

SHELF-STABLE PRESERVES AND CANDIES FROM SELECTED FRUITS AND VEGETABLES

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Study was conducted in Bangladesh for preparing preserves and candies from pineapple, mango, watermelon, papaya, radish and carrot. Fruits and vegetables cubes were treated with preservatives and firming agents, blanched and pricked before processing to preserves and candies. Moisture ranged between 28 to 31 and 16 to 19% respectively for preserves and candies while the respective sugar percentage was 67-70 and 79-83 %. Sensory evaluation data revealed that mango and pineapple preserves were of excellent quality while those prepared from watermelon and papaya were of good quality. The candies of pineapple, mango and papaya was categorized as "good product". The preserves and candies were shelf-stable upto 12 months under ambient temperature (23-38°). Study indicated a good scope for preparing preserves and candies from pineapple, mango, watermelon, papaya and carrot grown under Bangladesh agro-climatic conditions.

Key words: Fruits, Vegetables, Candies.

Introduction

Fruits and vegetables are highly perishable food items. After harvesting, these can not be kept for longer duration unless preserved properly. Every year, spoilage and under utilization of fruits and vegetables results in substantial losses to producers and consumers. Fruits and vegetables are nutritious and inexpensive sources of vitamins and minerals. So losses of these add to malnutrition and miseries of our population.

Bangladesh does not produce sufficient fruits and vegetables to fulfil her requirements. But some of these are available as seasonal surpluses during certain period of the year. In 1987-88, total production of mango, pineapple, watermelon, papaya and radish were 119665, 33790, 116000, 30000 and 153 metric tonnes respectively [1]. The acreage under cultivation of mango and pineapple during 1987-88 were 160180 and 145455 respectively [1].

This study was undertaken to standardise procedures for preparation of preserves and candies from selected fruits and vegetables and to evaluate their acceptability and storage stability.

Materials and Methods

The experiment was conducted in the laboratory of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh. Mango (Var. Fazlee), pineapple (Var. Giant Kew), watermelon (Japanese hybrid), papaya (local cultivar), radish (Var. Tasaki sun mula) and carrot (local cultivar) were procured from the local market.

Analysis of pulps. The fruits and vegetables used in preparation of preserves and candies were analysed for moisture, total sugar, acidity, ascorbic acid and ash content.

Total sugar was determined using standard AOAC method [2]. Acidity was estimated by titrating against standardized NaOH using phenolphthalein as indicator. Vacuum oven drying method [3] was used for moisture determination. Ash and ascorbic acid content were determined according to the method given by Rangana [4].

Processing of preserves and candies. The fruits and vegetables were washed thoroughly with potable water, peeled with stainless steel knife and cut into 3 x 2 x 2 cm cubes. The cubes were immersed for 2 to 3 hrs in 2% NaCl solution having 500 mg/kg $K_2S_2O_5$. Thereafter the cubes were drained and washed with water steeped for 24 hrs in solution containing 1 to 4% calcium lactate ($Ca(C_3H_5O_3)_2, 5H_2O$) and 1% $K_2S_2O_5$. After draining, the cubes were blanched in boiling water for 10 mins and rinsed under tap water. Pricked cubes were dipped in 25° Brix syrup and heated until temperature reached 101° and kept over night. The ratio of fruit to syrup was 1:3. During the following 2nd, 3rd and 4th day, the material was cooked to 102, 103 and 104° respectively. On 5th day, heating was continued until the syrup attained 50° Brix. At this stage citric acid was added @ of .5% on the basis of syrup. On 6th day the material was cooked to 105 to 107°. When constant weight of cubes was achieved the preserves alongwith the syrup were filled into clean dry glass bottles and heat sealed.

Processing of candies. Cubes were dipped in water to remove adhering syrup followed by blottering. Cabinet dryer was used to dry the preserves at 70° to 17-19% moisture content. Moisture was equilibrated by holding for 1 hr. at 37° and finally bringing to room temperature (27±1°). Candy pieces were packed in high density polyethylene bags prior to their storage.

Analysis of the products. Preserves candies were analysed for moisture, total sugar, acidity and ash contents. Total sugar was determined by AOAC method [2] and moisture by vacuum oven drying method [3]. The methods given by Rangana [4] were used for determination of acidity and ash contents.

Sensory evaluation. A panel of seven judges tasted the preserves and candies. They awarded scores according to ISI [5] and CAC/RS [6] specifications. The uniformity of judgement among the judges were ascertained by adding up the scores given by them for individual characteristics. When the difference between the maximum and the minimum of total score obtained did not exceed (K+5), where K is the number of judges, the score was considered as uniform for the container under consideration. If the difference exceeded (K+5), the most out laying score was discarded and examined the uniformity among the remaining judges. Arranged the score on numerical scale of 100. Determined, the acceptability are of the products from the predetermined the acceptability classes as shown below:

Score 90 and above Excellent products

Score 86 - 90 Good products

Score 81 - 85 Fair products

Score 80 and below Not acceptable products

Storage studies. The changes in total sugar and acidity during 12 months storage of processed preserves and candies were observed under room temperature (23–38°). During storage, the stability of colour, taste and flavour and visual fungal growth were also investigated.

