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Physico-chemical properties of mixed jam from pineapple and sweet gourd

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Abstract

This study investigated the preparation of mixed jam from sweet gourd and pineapple. The proximate compositions of sweet gourd pulp were: moisture content 90.3%, ash 0.33%, sugar 3.24% and ascorbic acid 2.97 mg/100g. Pineapple pulp contained 74.6% moisture, 0.3% ash, 9.95% sugar and 78.79 mg/100 g ascorbic acid. The keeping quality and shelf life of the prepared mixed jam were studied. For the case of mixed jam, the highest sugar content (62.54%) was in sample with 60% pineapple and 40% sweet gourd. Organoleptic test showed that overall acceptability of 60% pineapple +40% sweet gourds was better than that of other mixed jam. The highest score (8.0) was found from the sample with 60% pineapple + 40% sweet gourd, and the lowest score (6.0) was from the sample with 50% pineapple + 50% sweet gourd. During storage period, TSS, reducing sugar, non-reducing sugar and pH decreased for all cases. Fading of color was observed at 90 days of storage for some samples.

Introduction

Sweet gourd (*Cucurbita maxima*) belongs to the family Cucurbitaceae and is grown primarily as a vegetable or ornamental plant. The annual production of sweet gourd in Bangladesh is 1989865 metric tons (BBS, 2012). Sweet gourd is one of the most popular field crops and cultivated around the world. It is one of the most important vegetables grown in Bangladesh. Both immature and mature sweet gourds are used as a vital ingredient for several culinary preparations in Bangladesh. Sweet gourd is very versatile in its usages for cooking. Most parts of the sweet gourd are edible, including the fleshy orange shell, the seeds, the leaves, and even the flowers. The nutritive values of sweet gourd per 100 g edible portion were found to be carbohydrate 4.5 g, protein 1.4 g, fat 0.5 g, energy 30 cal and vitamin C 26.0 mg (Sharfuddin and Siddique, 1985).

Pineapple (*Ananascomosus*) is a delicious fruit in Bangladesh. It is very much favored for its attractive color and flavor. The world production of pineapple shows a steady increase over the years; much of the increase is due to the expansion of pineapple processing industry in the developing countries of the East Africa and Latin America. Statistical data shows that about 37037 acreage land is under pineapple cultivation in Bangladesh with an annual production of 218582 metric tons (BBS, 2012). Pineapple is the source of vitamin A, B, C; calcium; protein; carbohydrate; iron; carotene, etc. It also contains the protein digesting enzyme, bromelain (Collins, 1968). The composition of pineapple are: moisture content 75%, reducing sugar 3.06%, non-reducing sugar 6.88%, total sugar 19.94%, ascorbic acid 8.76 mg/100 g, ash 0.56%, acidity 0.64%, pH 2.57 and T.S.S. 13% (Kurt *et al.*, 2007).

Fruits and vegetables are important sources of energy and nutrients for human beings with availability only during specific season. People of all age groups like them. Due to high water content, they are perishable. Preparation of juice, jam, jelly, marmalade, etc. increases the shelf life of fruits allowing access to consumers all year round (Pavlova *et al.*, 2013). Jam is a product made with whole fruit, cut into pieces or crushed. The fruit is heated with water and sugar to activate the pectin in the fruit (Wikipedia, 2012). Generally, jam is produced by taking mashed or chopped fruit or vegetable pulp and boiling it with sugar and water. The proportion of sugar and fruit varies according to the type of fruit and its ripeness, but a rough starting point is equal weights of each. When the mixture reaches a temperature of 104°C (219°F), the acid and pectin in the fruit react with the sugar, and the jam will set on cooling (Ejiofor and Owuno, 2013). This research work was undertaken for processing and quality evaluation of mixed jam from sweet gourd and pineapple. The objectives of this study were: (i) to analyze the composition of sweet gourd and pineapple, (ii) to prepare mixed jam and analyze its composition, (iii) to evaluate sensory attribute of the jam, and (iv) to observe shelf life of the jam during storage.

Materials and Methods

The experiment was conducted in the laboratories of the Department of Food Technology and Rural Industries, under the Faculty of Agricultural Engineering and Technology, Bangladesh Agricultural University, Mymensingh-2202, during October 2014 to October 2015.

