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Ripening behaviour of sapota

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ABSTRACT

The matured fruits of PKM 1, 2 and 3 were treated with natural ripening media like coir waste, paddy straw, saw dust, bamboo basket, wooden crates and gunny bags. Among the natural ripening media paddy straw was observed to enhance ripening. It had low fruit weight (84.91g), volume (83.46 a), fruit firmness when ripened and higher physiological loss in weight.

Key words : Sapota, Ripening behaviour.

Sapota (*Manilkara achras* (Mill) Fosberg) is an evergreen fruit tree known for producing fruits of delicate flavour, melting pulp with sweet taste (chadha 1992). It has emerged as an important fruit crop cultivated widely in Karnataka, Gujarat, Andhra Pradesh, West Bengal, Maharashtra and Tamil Nadu with an area of 30,000ha with a production of 4.23 lakh tonnes. Being climacteric in nature, sapota fruits need ripening treatments after full maturity. During ripening fruit passes through a series of changes in colour, texture and flavour indicating that compositional changes are taking place. The ripe fruits have pleasant aroma and are excellent in sweetness without any astringency due to decrease in polyphenols with concurrent increase in sugars, production of ethylene, rate of respiration and catalase activity (Rao and Chundawak, 1988).

'Ripening' basically refers to those changes in the physical, physiological, biochemical and sensory traits of the harvested fruits which render them acceptable to the consumers for consumption (Mattoo *et al.*,1975).

Uniformity in ripening is a problem in sapota, which needs attention. At present the information on the ripening behaviour of commercial varieties like PKM 1, PKM 2 and PKM 3 is very scanty. The low cost ripening media is essential to get uniformity in ripening and also to have a better market price. Hence, the study was taken up to study the ripening behaviour of the promising types of sapota using different low cost media.

MATERIALS AND METHODS

The fully matured fruits of PKM 1, PKM 2 and PKM 3 were selected for the study. To enhance the ripening different low cost ripening media *viz.*,

The present investigation was undertaken with 7 treatments :

T_1 - Fruits spread on coir waste (10cm thickness), T_2- Fruits sandwiched in chopped paddy straw (10cm thickness), T_3 -Fruits spreading in saw dust (10cm thickness), T_4 - Fruits packed in bamboo basket (2kg capacity), T_5- Fruits packed in wooden crates (2kg capacity), T_6 -Fruits kept in gunny bags without lining (2kg capacity), T_7 - Fruits spread on ground in single layer (control) were tried.

Fully matured fruits with uniform size of 2kg were selected. The scurf present on the fruit was removed by washing them in water and then they were allowed for shade - drying. They were placed in the different low cost ripening media mentioned above.

The observations were recorded on physical characters (before and after ripening) *viz.*, fruit weight, fruit length, girth, volume and firmness, physiological loss in weight, ripening percentage, days taken for ripening, spoilage percentage.

RESULTS AND DISCUSSION

The fruits can be consumed only after complete ripening and the uniformity in ripening is a problem. This study was undertaken to induce uniform and early ripening in sapota. The variety PKM 3 recorded the highest fruit weight followed by PKM 2 and PKM 1. The variation in fruit weight among the varieties could be attributed to genotypic and phenotypic variability (Shanmugavelu and Srinivasan, 1973). The mean fruit weight recorded at 3rd and 4th day during ripening was significantly influenced by varieties, treatments and interactions. The fruit weight decreased gradually in all the three varieties as the day

to ripening advanced irrespective of the treatments. The decrease in fruit weight would be the result of the loss in weight due to moisture loss (Bandhyopadhyay, 1993).

As regards to paddy straw, the early ripening might be due to the increased temperature which led to break down of insoluble substances to soluble ones (Ingle *et al.*,1982).

The highest fruit weight was registered in control followed by fruits kept in coir waste which implies that the process of ripening was slow in both the treatments. In control, the endogenous ethylene evolved by fruits vapourized earlier and in coir waste the delay may be due to lower temperature surrounding the fruits as coir waste would have absorbed the moisture during transpiration of fruits (Table 1 and 2).

Among the varieties, PKM 3 recorded the highest fruit length, girth and volume followed by PKM 2 and PKM 1. There was a meager reduction in length and girth of the fruit which might be due to the loss in weight coupled with shrinkage. The fruit volume found to be decreased after ripening irrespective of the treatments. Such decrease in fruit volume would be the result of loss in weight due to moisture derivation (Sulladmath, 1975).

The days taken for complete ripening did not manifest variation among varieties, but it greatly influenced with in the treatments (Table 3).

