

PROCESSING AND PRESERVATION OF PAPAYA JAM

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ABSTRACT

The fresh papaya and processed jam were analyzed for proximate composition. The proximate compositions of fresh papaya were moisture 88.4%, ash 0.8%, fat 0.13%, vitamin-C 67mg/100g, acidity 0.16%, and pH 5.6. The compositions of jam were moisture 32.1%, ash 0.88%, fat 0.11%, vitamin-C 1.2mg/100g, acidity 0.63%, and pH 3.3. The acceptability of processed jam was organoleptically evaluated by the panelist using hedonic rating test. The mean score for color, flavor, texture and overall acceptability showed that all samples score within the acceptable limit ranging from 6.38 to 7.67. The test score indicated that the jam containing 55% sugar and 45% pulp was the most acceptable among seven samples. Storage studies were carried out and total viable load was observed up to six months at room temperature (29°-32°C) and at refrigerator temperature (4°C).

Keywords: Processing, Preservation and Papaya jam.

INTRODUCTION

The papaya is the fruit of the plant *Carica papaya*, in the genus *carica*. Papaya is one of the most nutritious and popular fruits in Bangladesh and also has medicinal value. It is also nutritious vegetable at green stage and available all the year round in contrast to most of the fruits which are mostly seasonal. The present fruit production provides 34g against the daily requirements of 75g. The main constituents of this fruit are moisture 88.4%, ash 0.7g, fiber 0.8g, protein 1.9g, fat 0.2g, carbohydrate 8.3g, calcium 31mg, iron 0.5mg, carotene 8100IU, vitamin-C 67mg/100g, vitamin-B₁ 0.08mg and vitamin B₂ 0.03 mg (Ripe Papaya). Papaya is high in ascorbic acid content (vitamin-C) and the flesh is very high in vitamin-A. It is low in calories, sodium and high in potassium. There are also small amount of iron, calcium, thiamin, riboflavin and niacin present in papaya (Phandis,1970). Papaya can be used in many ways in our life. It is a wholesome fruit and consumed primarily in two ways: table use and making preserves. Both ripe and raw fruits are used in the preparation of various preserves like syrups, wines, nectar, jam, jelly, marmalade, chutney, pickles, candy, toffee, dehydrated flakes, baby foods and fruited cereals. Many people prefer to eat papaya with salt and pepper. The fruit, as well as the other parts of the papaya tree, contain papain, an enzyme that helps to digest proteins. This enzyme is especially concentrated in the fruit when it is unripe. It is used in meat tenderizing, manufacturing of chewing gum, cosmetics, for degumming natural silk and to give shrink resistance to wool. Since there are only few references available on papaya jam, it was decided to determine the shelf life of papaya jam to study compositional changes of raw papaya and papaya jam. The nutritional variations due to processing were also observed in the study. The purpose of the research work was to establish an acceptable procedure for papaya jam with a desirable taste.

MATERIALS AND METHODS

In this study papaya, sugar, citric acid and pectin were used as samples. Brief descriptions of the methods followed for the study are given below:

Processing of jam: Fully matured papaya was washed with water thoroughly. Peeling and pulping were done to remove seed and core. At first sugar was added to the pulp and boiled with continuous stirring. Finally citric acid and pectin were added and TSS was observed about 67%. The jam was poured into sterilized bottles. Cooling, waxing and capping were also done

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sequentially. Finally it was stored at ambient temperature. The jam was prepared by the procedure stated by Desrosier (1977). The experiment was conducted with 7(seven) samples which were as follows:

Table 1. Composition of papaya jams

Sample	Pulp (g)	Sugar (g)	Citric acid (g)	Pectin (g)
1	450	550	5	5
2	500	500	5	5
3	550	450	5	5
4	600	400	5	5
5	650	350	5	5
6	700	300	5	5
7	750	250	5	5

Chemical Analysis: The raw and processed samples were analyzed for their moisture, ash, acidity, pH, fat and vitamin-C (AOAC methods, 2004).