Raw materials

Pineapple used in the study was collected from Madhupur market, Tangail. Only fresh and mature fruits were used in this study. Fresh and ripe sweet gourds

Processing of mixed jam

were collected from the local market used in the study. Sugar and other ingredients were used from the laboratory stock.

Preparation of sweet gourd pulp

The fresh sweet gourds of uniform color and not over ripe were sorted and washed with clean water. The inedible portion and the seeds were removed and cut into pieces using a clean table knife. The pieces were boiled, blended and cooled. After sieving the blended sweet gourd, fresh sweet gourd pulp was obtained.

Preparation of pineapple pulp

The fresh pineapples, firm and not over ripe, were sorted and washed with clean water. Then these were peeled and cut into pieces using a clean table knife and washed. The pieces were boiled, blended and cooled. After sieving the blended pineapple, required pulp was obtained.

Preparation of jam from sweet gourd and pineapple

At first, we mixed sweet gourd pulp and pineapple pulp at different ratio for five different samples. Sample S₁ (50% pineapple + 50% sweet gourd), S₂ (40% pineapple + 60% sweet gourd), S₃ (30% pineapple + 70% sweet gourd), sample S₄ (60% pineapple + 40% sweet gourd), sample S₅ (70% pineapple + 30% sweet gourd) and control (pineapple only) were prepared. After mixing sweet gourd and pineapple pulps, sugar and pectin were added. The mixers were boiled for getting TSS up to 67%. After that, citric acid was added. Finally, the prepared jam was bottled, capped, labeled and lastly stored for further studies.

Chemical analysis

Moisture content determination: Moisture content was determined by adopting the method by Ranganna (2003). At first, the weight of 3 empty dry crucibles was taken and 5g of each sample was taken in each dried crucible. The crucibles with the samples were dried in an air oven at 105°C for 24 h or more to get constant weight. The crucibles were cooled in desiccators and weighed soon after reaching room temperature. The losses in weight were taken as the moisture loss of the samples and the percent of moisture in the samples were calculated as:

$$\% \text{Moisture} = \frac{\text{Loss in weight}}{\text{Weight of sample}} \times 100$$

Ash content: AOAC (2005) method was used to determine the total ash content. Two-gram of each sample was taken in a dry, clean porcelain dishes and weighed. Hot air oven method was applied to remove the moisture. The sample was burned in a gas burner and transferred into the muffle furnace. It was heated for 4 to 6 h at 550°C and ignited until light gray ash resulted (or

to constant weight). The sample was cooled in a desiccator and weighed. The ash content is expressed as:

$$\% \text{ ash} = \frac{\text{Weight of residue}}{\text{Weight of sample}} \times 100$$

Vitamin-C content (Ascorbic acid)

Ascorbic acid was determined by the method reported by Ranganna (2003).

Reagents

Meta phosphoric acid (HPO₃): This was prepared by dissolving the sticks or pellets of HPO₃ in glass-distilled water.

Standard ascorbic acid: Accurately 100mg of L ascorbic acid was weighed and the volume was made up to 100ml with 3% HPO₃. Ten milliliters were diluted to 100ml with 3% HPO₃.

Dye solution: Fifty (50) milligram sodium salt was dissolved in 2, 6-dichlorophenol indophenol in approximately 150ml of hot glass distilled water containing 42 mg of sodium bicarbonate. It was cooled and diluted with glass-distilled water to 200ml. It was stored in refrigerator and standardized every day.

The dye 2, 6-dichlorophenol indophenol was blue in alkaline solution and was reduced to light red color by an ascorbic acid at pH range of 1.0–3.5.

Standardization of dye

Five milliliters of standard ascorbic acid solution and 5ml of HPO₃ were taken. A micro burette was filled with dye and titrated with dye solution to a pink colour, which should persist for 15 seconds. The dye factor was determined (i.e., mg of ascorbic acid per ml of the dye) using the following formula:

$$\text{Dye factor} = \frac{0.5}{\text{Titre}}$$

Preparation of samples

Five (5) grams of the pineapple and sweet gourd sample were taken, and made up to 100ml with 3% HPO₃ and then filtered.