Among the natural ripening media, paddy straw was found to hasten uniform ripening and this might be due to rise in temperature in the environment. Thus respiratory rate was increased and the increase in ethylene

Table 1 : Changes in physical characters before ripening in Sapota

Treatment /	Fruit weight (g)			Fruit length (cm)			Fruit girth			Fruit volume (CC)			Fruit firmness $kgCM^{-2}$		
Varieties	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3
Coir waste	80.10	94.26	110.20	8.30	9.60	10.35	15.20	15.55	17.45	80.00	94.01	110.0	11.16	11.13	11.53
Paddy straw	80.01	95.24	110.46	8.40	9.55	10.40	15.25	15.50	17.40	79.15	94.02	110.0	11.14	11.14	11.56
Sawdust	79.10	94.28	108.26	8.35	9.55	10.40	15.20	15.55	17.45	79.00	94.04	108.0	11.17	11.15	11.58
Bamboo basket	79.20	93.19	109.46	8.40	9.60	10.35	15.20	15.50	17.45	80.00	93.00	109.0	11.19	11.16	11.54
Wooden crates	80.10	96.20	108.56	8.35	9.60	10.40	15.25	15.55	17.40	80.05	95.00	108.0	11.14	11.14	11.57
Gunny bags	80.20	94.21	110.24	8.35	9.55	10.40	15.25	15.50	17.40	81.00	94.00	110.0	11.14	11.16	11.57

Table 2 : Changes in physical characters after ripening in Sapota

Treatment /	Fruit weight (g)			Fruit length (cm)			Fruit girth			Fruit volume (CC)			Fruit firmness $kgCM^{-2}$		
Varieties	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3	PKM 1	PKM 2	PKM 3
Coir waste	75.60	88.31	103.60	8.19	9.48	10.23	15.01	15.32	17.22	74.64	85.72	101.05	2.99	3.04	3.18
Paddy straw	71.75	85.63	97.35	8.31	9.42	10.30	15.05	15.30	17.19	70.72	83.51	96.15	1.13	1.14	1.20
Sawdust	73.82	88.17	101.13	8.32	9.43	10.31	15.01	15.30	17.18	72.82	85.74	100.05	2.92	2.96	3.09
Bamboo basket	74.98	86.87	101.68	8.31	9.49	10.26	15.01	15.32	17.20	73.98	85.77	100.60	3.12	2.99	3.16
Wooden crates	75.68	89.63	100.96	8.24	9.48	10.29	15.02	15.31	17.18	74.02	85.71	99.14	3.07	3.01	3.12
Gunny bags	75.49	87.81	102.58	8.24	9.41	10.30	15.01	15.30	17.19	74.16	85.61	100.17	2.94	3.06	3.06

Table 3 : Effect of treatments on days taken for ripening and percentage of physiological loss in weight

Treatment /	Days taken for ripening				% of physiological loss in wt				Spoilage percent			
varieties	PKM 1	PKM 2	PKM 3	Mean	PKM 1	PKM 2	PKM 3	Mean	PKM 1	PKM 2	PKM 3	Mean
Coir waste	7.0	7.0	7.0	7.0	5.63	6.32	6.44	6.13	5.0	6.0	6.0	5.7
Paddy straw	5.0	5.0	5.0	5.0	9.70	10.10	11.87	10.55	2.0	2.0	2.0	2.0
Saw dust	7.0	7.0	7.0	7.0	5.48	6.48	6.59	6.18	6.0	4.0	4.0	4.7
Bamboo basket	6.5	6.5	6.5	6.5	5.34	6.74	6.88	6.32	6.0	6.0	4.0	5.3
Wooden crates	7.5	7.0	7.0	7.0	5.53	6.83	7.00	6.45	6.0	6.0	5.0	5.7
Gunny bags	6.5	6.5	6.5	6.5	5.89	6.79	6.95	6.54	6.0	6.0	5.0	5.7
Control	7.0	7.0	7.0	7.0	4.63	6.31	5.58	5.51	-	-	-	-
Mean	6.6	6.6	6.6	-	6.03	7.08	7.33	-	5.2	5.0	4.3	-

		S.E. ±		C.D. (P = 0.05)	
Treatments	:	0.55	1.11	0.04	0.08
Varieties	:	0.23	NS	0.02	0.03
TXV	:	0.96	1.94	0.07	0.14

concentration which evolved through the fruit surface accumulated in the environment. Hence, the uniform ripening was induced. This is in conformity to the earlier findings of Ingle *et al*. (1981).

The physiological loss in weight indicates the progress of ripening in climacteric fruits. Higher the PLW more the concentrated ripening. Among the natural ripening media paddy straw recorded the highest PLW where as control recorded the lowest PLW.

Fruit firmness recorded ripening was significantly influenced by treatment, varieties and their interaction. In general, fruit softening during ripening is attributed to increased solubilization of cell wall pectin by the action of pectin methyl esterase and polygalactouronase hydrolysis of starch to glucose and fructose which results in change in the texture of the fruit (Selvaraj and Pal, 1984).

Among natural ripening media the highest spoilage might be due to the presence of micro - organisms. However in paddy straw medium the spoilage was significantly less indicating the lesser load of micro – organisms compared to coir waste Ingle *et al.*, 1981).

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