

Nutritional Changes in Sundried Sapota (*Manilkara achras* (Mill) Fosberg) Slices during Storage

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Abstract An experiment on nutritional changes in sapota (*Manilkara achras* (Mill) Fosberg) dried slices during storage was conducted with six varieties DHS-1, CO-2, Kirtibarathi, Singapore, PKM-1 and Kalipatti in CRD design with four repetitions. The analysis of nutritional values viz. TSS, total sugar, reducing sugars, acidity, ascorbic acid and moisture were carried out. TSS, total sugars, reducing sugars and ascorbic acid were observed decreasing trend whereas acidity and moisture found increasing during six month storage. Study indicated that maximum dehydrated products recovery was obtained from CO-2, while Kirtibarathi at 2nd rank and Kalipatti were at 3rd rank, respectively.

Keywords Sapota varieties, Nutritional quality, Sundried slices Storage.

Introduction

Sapota or sapodilla (*Manilkara achras* (Mill.) Fosberg) synonym *Achras zapota* L. is an important tropical fruit also grown in subtropical region of the world. It is a native of tropical America especially South Mexico or Central America from where it spread to other countries. It is commercially cultivated in the Philippines, Malaysia, Indonesia, Florida, Sri Lanka, India and Caribbean Island.

It is cultivated in states of Karnataka, Gujarat, Andhra Pradesh, Maharashtra, West Bengal and Tamil Nadu. The well established orchard of sapota in India, is under 140.1 thousand ha with an 1117.1 thousand M. T production [1]. Amongst it, in Gujarat 25,833 ha area with a production 2,49,951 M. [2].

Sapota fruit is climacteric in nature therefore, it is harvested matured and ripened at ambient temperature. The fully ripe fruits are highly delicious, with excellent sweet taste and have a pleasant aroma. Fruits are round, oval or conical in shape depending on variety and season of harvest. It has thin rusty brown skin resembling potato in appearance. Fruits consist of three components viz. peel 15%, edible pulp 81% and seeds 4%. Its flesh is yellowish brown to honey brown, soft with sandy or granular texture in which hard black seeds are embedded. Fruit is very sweet, good source of digestible sugar, which ranges from 12 to 18% and has an appreciable amount of carbohydrates, fiber and minerals like calcium, phosphorus

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Table 1. Changes in various treatments on TSS, total sugar and reducing sugar during the storage of dried sapota slices prepared from different varieties.

Tr. No	Treatments	TSS (%)				Total sugar (%)				Reducing sugar (%)			
		0 Months	3 Months	6 Months	Mean	0 Months	3 Months	6 Months	Mean	0 Months	3 Months	6 Months	Mean
V ₁	DHS-1	59.86	58.72	57.4	58.66	44.19	43.15	42.18	43.17	33.64	32.25	31.15	32.35
V ₂	CO-2	58.98	57.94	56.78	57.90	44.17	43.00	42.05	43.07	33.62	32.10	31.00	32.24
V ₃	Kirtibarathi	58.70	57.68	56.35	57.58	43.42	42.35	41.30	42.36	32.87	31.50	30.35	31.57
V ₄	Singapore	57.55	56.40	55.00	56.32	43.30	42.00	41.10	42.13	32.75	31.25	30.15	31.38
V ₅	PKM-1	61.55	60.25	59.65	60.48	45.00	44.20	43.00	44.07	34.45	33.30	32.20	33.32
V ₆	Kalipatti	62.73	61.60	60.2	61.51	47.00	46.10	45.00	46.03	35.00	34.20	33.00	34.07
SEm±		0.41	0.50	0.58	–	0.53	0.50	0.50	–	0.40	0.44	0.42	–
CD at 5%		1.21	1.49	1.71	–	1.56	1.49	1.48	–	1.20	1.31	1.24	–
CV %		1.36	1.71	2.00	–	2.36	2.30	2.36	–	2.40	2.72	2.67	–

and iron that are necessary for good human health. However, sapota is highly perishable and having a short shelf life.

The abundant flow of the sapota fruits in a short span of the period causes glut in the market resulting in very low prices for the producer. The fruits of sapota are highly perishable and cannot be stored for a longer period at room temperature, hence the farmers are compelled to sell their valuable produce at the throw away process.

Hence this investigation was undertaken to study their nutritional changes during six month of storage and evaluate suitable varieties for storage of dried sapota slices.