Titration

Ten (10) milliliters of the aliquot was taken in a 250 ml conical flask. One (1.0) ml of 40% formaldehyde and 0.1 ml of HCl were added to it and kept for 10 minutes. This was titrated with standard dye to a light pink color (end point), which persisted for 15 seconds.

Vitamin-C was estimated as:

Milligrams of vitamin-C per 100 g sample =

$$\frac{T \times D \times V_1}{V_2 \times W} \times 100$$

where T = Titer; D = Dye factor; V₁ = Volume of the sample; V₂ = Aliquot of extract taken for estimation; and W = Weight of sample taken for estimation.

Total soluble solid (TSS)

Total soluble solid (TSS) was determined by using Abbe Refract meter (Model no. 8987 Pujikuki Ltd. Tokyo,

Japan). Two drops of prepared sample was taken and placed on the prism of a refractometer. Percent TSS was obtained from direct reading of the refract meter.

pH

The pH of the sample was measured by using PERKINFLMER Merion-V pH meter at ambient temperature. The pH meter was first standardized using buffer of pH7. Then, for determining the pH of samples, a buffer of pH4 was sufficed. Again the pH meter was standardized using this buffer and checked pH of the sample from direct reading of the pHmeter.

Titration Acidity

Titration Acidity was determined using AOAC (2005) method. Five grams of sample was blended and homogenized in a blender with distilled water. Then volume was made to 100 ml in a measuring cylinder and filtered. Ten milliliters of filtered liquid was titrated using phenolphthalein as an indicator against 0.1 NaOH. The titration acidity was calculated from the following formula:

$$\% \text{ Titration acidity} = \frac{T \times N \times V_1 \times E}{V_2 \times W \times 1000} \times 100$$

where T = Titre; N = Normality of NaOH; V_1 = Volume of the sample; E = Equivalent weight of acid; V_2 = Volume of sample taken for estimation; and W = Weight of sample.

Total sugar

Sugar content was estimated by determining the volume of unknown sugar solution of sweet gourd sample required for complete reduction of standard Fehling's solution. Sugar content was determined following the procedure of Ranganna (2012).

Reducing sugar

The reagents used for the estimation of reducing, non-reducing and total sugar were: Fehling's solution (A), Fehling's solution (B), Methylene blue indicator, 45% Neutral lead acetate solution, and 22% Potassium oxalate solution.

Standardization of Fehling's solution

Ten milliliters of both Fehling's solution A and Fehling's solution B were mixed together in a beaker. Ten milliliters of mixed solution was pipetted into a 250ml conical flask and 25ml distilled water was added to it. Standard sugar solution was taken in a burette. The conical flask containing mixed solution was heated on a hot plate. When the solution began to boil, three drops of methylene blue indicator solution was added to it. Mixed solution was titrated by standard sugar solution. The end point was indicated by decolorization of the indicator. Fehling's factor was calculated by using the following formula:

$$\text{Fehling's factor} = \frac{\text{Titre} \times 2.5}{1000}$$

Preparation of the sample

Ten grams of filtered juice and 100ml of distilled water were mixed in homogenizer and transferred to 250ml volumetric flask. It was neutralized with 0.1N NaOH and 2 ml lead acetate solution was added to it, and kept for 10 minutes. Five (5) ml potassium oxalate solution was added and the volume was made at 250ml. Then it was filtered to prepare the sample.

Titration for reducing sugar

Ranganna (2012) stated the methods of reducing sugar determination. Ten milliliters of mixed Fehling's solution was taken in a conical flask and 25 ml of distilled water was added to it. Purified juice was taken in a burette. Conical flask containing mixed Fehling's solution was added to the flask when boiling started and titrated with solution taken in the burette at the same time. The end point was indicated by decolorization of indicator. Percent reducing sugar was calculated by using the following formula:

$$\% \text{ reducing sugar} = \frac{I \times D \times 100}{T \times W \times 1000}$$

where I = mg of invert sugar required to reduce known volume of Fehling's solution; D = Dilution factor; T = Titration; and W = Weight of sample.

