PKM 1). The latex flow decreased towards maturity and got arrested at full maturity. On ripening of fruits, the weight of the fruit decreased considerably. The PLW was the lowest in Cricket ball (9.3%) and the highest in Pala (15.9%).

Table 1. Maturity characteristics of fruits of sapota cultivars (N=6)

Cultivars	Time taken for flower bud initiation to flowering (days)	Time taken for flowering to fruitset (days)	Time taken for fruitset to fruit maturity (days)	Fruit weight at maturity (days)	Fruit colour at maturity (visual grading)
PKM 1	57	49	220	118	Yellowish brown
PKM 2	53	50	217	102	Light brown
PKM 3	55	49	235	145	Light brown
CO 1	60	51	219	125	Light brown
CO 2	58	50	238	109	Yellowish brown
Oval	61	49	208	75	Brown
Cricket ball	56	54	253	236	Light yellow
Guthi	62	52	198	68	Light brown
Thagrampudi	58	53	240	156	Yellowish brown
Virudhunagar	60	53	228	132	Light brown
Kirthibarthi	59	52	239	166	Yellowish brown
Pala	56	50	196	49	Light brown
CD (P=0.05)	5.4	4.9	15.0	10.7	

Table 2. Fruit ripening behaviour of sapota cultivars (N=6)

Cultivars	PLW at 80% ripening	Spoilage (%)	Duration of ripening (days)							Days taken for 80% ripening
			1	2	3	4	5	6	7	
PKM 1	12.5	4.2	-	5	20	35	80	95	100	5.0
PKM 2	15.0	5.1	-	2	25	40	75	94	98	5.2
PKM 3	11.2	6.7	-	4	20	42	80	95	100	5.0
CO 1	13.5	8.4	-	2	18	43	81	93	97	5.0
CO 2	12.1	9.8	-	5	17	41	75	80	98	6.0
Oval	13.0	8.3	-	2	15	47	76	88	100	5.5
Cricket ball	9.3	12.1	-	1	20	35	75	89	96	6.3
Guthi	13.0	7.9	-	5	17	37	78	84	98	5.4
Thagrampudi	12.1	11.2	-	1	16	39	81	87	99	5.5
Virudhunagar	13.6	6.8	-	1	19	41	80	91	100	5.0
Kirthibarthi	14.5	10.8	-	2	17	46	81	94	98	5.0
Pala	15.9	7.5	-	3	14	40	84	93	100	4.9
CD (P=0.05)	2.54	1.71	-	-	-	-	-	-	-	0.32

In general, the sapota cultivars took 4.9 to 6.3 days for 80% ripening under Periyakulam condition during March'98 (Table 2). The ripening started from the second day onwards and reached complete ripening on seventh day after the

harvest under ambient conditions. These results are in conformity with the findings of Broughton and Wong (1979). The spoilage of the fruits at complete ripening on seventh day also differ widely. The biggest sized fruits (Cricket ball)

Table 3. Biochemical composition of fruits of sapota cultivars (N=6)

Cultivars	TSS (Brix)	Total sugar (%)	Reducing sugar (%)	Non- reducing sugar (%)	Acidity (%)	Ascorbic acid (mg/ 100 g)	Tannins (%)
PKM 1	24.5	20.8	11.3	9.5	0.124	4.85	0.51
PKM 2	22.9	19.3	10.5	8.8	0.117	2.5	0.52
PKM 3	23.2	18.7	10.2	8.5	0.108	3.79	0.57
CO 1	17.6	15.1	9.7	5.4	0.087	5.73	0.62
CO 2	19.3	16.2	8.9	7.3	0.114	7.15	0.63
Oval	21.5	18.8	9.9	8.9	0.088	1.95	0.58
Cricket ball	19.4	16.2	9.1	7.1	0.097	2.12	0.54
Guthi	22.4	19.0	10.4	8.6	0.120	3.87	0.55
Thagrampudi	21.1	18.2	11.0	7.2	0.119	3.05	0.54
Virudhunagar	20.8	17.3	9.5	7.8	0.087	3.75	0.59
Kirthibarthi	22.9	18.2	10.1	8.1	0.099	4.17	0.60
Pala	20.5	16.5	8.9	7.0	0.110	3.25	0.58
CD (P=0.05)	3.81	1.76	1.54	0.92	0.05	0.29	0.27

recorded the maximum spoilage (12.1%) as against the minimum spoilage in medium size fruits of PKM 1 (4.2%).

The ripened fruits (80% ripening) were analysed for biochemical constituents (Table 3). The TSS ranges from 17.6° to 24.5°. The total sugar also ranges from 15.1 % to 20.8%. The reducing sugar was comparatively higher than the non-reducing sugars. The acidity was very low and ranged between 0.087% to 0.124%. The pH of the fruits was ranged from 5.6 to 6.5. The tannin content of the fruit was very low during ripening (0.51 to 0.63%). The present findings are in agreement with the findings of Shanmugavelu and Srinivasan (1973) who have also observed variations, in biochemical composition of sapota fruits grown under Coimbatore conditions.

From this study, it could be concluded that the sapota fruit took around 200 days to mature from fruit set. The change of fruit colour to yellowish brown and arrest of latex flow on peeling of fruit skin were the morphological indices for fruit maturity. Sapota fruit ripened rapidly and took only 5 days for 80 per cent ripening under ambient conditions. Biochemical composition varied among sapota cultivars and cv PKM 1 recorded the highest TSS and sugar content.

References

- Bhanja, P.K. and Lenka, P.C. (1994). Effect of pre and post harvest treatments on storage life of sapota fruits cv. Oval. *The Orissa J Hort.* 22: 54-56.
- Broughton, W.J. and Wong, H.C. (1979). Storage conditions and ripening of chiku fruits. *Scientia Hort.* 10: 377-385.
- Chadha, K.L. (1992). Strategy for optimisation of productivity and utilisation of sapota. *Indian J. Hort.* 49: 1-17.
- Lakshminarayanan, S. and Subramaniyan, H. (1966). Physical, chemical and physiological changes in sapota fruit during development and ripening. *J. Food Sci. Tech.* 3: 151-154.
- Ranganna, S. (1964). Manual of analysis of fruit and vegetable products. Tata McGraw Hill Publishing company Ltd., New Delhi. India pp. 9-10.
- Sankaran, A. (1966). A laboratory manual for Agricultural Chemistry. Asia Publishing house, Bombay. pp. 255-257.
- Shanmugavelu, K.G. and Srinivasan, C. (1973). Proximate composition of fruits of sapota cultivars. *South Indian Hort.* 21: 107.

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