Materials and Methods

The ripe fruits were selected and washed with water to remove any surface dust and dirt. The fruits were peeled by steel knife and made the slices longitudinally. The white fibrous material and seeds were removed. The prepared slices were dipped for 5 minutes in an orange juice (1 lit) + 0.1% KMS. Treated sapota slices were drain and spread over stainless steel trays. Loaded trays kept in sun for drying upto 36 h and dried at 16 to 17% moisture [3]. Temperature range was varied from 26.6° to 35.8°C and relative humidity from 80 to 89% during the drying period. The dried slices were packed in 400 gauze polythene bags.

Results and Discussion

The TSS (%), total sugar (%) and reducing sugar (%) values in the product were measured at 0, 3 and 6 month of storage (Fig. 1) and are presented in Table 1.

The initial status of sundried sapota slices in respect of TSS Kalipatti variety found maximum with TSS (62.73%) at initial level which was decreased during storage period but remained higher (61.51%) in mean value, while at par with PKM-1 ranked at 2nd position. While, DHS-1 ranked at 3rd and CO-2 ranked at 4th position respectively at initial but have a decreasing trend during storage and remained same in mean value. The lowest TSS value (57.55%) was in Singapore at initial stage and remained lowest in mean value also. It was at par with Kirtibarathi from initial up to the six month of storage. This kind observation is supported by Rajput in dehydrated sapota slices.

Looking to the initial status of the total sugars content of sundried sapota slices the significantly highest value (47.00%) was observed in Kalipatti variety and it remained significantly highest during the storage of 3 and 6 month. While, the lowest value (43.30%) initially in Singapore and it also remained similar up to 3 and 6 month. The changes in the values of total sugars content observed decreasing trend during storage. It means the loss of total sugars was observed during 0 to 6 month storage. This kind of observation also recorded by Palodkor et al. [4] and Singh et al. [5] in different dried aonla products and

Table 2. Changes in various treatments on acidity, ascorbic acid and moisture during the storage of dehydrated sapota slices prepared from different varieties.

Tr. No	Treatments	Acidity (%)				Ascorbic acid (mg/100g pulp)				Moisture (%)			
		0 Months	3 Months	6 Months	Mean	0 Months	3 Months	6 Months	Mean	0 Months	3 Months	6 Months	Mean
V ₁	DHS-1	0.159	0.172	0.183	0.171	42.62	32.50	24.30	33.14	12.50	13.50	14.80	13.60
V ₂	CO-2	0.168	0.180	0.190	0.179	43.67	33.60	25.55	34.27	12.85	13.86	14.95	13.89
V ₃	Kirtibarathi	0.166	0.179	0.189	0.178	42.36	32.00	24.00	32.79	13.00	14.01	15.50	14.17
V ₄	Singapore	0.184	0.190	0.201	0.192	42.60	32.35	24.23	33.06	13.50	14.55	15.75	14.60
V ₅	PKM-1	0.160	0.173	0.184	0.172	43.03	32.85	24.80	33.56	12.00	13.02	14.07	13.03
V ₆	Kalipatti	0.160	0.173	0.184	0.172	43.33	33.35	25.30	33.99	11.68	12.68	13.82	12.73
SEm±		0.0017	0.0004	0.0004	–	0.18	0.18	0.19	–	0.25	0.26	0.29	–
CD at 5%		0.0051	0.0011	0.0012	–	0.54	0.53	0.57	–	0.74	0.78	0.85	–
CV %		2.06	0.42	0.43	–	0.85	1.09	1.57	–	3.98	3.87	3.86	–

Rajput in dehydrated sapota slices.

The overall initial status of the subdried sapota slices, Kalipatti and PKM-1 varieties were at par and they had given maximum reducing sugars and they were in decreasing trend during the storage of 0 to 6 month. Considering the mean value they also remained in similar order. While, the lowest value observed in Singapore and at par with DHS-1, CO-2 and Kirtibarathi varieties and remained in decreasing trend during the storage and also similar in mean value. Same observation also noted by Palodkar et al. [4] and Singh et al. [5] in different dried aonla products and [3] in dried sapota slices.

The values of acidity, ascorbic acid and moisture in dehydrated sapota products recorded during the 0, 3 and 6 months of storage have been presented in Table 2.