Non-reducing sugar

Following Ranganna (2012), 50 ml purified solution was taken into a conical flask. Fifty milliliters of distilled water and 5g of citric acid were added to it. The conical flask was heated for 10 minutes for insertion of sucrose and cooled. The sample was then neutralized by 0.1N NaOH solution using phenolphthalein indicator. The volume was made up to 100 ml with distilled water. The mixed Fehling's solution was titrated using similar procedure followed as in the case of reducing sugar. The percent invert sugar was then calculated by the similar procedure as the case of reducing sugar:

$$\% \text{ Non-reducing sugar} = \% \text{ Invert sugar} - \% \text{ Reducing sugar}$$

Estimation of total sugar

Total sugar was calculated as:

$$\% \text{ Total sugar} = \% \text{ Reducing sugar} + \% \text{ Non-reducing sugar}$$

Sensory evaluation

The consumer's acceptability of developed products was evaluated by a testing panel. The panelists were the students, teachers and employees of the Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh. The panelists (10) were asked to assign appropriate score to each product tested on a 1 to 9 point hedonic scale (Singh, 2002) for characteristics of colour, flavour, texture and overall acceptability of four samples of mixed jam.

The scale is arranged as: 9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like nor dislike, 4 = dislike slightly, 3 = dislike moderately, 2 = dislike very much, and 1 = dislike extremely. The results were evaluated by analysis of variance and Duncan's New Multiple Range Test procedures of the Statistical Analysis System (SAS, 1985).

Storage studies

Processed mixed jams were stored into a refrigerator. Different parameters for changing of mixed jams were observed at a regular interval of time. The acidity, sugar content, TSS, colour and flavour were observed initially at an interval of 15 days for three months.

Results and Discussion

Composition of fresh sweet gourd and fresh pineapple

The pineapple and sweet gourd were analyzed for moisture, ash, acidity, ascorbic acid and total sugar. The results are given in Table 1. The compositions of sweet gourd were: 90.3% moisture content, 0.33% ash content, 2.97 mg/100g ascorbic acid, 3.24% sugar, and 0.013% acidity. The results showed a slight variation with the results of some other workers. Gopalan *et al.* (2001) reported that fresh sweet gourd contained 92.6% moisture, which is very close to this study. The difference may be attributed to varietal differences and differences in climatic conditions. The variation also may be due to differences in identifying stage of maturity.

The moisture, total sugar, ascorbic acid, ash and acidity of pineapple were 84.6%, 9.95%, 78.79 mg/100g, 0.30% and 0.67%, respectively. The results showed a slight variation with the results of some other researchers. Rahman (2007) reported that fresh pineapple contained moisture content 86.56%, ash content 0.361%, ascorbic acid (vitamin C) 8.22 mg/100g, acidity 0.79%, and total sugar 10.41%. The differences observed in these compositions may be due to varietal differences, seasonal and seasonal effects, agro-ecological condition, fertilizer use, methods of analysis, etc.

Chemical composition of mixed jam

Moisture contents of S₁, S₂, S₃, S₄ and S₅ mixed jam sample were 33, 31, 35, 37 and 34%, respectively. The highest moisture content was 37% for sample S₄ and the lowest moisture content was 31% for S₂ (Table 2). Ash content of mixed jams varied from 0.208 to 0.314%. The pH was studied to ensure physico-chemical changes during preparation of jam. The pH of S₁, S₂, S₃, S₄ and S₅ of mixed jam samples were 3.39, 3.33, 3.25, 3.34 and 3.43%, respectively. The component, which affects the product's taste is the sugar content, which was higher in sample S₄ (62.54%). The calorie value of jam increased with higher sugar content.

Table 1. Compositions of fresh sweet gourd and pineapple

Composition	Sweet gourd	Pineapple
Moisture content (%)	90.3	84.6
Sugar (%)	3.24	9.95
Ascorbic acid (mg/100)	2.97	78.79
Ash (%)	0.33	0.30
Acidity (%)	0.013	0.67

Table 2. Composition of sweet gourd and pineapple mixed jams

Sample	Moisture content (%)	Ash (%)	TSS (%)	P ^H	Total sugar (%)
S ₁	33	0.234	67	3.39	57.86
S ₂	31	0.254	67	3.33	60.45
S ₃	35	0.208	67	3.25	56.78
S ₄	37	0.314	67	3.34	62.54
S ₅	34	0.301	67	3.43	55.53
*S ₀	32	0.245	67	4.21	59.25

