

INFLUENCE OF STORAGE STABILITY ON QUALITY OF SAPOTA FLAKES

ABSTRACT

Sapota, fruits are not only delicious and nutritious but also having good medicinal values. However, it is not possible to enjoy its taste throughout the year because of its seasonal and highly perishable nature. Moreover, in India, these fruits are sold in local market in fresh form. So value addition through product diversification should be the main theme in future. The present investigation was carried to know the effect of storage on quality of sapota flakes as influenced by different storage methods. An On Farm Trial (OFT) carried out on the effect of storage stability on quality of sapota flakes was influenced the end product of sapota flakes. The flakes was prepared from uniformly ripened sapota fruit peeled, sliced and pretreated with citric acid solution. The pretreated sapota slices were dried in sun drying, and then the dried slices were packed in polythene bag and pet jars for storage studies. During storage period chemical composition and organoleptic tests were carried out. Qualitative changes exhibited the increasing trend in TSS, reducing sugar, total sugar and pH with decline in acidity of sapota flakes during the storage period of three months. Similarly in organoleptic qualities, except colour, the acceptability of all sensory parameters like flavour, texture and taste of flakes was declined significantly during storage period of three months. The chemical composition retention and organoleptic scores were high in stored at pet jars when compared to polythene bag during storage period (room temperature).

Key words: Sapota flakes, Citric acid, chemical composition and storage period.

INTRODUCTION

India is the largest producer of sapota followed by Mexico, Guatemala and Venezuela. Area under sapota in India is estimated to be 1.40 lakh hectares, with an annual production of 11.17 lakh tonnes (www.apeda.com). Sapota fruit is a good source of sugar which ranges between 12 and 14 per cent (Bose and Mitr, 1990). Sapota, fruits are not only delicious and nutritious but also having good medicinal values. However, it is not possible to enjoy its taste

throughout the year because of its seasonal and highly perishable nature. Moreover, in India, these fruits are sold in local market in fresh form. So value addition through product diversification should be the main theme in future. In recent years, consumers have become more health conscious in their food choices but have less time to prepare healthful meals. As a result the market demand for “minimally processed” or “lightly processed” foods has rapidly increased. This investigation was carried out with an objective to processing of the sapota candy with different syrup concentrations, to study the organoleptic evaluation and nutrient analysis of the developed sapota fruit candy.

MATERIALS AND METHODS

The cricket ball variety of sapota fruit (*Achras sapota* L.) was purchased from the farmer's field. Ripe, fresh firm texture sapota was selected, washed and surface dried. The outer skin of the ripened fruit was peeled off manually using a knife without damaging the pulp.

Preparation of sapota candy:

The sliced fruit was osmosis for a day by different sugar syrup concentrations (different treatments such as 30°Brix (T₁), 40°Brix (T₂), 50°Brix (T₃), and 60°Brix (T₄), different percentage of citric acid (0.5%, 1% and 1.5%). The osmosed slices were then dried in sun drying upto the final moisture level. The process flow chart for preparation of sapota fruit candy is given in Fig 1.

Storage study of sapota candy:

Out of different candies prepared, the best one based on texture of candy and sensory scores were selected for storage study. Among the sapota candy samples, 40°Brix sugar syrup containing one percent citric acid sample was best and it was selected for shelf life study of the candy. The candy stored at ambient temperature were analyzed at monthly intervals for four

months for moisture, ascorbic acid, total sugars reducing sugar, ascorbic acid, and titrable acidity.

Nutritional quality analysis

The methods adapted to analysis the various nutritional components of the sapota candy during storage at regular intervals are given below.

List 1 : Methods of bioactive components analysis

S.NO.	Nutritional components	Method adopted	Reference
1.	Moisture	Hot air oven	AOAC (2020)
2.	Titrable acidity	Titrating against 0.01 N NaOH using phenolphthalein	Ranganna (2022)
3.	pH	pH meter	Hart and Fisher (2014)
4.	TSS	Hand refractometer	Saini <i>et al.</i> (2021)
5.	Reducing sugar and total sugars	Shaffer somogyi micro method	McDonlad and Foley (2015)
6.	Vitamin – C	2,6 dichlorophenol indophenol visual titration	Sadasivam and Manickam (2022)

RESULTS AND DISCUSSION

The sapota candy was stored at ambient temperature for 120 days at ambient temperature.