Results and Discussion

Table 2 shows that there were variations in moisture and total sugar content in preserves and candies prepared from various fruits and vegetables. The moisture content in the preserves was in the range of 28 to 31%. In candies, moisture content ranged from 16 to 19%. In preserves and candies, total sugar content ranged from 67 to 70% and 79 to 83% respectively.

From the results of sensory evaluation (Table 3), it is evident that the quality of mango and pineapple preserves were excellent. The quality of watermelon and papaya preserves were good. The acceptability of candies prepared from pineapple, mango and watermelon were good. The papaya candies ranked fair quality. The preserves and candies processed from carrot were fairly acceptable. Radish preserves and candies were not acceptable to the panelists.

From storage studies (Table 4) it was concluded that the preserves and candies were shelf-stable upto 12 months. No notable change could be observed in total sugar and acidity. During 12 months storage of the products, the colour remained

natural, while taste and flavour were scored good. No fungal growth was observed.

TABLE 1. COMPOSITION OF PULPS.

Pulps	Moisture (%)	Total sugar (%)	Acidity (%)	Ascorbic acid mg/100gm	Ash (%)
Mango	84.93	11.94	0.25	18.00	0.40
Pineapple	84.34	14.03	0.36	36.00	0.12
Watermelon	89.92	7.52	0.10	3.57	0.26
Papaya	88.56	9.23	0.15	57.00	0.25
Carrot	88.20	4.29	0.05	4.00	0.36
Radish	94.40	2.00	0.05	12.00	0.20

TABLE 2. COMPOSITION OF PRESERVES AND CANDIES.

Products	Moisture (%)	Total sugar (%)	Acidity (%)	Ash (%)
Pineapple preserves	29.00	70.00	0.35	0.14
Pineapple candies	17.80	83.00	0.40	*
Mango preserves	30.00	68.00	0.24	0.45
Mango candies	16.00	82.00	0.28	*
Watermelon preserves	30.00	68.00	0.10	0.28
Watermelon candies	18.60	81.00	0.12	*
Papaya preserves	29.00	69.00	0.15	0.30
Papaya candies	16.00	82.00	0.16	*
Radish preserves	30.00	68.00	0.10	0.21
Radish candies	18.90	79.00	0.12	*
Carrot preserves	31.00	67.00	0.08	0.41
Carrot candies	19.00	79.00	0.10	*

N.B. "*" sign indicates that ash content was not determined.

TABLE 3. SENSORY EVALUATION OF FRESHLY PREPARED PRESERVES AND CANDIES.

Products	Average scores			Total scores (100)	Re-marks
	Colour & texture (25)	Flavour (50)	Absence of defects (25)		
Pineapple preserves	23.8	44.5	23.0	91.3	E P
Pineapple candies	21.0	43.4	22.5	87.1	G P
Mango preserves	24.0	45.5	23.0	92.5	E P
Mango candies	23.2	43.0	22.2	88.4	G P
Watermelon preserves	23.4	40.0	21.0	84.9	G P
Watermelon candies	23.0	40.0	20.0	83.0	F P
Papaya preserves	22.7	43.8	22.5	89.0	G P
Papaya candies	22.5	42.2	22.3	87.0	G P
Radish preserves	15.0	36.0	18.0	69.0	N A P
Radish candies	14.0	32.2	16.0	62.2	N A P
Carrot preserves	23.0	40.2	21.0	84.2	F P
Carrot candies	22.5	41.0	20.5	84.0	F P

N.B.: E P = excellent products, G P = good products, F P = fair products, N A P = not acceptable products.

TABLE 4. CHANGE IN TOTAL SUGARS AND ACIDITY DURING 12 MONTHS STORAGE UNDER ROOM TEMPERATURE (23 - 38°).

Products	Total sugars %				Acidity %			
	Storage periods, months							
	0	4	8	12	0	4	8	12
<i>Preserves</i>								
Pineapple	70	70	70	70	0.35	0.35	0.35	0.35
Mango	68	68	68	68	0.24	0.24	0.24	0.24
Watermelon	68	68	68	68	0.10	0.10	0.10	0.10
Papaya	69	69	69	69	0.15	0.15	0.15	0.15
Carrot	67	67	67	67	0.10	0.10	0.10	0.10
<i>Candies</i>								
Pineapple	83	83	83	83	0.40	0.40	0.40	0.40
Mango	83	83	83	83	0.40	0.40	0.40	0.40
Watermelon	81	81	81	81	0.10	0.10	0.10	0.10
Papaya	82	82	82	82	0.16	0.16	0.16	0.16
Carrot	79	79	79	79	0.10	0.10	0.10	0.10

Conclusion

This study indicates a good prospect of processing preserves and candies from pineapple, mango, watermelon, papaya and carrot. These products may be prepared more profitably in remote areas where the modern facilities for preservation are not readily available. Developed process for preparing preserves and candies will be valuable for home

processors, catering institutions, food industries and agricultural extension agencies.

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