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30% pineapple + 70% sweet gourd; S₄ = 60% pineapple + 40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

Sensory evaluation of mixed jam

The orders of preferences for color, texture, taste, overall acceptability of different sample of mixed jam were determined by Duncan's New Multiple Range Test (DMRT) and results are given in Table 3. Mixed jam samples were statistically analyzed for average score of variance of color, flavor, texture and overall acceptability (P<0.5). It shows that control sample (S₀) secured the highest score (9.0) followed by the sample S₄ (8.4) and S₃ (7.3) for color. The sample S₁ secured the lowest score (6.4) among the samples. The sample S₂ and S₅ were equally acceptable for color. In case of texture, the highest score was secured by S₄ (8.0) and the lowest score was secured by S₁ (7.0). In case of flavor preference, results show that there was significant difference among the samples. However, the highest score (8.0) for flavor was obtained from control sample. The lowest score (5.8) recorded from sample S₁. For overall acceptability, sample S₄ secured the highest score (8.0). The lowest score (6.0) was obtained for sample S₁.

Table 3. Duncan's New Multiple Range Test (DMRT) for color, Texture, taste and overall acceptability of mixed jams

Sample	Sensory Attributes			
	Color	Flavor	Texture	Overall acceptability
S ₁	6.4 ^d	5.8 ^d	7.0 ^c	6.0 ^d
S ₂	7.1 ^c	6.4 ^c	7.3 ^b	6.8 ^c
S ₃	7.3 ^c	7.2 ^b	7.8 ^a	7.0 ^c
S ₄	8.4 ^b	7.8 ^a	8.0 ^a	8.0 ^a
S ₅	7.1 ^c	7.7 ^a	7.9 ^a	7.5 ^b
*S ₀	9.0 ^a	8.0 ^a	8.0 ^a	8.0 ^a
LSD Value	0.3725	0.35	0.2279	0.2483

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30%

pineapple + 70% sweet gourd; S₄ = 60% pineapple +40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

The effect of storage time on chemical composition of mixed jam

The effects of storage period on chemical compositions of prepared jam were analyzed and observed initially at an interval of 15 days for three months. The results are presented in Table 4. During the storage time, TSS decreased slightly because of improper sealing or premature setting. Total sugar content of mixed jam decreased slowly with the increase in storage period due to evaporation of water.

The effect of storage time on color and flavor of mixed jam

The effects of storage on color and flavor were observed and results are given in Table 5 and Table 6. The color of the mixed jam for all samples remained unchanged

for 30 days. But, at 45 days, color of sample S₁ and S₂ changed to slight whitish. The color of sample S₄ was unchanged for 75 days. Variations of color in different formulations were due to the varied content of mixed pulp and hence the carotenoid content. Fading of color appeared after 90 days due to storage temperature and oxygen content. On the other hand, the change can be happened for the error of sealing; exposure to light caused little deterioration in color. The flavour of all sample remained fresh up to 45 days during storage and the taste of the sample was pleasant and free from all types of objectionable matter. At 60 days of storage period, the flavour of sample S₁, S₂ and S₅ slightly changed. After 90 days later, sample S₁ and sample S₂ gained off flavour. The change took place for the error of sealing.

Table 4. The effects of storage time on chemical compositions of mixed jams

Storage time	Parameters	Sample					
		S ₁	S ₂	S ₃	S ₄	S ₅	*S ₀
15 Days	TSS (%)	67.00	67.00	67.00	67.00	67.00	67.00
	pH	3.39	3.33	3.25	3.34	3.43	4.21
	Reducing sugar (%)	23.34	26.78	21.97	27.13	21.89	22.54
	Non-reducing sugar (%)	34.52	33.67	34.81	35.41	33.64	36.71
	Total sugar (%)	57.86	60.45	56.78	62.54	55.53	59.25
30 Days	TSS (%)	67.00	67.00	66.90	67.00	66.80	67.00
	pH	3.38	3.31	3.25	3.34	3.43	4.21
	Reducing sugar (%)	23.34	26.78	21.97	27.13	21.88	22.54
	Non-reducing sugar (%)	34.52	33.67	34.81	35.41	33.64	36.71
	Total sugar (%)	57.86	60.45	56.78	62.54	55.52	59.25
45 Days	TSS (%)	66.90	67.00	66.90	67.00	66.70	67.00
	pH	3.37	3.31	3.25	3.33	3.43	4.20
	Reducing sugar (%)	23.34	26.77	21.97	27.13	21.88	22.54
	Non-reducing sugar (%)	34.52	33.67	34.81	35.41	33.63	36.71
	Total sugar (%)	57.86	60.44	56.78	62.54	55.51	59.25