Table 1 summarises the changes observed in the moisture content of sapota candy during storage. A gradual decrease in the moisture content was noted in sapota candy during storage irrespective of treatments and different percentages of citric acid. The initial moisture content of T₁ was 4.92 per cent, which had increased to 4.33 per cent after storing for four months. Similarly 4.25 per cent in T₂, 4.27 per cent in T₃ and 4.28 per cent in T₄ respectively. The moisture content retention was observed in T₂ when compared to other candy samples. Sagar *et al.* (2000) observed changes in the moisture content of mango powder up to two months of storage at ambient and low temperatures. This may be due to changes in weather conditions during storage. Mishra *et al.* (2002) reported the moisture absorption of apple powder during storage at different temperatures and in different types of packages.

There was a declining trend (Table 2) in the acidity of sapota candy during storage. The initial acid content of T₁ was 0.312 g/100g, which decreased to 0.254, 0.238 in T₂, 0.417 in T₃ and 0.408g/100g in T₄ respectively at the end of the storage period. The decrease in acidity was reported due to chemical interaction between the organic constituents of the fruits induced by temperature and the action of enzymes (Nath *et al.*, 2005). Firoz *et al.* (2003) observed that the total acid content of pulse-based papaya powder was decreased up to second month of storage packed in glass bottles.

Remarkable changes in the total sugar content of the sapota candy were observed throughout the storage periods (Table 3). The freshly processed sapota candy contained slightly more total sugar content than the others. The initial total sugar contents of sapota candy were 16.42, 16.48, 16.47 and 16.45 in T₁, T₂, T₃ and T₄ respectively. The corresponding values were noted after storing the sapota candy for four months in T₁ (15.10), T₂ (15.79), T₃ (15.25) and T₄ (15.19). Kalsi and Dhawan (2001) observed a decrease in the total sugar content from

33.80 to 29.74 percent in guava powder during storage. Increase in reducing sugar during storage of products (Table 4) is a general phenomenon as observed by many workers, Vijay Jain *et al.* (2005) in amla, squash and Vanilla. Gupta *et al.* (1980) studied the physico-chemical and organoleptic changes candy prepared from Ber during storage at room temperature. The less reducing sugar increases was observed in T₂ (6.24 to 6.68g/100g). The candy prepared from 40°Brix sugar syrup containing one percent citric acid showed least changes in reducing sugar during storage period.

The ascorbic acid values of sapota candy during storage are shown in Table 5. The ascorbic acid content of candy declined during the storage period. The loss of ascorbic acid was found to be less in T₂ when compared to others. The initial ascorbic acid content of T₁, T₂, T₃ and T₄ were 2.21, 1.85, 1.18 and 1.46 mg/100g respectively. At the end of the storage, T₂ had higher ascorbic acid retention was observed at the end of the storage. The reduction of ascorbic acid was due to the destructive effect of the prolonged thermal treatment, which caused oxidation of the ascorbic acid (Levi *et al.*, 1983). Dabhade and Khedkar (1980) found that 30.88, 20.45 and 11.24 per cent loss of ascorbic acid occurred during zero, three and six months of storage in sun-dried raw mango powder.

Table 1. Changes in the moisture content (%) of sapota candy during storage

Treatment	Storage period (in months)				
	Initial	1	2	3	4
T ₁	4.92	4.66	4.59	4.38	4.33
T ₂	4.54	4.43	4.36	4.28	4.25
T ₃	4.59	4.50	4.42	4.33	4.27

T ₄	4.61	4.50	4.47	4.35	4.28
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Table 2. Changes in the acid content (%) of sapota candy during storage

Treatment	Storage period (in months)				
	Initial	1	2	3	4
T ₁	0.312	0.295	0.274	0.261	0.254
T ₂	0.256	0.251	0.247	0.242	0.238
T ₃	0.455	0.443	0.434	0.422	0.417
T ₄	0.453	0.438	0.427	0.416	0.408

Table 3. Changes in the total sugar (%) of sapota candy during storage

Treatment	Storage period (in months)				
	Initial	1	2	3	4
T ₁	16.42	16.17	16.00	15.59	15.10
T ₂	16.48	16.35	16.20	16.00	15.79
T ₃	16.47	16.20	15.92	15.65	15.25
T ₄	16.45	16.20	15.89	15.60	15.19