At the initial status of sundried sapota slices in respect of acidity Singapore variety showed significantly highest acidity (0.184%) at initial level which increased and remained higher (0.192%) in mean value. While, Singapore variety ranked 2nd and Kirtibarathi variety ranked 3rd respectively at initial and also increasing trend during storage and remained similar ranked in mean value. The lowest acidity value (0.159%) at initial was found in DHS-1 variety. It was increasing trend slowly during the storage period and remained lowest (0.171%) in mean value and it was at par with Kalipatti and PKM-1 varieties from initial to 6 months storage. This kind observation also seen by

Rajput Kinjal [3] in dehydrated sapota slices.

Looking to the initial status of product in respect of ascorbic acid content was maximum (43.67 mg/100 g) in CO-2 variety and it decreased during the storage and remain higher (34.27 mg/100 g) in mean value of ascorbic acid content which was at par with Kalipatti during 0, 3 and 6 month storage. Kalipatti variety was at par with PKM-1 variety. PKM-1 variety was at par with DHS-1 and Singapore during 0, 3 and 6 month storage and showed decreasing in trend during storage. The lowest ascorbic acid content at initial (42.36 mg/100 g) was found in Kirtibarathi and it decreases during the storage and remained lowest (32.79 mg/100 g) in mean value and it was at par with DHS-1 and Singapore varieties during 0 to 6 month storage. The value of ascorbic acid content was found decreasing trend during storage. It means the loss of ascorbic acid was observed during the period from 0 to 6 month storage. This kind of observation also recorded by Rajput Kinjal [3] in dehydrated sapota slices.

From looking to the initial status of the moisture control of product the maximum moisture (13.50%) was found in Singapore and it was increasing in trend during the storage period and remained higher (14.60%) in mean value. While, the lowest moisture content was (11.68%) initially found in Kalipatti and it slowly increase up to 6 month and remained lowest (12.73%) in mean value and it was at par with PKM-1 during 0, 3 and 6 month storage. Looking to the value of mean data, Kalipatti and PKM-1 varieties were observed equally best in respect of lower moisture. Simi-



Fig. 1. Sundried slices of different varieties of sapota

lar observation was recorded Palodkar et al. [4] and Singh et al. [5] in study of different dried aonla products and [3] in dehydrated sapota slices.

Conclusion

The slices of six varieties were impregnated by dipping in orange juice with KMS- preservatives thereafter dehydrated and studied for nutritional qualities status during 0, 3 and 6 months storage. Study indicated that maximum dehydrated products recovery was obtained from CO-2, while Kirtibarathi at 2nd rank and Kalipatti were at 3rd rank, respectively. In respect to the chemical status TSS, TS, RS and AA content in dehydrated product highest was found in Kalipatti than rest of the varieties which was equally good in PKM-1 except CO-2 which only differed in AA content for nutritional status. However, acidity and moisture level was maximum in Singapore but Kirtibarathi and CO-2 were equal in moisture level. While lower level of TSS, TS and RS content were obtained in Singapore but TS and RS equally lowest in CO-2. Kirtibarathi and DHS-1. The lower level of acidity and

ascorbic acid was found in DHS-1, but Kirtibarathi and Singapore added equally lowest in respect of ascorbic acid of dehydrated slices. The moisture level was lowest in Kalipatti and PKM-1, which showed higher shelf life of dehydrated slice product. Looking to the storability in respect of behavior of chemical constituents in the dehydrated slices viz. TSS, TS, RS and AA found decreasing trend, while acidity and moisture level found increasing trend during 0, 3 and 6 months storage.

References

1. Anonymous (2006) Area and Production of Fruit crops in India, NHB, Database.
2. Anonymous (2007) Deputy Director of Horticulture, Gujrat State, Gandhinagar.
3. Rajput Kinjal (2007) Development of Sapota (*Manilkara achras* (Mill) Fosberg) product Dried slices in cv Kalipatti MSc (Ag) thesis. Navsari Agri Univ, Navsari.
4. Palodkar DM, Rodge BM, Patil MB (2003) Studies on Drying and Dehydration of Aonla Fruits. J Maharashtra Agric Univ 28 : 81—83.
5. Singh R, Dashora LK, Upadhyay B (2006) Effect of pre drying treatments and drying methods on physico nutritional quality of dried aonla shreds. Ind Food Packer 60 : 57—60