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30% pineapple + 70% sweet gourd; S₄ = 60% pineapple +40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

Table 4. The effects of storage time on chemical compositions of mixed jams (continued)

Storage Time	Parameters	Sample					
		S ₁	S ₂	S ₃	S ₄	S ₅	*S ₀
60 Days	TSS (%)	66.90	66.70	66.80	66.90	66.70	67.00
	pH	3.37	3.30	3.24	3.33	3.42	4.20
	Reducing sugar (%)	23.33	26.76	21.96	27.12	21.88	22.54
	Non-reducing sugar (%)	34.51	33.67	34.80	35.41	33.63	36.71
	Total sugar (%)	57.83	60.43	56.76	62.53	55.50	59.25
75 Days	TSS (%)	66.70	66.70	66.70	66.60	66.70	66.80
	pH	3.36	3.30	3.24	3.32	3.41	4.19
	Reducing sugar (%)	23.33	26.76	21.96	27.12	21.87	22.53
	Non-reducing sugar (%)	34.51	33.67	34.80	35.40	33.63	36.71
	Total sugar (%)	57.83	60.43	56.76	62.52	55.50	59.24
90 Days	TSS (%)	66.60	66.50	66.60	66.50	66.70	66.80
	pH	3.36	3.30	3.23	3.32	3.41	4.19
	Reducing sugar (%)	23.31	26.76	21.96	27.12	21.87	22.53
	Non-reducing sugar (%)	34.51	33.67	34.80	35.40	33.63	36.70
	Total sugar (%)	57.82	60.43	56.76	62.52	55.50	59.23

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30% pineapple + 70% sweet gourd; S₄ = 60% pineapple +40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

Table 5. Storage studies of mixed jam for color

Storage days	Color					
	S ₁	S ₂	S ₃	S ₄	S ₅	*S ₀
15 Days	No change	No change	No change	No change	No change	No change
30 Days	No change	No change	No change	No change	No change	No change
45 Days	Slight change	Slight change	No change	No change	No change	No change
60 Days	Slight change	Slight change	Slight change	No change	Slight change	No change
75 Days	changed	Slight change	changed	No Change	Slight change	No change
90 Days	changed	changed	changed	Slight Change	Slight change	Slight change

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30% pineapple + 70% sweet gourd; S₄ = 60% pineapple +40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

Table 6. Results of storage studies of mixed jams for flavor

Storage days	Flavor					
	S ₁	S ₂	S ₃	S ₄	S ₅	*S ₀
15 Days	Good	Good	Good	Good	Good	Good
30 Days	Good	Good	Good	Good	Good	Good
45 Days	Good	Good	Good	Good	Good	Good
60 Days	Slight change	Slight change	Good	Good	Slight change	Good
75 Days	Slight change	Slight change	Slight change	Good	Slight change	Good
90 Days	Slight off flavor	Slight Off flavor	Slight change	Slight change	Slight changed	Slight change

* S₀ = Control only pineapple; S₁ = 50% pineapple + 50% sweet gourd; S₂ = 40% pineapple + 60% sweet gourd; S₃ = 30% pineapple + 70% sweet gourd; S₄ = 60% pineapple +40% sweet gourd; S₅ = 70% pineapple + 30% sweet gourd.

Conclusion

The color of the mixed jams from sweet gourd and pineapple for all samples remained unchanged for 30 days. But at 45 days, the color of few samples changed to slight whitish. The color of sample S₄ (60% pineapple +40% sweet gourd) was unchanged for 75 days. The flavor of all samples remained fresh up to 45 days during storage time, and the taste of the samples was pleasant and free from all types of objectionable condition. This is a new area for the utilization of sweet gourd and pineapple. It may encourage more production of sweet gourd and pineapple, which will provide better nutrition to the people of Bangladesh.

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