Table 4. Changes in the reducing sugar (%) of sapota candy during storage

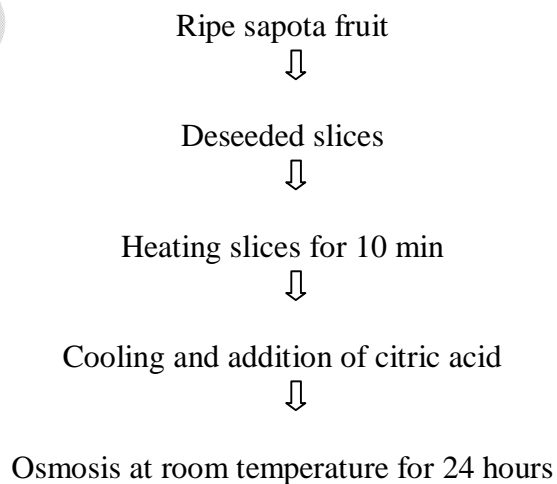
Treatment	Storage period (in months)				

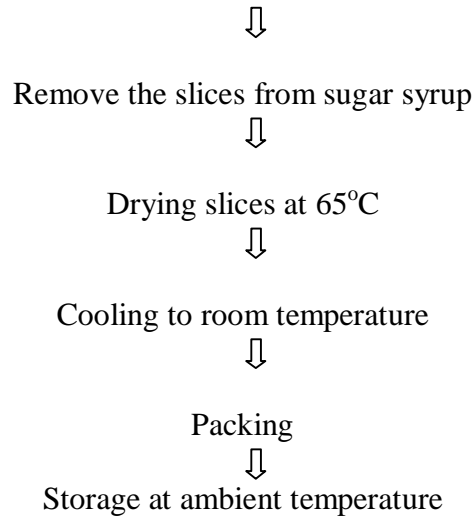
	Initial	1	2	3	4
T₁	7.20	7.70	8.05	8.10	8.27
T₂	6.24	6.35	6.48	6.55	6.68
T₃	5.22	5.48	5.69	5.81	5.89
T₄	5.21	5.69	5.99	6.10	6.21

Table 5. Changes in the ascorbic acid (%) of sapota candy during storage

Treatment	Storage period (in months)				
	Initial	1	2	3	4
T₁	2.21	2.13	2.00	1.89	1.73
T₂	1.85	1.74	1.60	1.52	1.27
T₃	1.18	1.25	1.45	1.55	1.65
T₄	1.46	1.25	1.12	1.04	0.92

FIG 1: FLOW CHART FOR PREPARATION OF SAPOTA CANDY





Organoleptic evaluation of the sapota candy

Sapota candy was organoleptically evaluated by a panel of 10 untrained judges during storage. The initial and final scores obtained by hedonic scale rating (9-1) for the sapota powders were discussed with respect to quality attributes such as colour, flavour, texture, taste and overall acceptability. Colour is an important visual attribute which has been used to judge the overall quality of foods for a very long time. The score value for colour was decreased during storage. The initial colour score of control and foam mat dried sapota candy was 8.4 and 8.9 to 9.0 respectively. During the storage, it was observed the significant effect on the flavour quality of candy. Sapota candy had acceptable texture throughout storage period. Taste is the major attribute, which determines the acceptability of food materials. The sapota candy secured more taste scores (8.8 to 9.0) during storage period. The overall acceptability score found to be decreased with increase in the period of storage. The initial scores for was 8.9 and it was decreased 8.8 at the end of storage period.

CONCLUSION

The present study concluded that sapota is a significant small fruit crop that is a medium-sized tree. It may be regarded as one of the fruits that is healthy because it contains a variety of healthful nutrients like macro- and micronutrients, sugars, amino acids, and bioactive compounds. The sapota fruit has numerous health benefits and it is a perishable fruit that has played a significant part in traditional Indian medicine that treats various diseases. Additionally,

sapota fruits are used to make a variety of food products. Sapota candy is a long shelflife product and most of the childrens and all age group people are preferred one.

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Details of the AI usage are given below:

1. Chat GPT
2. Statistical tools used

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