Microbiological examination: For total viable count of microorganism present in papaya jams, standard plate count method was followed according to the method described in "Recommended method for the microbiological examination of food" American Public Health Association (2004).

Sensory Evaluation: The consumer's acceptability of the developed jams was evaluated by using hedonic rating test as described by Ranganna (1992). The panelists were selected from students of the faculty of Agro-Industrial and Food Process Engineering, Hajee Mohammad Danesh Science and Technology University, Dinajpur. Samples were served to the 10 panelists and were asked to assign appropriate score for characteristics color, flavor and overall acceptability of processed papaya jams. The scale was arranged such that: 9= Like extremely, 8= Like very much, 7= like moderately, 6=like slightly, 5=Neither like or dislike, 4= Dislike slightly, 3= Dislike moderately, 2= Dislike very much and 1=Dislike extremely.

Storage studies of papaya jam: Seven different samples of papaya jam were used for storage studies at room temperature (29°C-32°C) and at refrigerator temperature (2°C-5°C) from 1 to 6 months. The effect of time and temperature on the sensory attributes such as color, flavor and overall acceptability of the jam were studied finally.

RESULTS AND DISCUSSION

Composition of fresh papaya and papaya jam: The chemical composition of the papaya jam varies slightly depending on the recipe by which it processed. These may also differ due to climatic condition, growing season, intercultural operations involved, varieties and stage of maturity as well as harvesting. The sugar and citric acid prevents microbial contamination. Lower moisture content means higher solid contents which provides higher amount of nutrients. This fruit contains appreciable amount of ascorbic acid (67mg/100g) which is very important for proper nourishment. The result shown in Table.1 reveals that the highest moisture content (35.9%) was given by sample -6 whereas the lowest amount of moisture (26.5%) was found in sample -3. The % acidity content were decreased in first five samples (1, 2, 3, 4 and 5) and also increased in other two samples (6 and 7). Vitamin-C content decreased in the all samples whereas ash content remains same.

Storage studies of papaya jam: Samples of papaya jam were used for storage studies at room temperature (29°-32°C) and at refrigerator temperature (2° to 5°C) from 1 to 6 months. The effect of time and temperature on the sensory attributes such as color, flavor, texture and overall acceptability of jam sample was studied. All the processed samples of papaya jam were in good

Table 2. Chemical composition of fresh papaya and papaya jams

Sample code	Moisture Content (%)	Ash (%)	Fat (%)	Acidity (%)	Vitamin-C (mg/100g)	pH
Fresh papaya	88.4	0.89	0.13	0.18	67	5.6
1	30.2	0.88	0.12	0.31	1.3	3.2
2	29.6	0.88	0.11	0.30	1.2	3.3
3	26.5	0.85	0.15	0.29	1.3	3.4
4	32.1	0.88	0.11	0.29	1.1	3.4
5	33.2	0.84	0.12	0.29	1.2	3.4
6	35.9	0.89	0.11	0.32	1.1	3.1
7	31.3	0.89	0.12	0.32	1.1	3.1

condition up to 3 months of storage at room temperature (29°-32°C) and up to 6 months of storage at refrigeration temperature. But the sample-1 was acceptable up to 6 months at room temperature. After six months, the samples which were preserved at room temperature were spoiled due to improper bottling. Slight color variations were observed in sample 2 and 7, but no color variation was found in sample 1 after two months of storage. All the samples were texturally good up to 2 months of storage. It was deteriorated and became extremely syrupy. No off flavors was observed up to 3 months of storage with the exception of samples 3, 4 and 5. But after the end of 6 months storage, all the samples were subjected to off flavor.

