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 flkes, 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

Cricket ball variety of sapota fruit (*Achras sapota* L.) was purchased from the farmer 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 (T_1), 40°Brix (T_2), 50°Brix (T_3), and 60°Brix (T_4), 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 *et al.*(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 summaries 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 percentage of citric acid. The initial moisture content of T_1 was 4.92 percent, which had increased to 4.33 percent after storing for four months. Similarly 4.25 percent in T_2, 4.27 percent in T_3 and 4.28 percent in T_4 respectively. The moisture content retention was observed T_2 when compare to other candy samples. Sagar *et al.* (2000) observed changes in moisture content of mango powder upto 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 that 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 T_1 was 0.312 g/100g, which decreased to 0.254, 0.238 in T_2 , 0.417 in T_3 and 0.408g/100g in T_4 respectively at the end of storage period. The decrease in the acidity was reported due to chemical interaction between the organic constituents of the fruits induced by temperature and action of enzymes (Nath *et al.*, 2005). Firoz *et al* . (2003) observed that the total acid content of pulse based papaya powder was decreased upto second month of storage packed in glass bottles.

Remarkable changes in the total sugar content of the sapota candy was 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 T_1 , T_2 ,T_3 and T_4 respectively. The corresponding values noted after storing the sapota candy for four months in T_1 (15.10), T_2 (15.79), T_3 (15.25) and T_4 (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 T_2 (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 showed in Table 5. Ascorbic acid content of candy declined during storage period. The loss of ascorbic acid was found to be less in T_2 when compared to others. The initial ascorbic acid content of T_1, T_2 and T_3 and T_4 were 2.21, 1.85, 1.18 and 1.46 mg/100g respectively. At the end of the storage T_2 had higher ascorbic acid retention was observed at the end of the storage. The reduction of ascorbic acid 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 month 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

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
T_1	7.20	7.70	8.05	8.10	8.27

T_2	6.24	6.35	6.48	6.55	6.68
T_3	5.22	5.48	5.69	5.81	5.89
T_4	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
T_1	2.21	2.13	2.00	1.89	1.73
T_2	1.85	1.74	1.60	1.52	1.27
T_3	1.18	1.25	1.45	1.55	1.65
T_4	1.46	1.25	1.12	1.04	0.92

FIG 1: FLOW CHART FOR PREPARATION OF SAPOTA CANDY

Ripe sapota fruit

⇩

Deseeded slices

⇩

Heating slices for 10 min

⇩

Cooling and addition of citric acid

⇩

Osmosis at room temperature for 24 hours

⇩

Remove the slices from sugar syrup

⇩

Drying slices at 65^{o}C

⇩

Cooling to room temperature

⇩

Packing

⇩

Storage at ambient temperature

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