Table 3. Storage studies of papaya jam

Storage period(m onths)	S/L	Color	Flavor	Texture	Visual fungal growth	Remarks
1 st	1	No change	No off flavor	Not too stiff	No growth	Good
	2	No change	No off flavor	Not too stiff	No growth	Good
	3	No change	No off flavor	Sticky	No growth	Good
	4	No change	No off flavor	Gummy	No growth	Good
	5	No change	No off flavor	Syrupy	No growth	Good
	6	No change	No off flavor	Syrupy	No growth	Good
	7	No change	No off flavor	sticky	No growth	Good
2 nd	1	No change	No off flavor	Not too stiff	No growth	Good
	2	No change	No off flavor	Not too stiff	No growth	Good
	3	Change	No off flavor	Sticky	No growth	Good
	4	Change	No off flavor	Gummy	No growth	Good
	5	Change	No off flavor	Syrupy	No growth	Good
	6	Change	No off flavor	Syrupy	No growth	Good
	7	No change	No off flavor	Sticky	No growth	Good
	1	No change	No off flavor	Not too stiff	No growth	Good

3 rd	2	No change	No off flavors	Syrupy	No growth	Good
	3	Change	Off flavor	Sticky	No growth	Good
	4	Change	Off flavor	Gummy	No growth	Good
	5	Change	Off flavor	Syrupy	No growth	Good
	6	Change	Off flavor	Syrupy	No growth	Good
	7	No change	No off flavor	Sticky	No growth	Good
4 th	1	No change	No off flavor	Not too stiff	No growth	Good
	2	No change	No off flavor	Syrupy	No growth	Good
	3	Change	Off flavor	Sticky	Slightly growth	Slightly spoiled
	4	Change	Off flavor	Gummy	Slightly growth	Slightly spoiled
	5	Change	Off flavor	Syrupy	Slightly growth	Slightly spoiled
	6	Change	Off flavor	Syrupy	Slightly growth	Slightly spoiled
	7	Change	Off flavor	Sticky	Slightly growth	Slightly spoiled
5 th	1	No change	No off flavor	Not too stiff	Slightly growth	Good
	2	Change	Off flavor	Sticky	Excessive growth	Slightly spoiled
	3	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	4	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	5	Change	Off flavor	Gummy	Excessive growth	Spoiled
	6	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	7	Change	Off flavor	Sticky	Excessive growth	Spoiled
6 th	1	No change	No off flavor	Not too stiff	Slightly growth	Good
	2	Change	Off flavor	Sticky	Excessive growth	Spoiled
	3	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	4	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	5	Change	Off flavor	Gummy	Excessive growth	Spoiled
	6	Change	Off flavor	Syrupy	Excessive growth	Spoiled
	7	Change	Off flavor	Sticky	Excessive growth	Spoiled

Sensory evaluation of papaya jam: The mean score for flavor, color, and overall acceptability of papaya jam are presented in Table 4. A two-way analysis of variance (ANOVA) was carried out for color preference and results revealed that there was significant difference in color acceptability among all the samples. As shown in Table 2 mean score suffixed for sample-6 is the lowest value than that of others. Color of samples (1,2 and 7) were different from samples (3,4 and 5). So this indicates that color of samples-1, 2 and 7 were more acceptable than others.

Table 4: Sensory evaluation of papaya jam

Sample	Sensory attributes		
	Color	Flavor	Overall acceptability
1	8.0	8.1	7.8
2	7.5	7.9	7.7
3	5.5	6.3	6.5
4	5.3	6.52	6.3
5	5.7	6.17	6.15
6	4.8	5.92	5.17
7	7.8	6.95	6.95

Microbiological study of papaya jam: The total viable load was slightly increased with the storage period for all products. After 6 months storage of papaya jam was observed very little difference in microbiological load compared to that 1 month storage for both the cases.

Table 5: Microbiological studies of papaya jam

Sample	Total count (cfu/g)					
	1 st month	2 nd month	3 rd month	4 th month	5 th month	6 th month
1	5.21	5.51	5.75	5.86	5.92	5.96
2	5.17	5.47	5.53	5.65	5.76	5.83
3	3.19	3.93	3.99	4.11	4.19	4.33
4	5.16	5.34	5.51	5.72	5.84	5.96
5	5.15	5.32	5.43	5.55	5.67	5.77
6	5.14	5.28	5.39	5.49	5.61	5.76
7	4.82	5.01	5.12	5.18	5.30	5.46

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