STUDY ON THE PREPARATION OF MIXED FRUIT JAM (PINEAPPLE AND WATERMELON)

Khin Swe Oo[1], Khine Myat Myint[2], Dr Yee Yee Win[3]

Abstract

The main objective of this research is to reduce fruit losses, to supply wholesome and safe preserved fruits to utilize during the off-season and develop new value-added products. The present research placed it emphasis on preparing mixed fruits jam products (pineapple and watermelon) retaining its natural flavor, aroma and a longer shelf-life. Their characteristics such as pH, acidity, viscosity, fiber content, ash content, colour, soluble solid (°Brix) and organoleptic properties were determined. Effect of chemical preservatives, effect of concentration of sugar, effect of heating temperature on the quality of mixed fruits jam product were investigated to produce good quality products. The results so obtained would in some way be helpful or supplement the local cottage industries.

***Keywords*:** mixed fruit jam, pineapple, watermelon

Introduction

Pineapple and watermelon are the popular fruits of the Myanmar. Pineapples are grown during in Shan State, Kachin State and Bago Division. Watermelons are especially grown in Yangon Division and Bago Division. In Myanmar, these fruits are abundantly available.

Among preserved fruits, jams, and jellies form an important class of products. Sweet spreads are a class of foods with many textures, flavours, and colours. Jam is a prepared fruit cooked to a precise formula so that the natural pectin and acid are extracted and, together with added sugar, forms a colourful and tasteful mixture which sets well and keeps for a long time. A good jam possesses the qualities, firm in consistency, brilliant in colour, even in fruit distribution, soft in texture of skin and flesh, true flavour of the fruit, filled to the jar top, and capable of storage without the formation of syrup, crystals, mould or ferment. Jam also will hold its shape, but it is less firm than jelly. Jam is made from crushed fruits and sugar. Generally citric, tartaric or malic

[1.] Lecturer, Department of Industrial Chemistry, University of Yangon
[2.] MRes, Department of Industrial Chemistry, East Yangon University
[3.] Professor and Head(Retired), Department of Industrial Chemistry, East Yangon University

acids are used to supplement the acidity of fruits for jam making. Addition of the acid to fruits is necessary because appropriate combination of pectin, sugar, and acid is essential to give a 'set' to the jam. The amount of added pectin needed to give a good gel also depends on the type of fruit used in the jam. Sugar serves as a preserving agent, contribute flavor, and acids gelling (Manay and Shadaksharaswamy, 2005).

The finished product of jam should contain 30-50% invert sugar to avoid the crystallization of cane sugar in the jam during storage. When packed in cans are pasteurized for about 30 minutes (N. Shakuntala Manay.etal, 2003).

About 30% of the vitamin C present in fresh fruit is destroyed during the jam making process, but that which remains in the finished product is stable during storage (Dauthy, M.E., 1995).

The aim of this research work is to supply wholesome, safe, nutritious and acceptable mixed fruits jam products containing natural flavour and aroma characteristics to consumers throughout the year.

Materials and Methods

Materials

In this research work, good, sound and matured ripe pineapple (yellow colour) and watermelon (red colour) obtained from Thanlyin Township, Southern Yangon Area. Food additives such as sugar, salt, citric acid, sodium carboxy methyl cellulose, pectin and commercial grade preservatives (potassium sorbate, potassium metabisulfite and sodium benzoate) were purchased from local markets.

Preparation of Pineapple-watermelon Jam

A good, sound and ripe pineapple of yellow colour was thoroughly washed with water. The washed pineapple was then cored and sliced into1cm cube.

A good, sound and ripe watermelon of deep red colour was thoroughly washed with water. The washed watermelon was then cored, sliced and placed

in a juice extractor to obtain juice. (1000g) of extracted juice was heated and stirred thoroughly at 85°C for 75 minutes until soluble solid content of juice was obtained 20°Brix.

(200g) of 20°Brix watermelon juice and (100g) pineapple (1cm cubic) were placed in the stainless steel pan. 35% of sugar, 0.17% citric acid, 0.5% salt and 0.4% sodium carboxmethyl cellucose were added into it. The mixture was heated under controlled temperature at 90˚C and stirred thoroughly. Heating was continued to obtain the desired soluble solid content range 60-75 °Brix of pineapple-watermelon jam. And then, 0.1 % of potassium sorbate were added and thoroughly agitated. Finally the firm pineapple-watermelon jam was carefully poured into the sterilized glass bottle and sealed with sterilized cap and then storage at room temperature.

Results and Discussion

Jam is product of sugar and pectin contained fruits. It has characteristics of texture, colour and taste. It should be capable of storage for a reasonable period after opening of bottle without risk of spoilage.

The physical and chemical characteristics of raw pineapple and watermelon are indicated in Table (4.1).

Table (4.2) shows that the effect of sugar concentration on pineapple-watermelon jam. From this table, the most favourable sugar concentration of pineapple-watermelon jam was 35% because this sugar amount gave good sweet taste and attractive colour.

Table (4.3) displays the effect of chemical preservative on the properties of pineapple-watermelon jam. From the table, it was observed that the optimum potassium sorbate concentration was 0.1% due to the pH, acidity, ºBrix, colour, shelf-life and odour of mixed fruits jam.

Table (4.4) indicates that the effect of heating temperature on the properties of pineapple-watermelon jam. From the results, heating time 1:15 hours and heating temperature 90ºC were the most favorable condition because the more attractive colour of mixed fruits jam were obtained.

Acidity is the measure of shelf-life of the product. Acidity studied to ensure physico-chemical changes during preparation and storage (Kalra and Tandon, 1985). Table (4.5) shows the effect of storage time on acidity, pH and soluble solids content (ºBrix) of pineapple-watermelon jam.

In pineapple-watermelon jam, acidity content was increased to 0.21% at 2 weeks, 0.28% at 4 weeks, 0.35% at 6 weeks, 0.36% at 8 weeks of storage respectively. There was no change in the acidity after 8 weeks at room temperature. Increase in acidity of fruit jam is due to ascorbic acid degradation or hydrolysis of pectin (Cruess, W.V., 1958, Sogi, D.S and S.Singh, 2001).

Fruit products are being effectively preserved at low pH (Sindhu et.al., 1984). Significant pH changes were noticed during 8 weeks storage of pineapple-watermelon jam. No appreciable changes in pH occured in both prepared jams after 8 weeks storage at room temperature.

The results from Table (4.5) also show that soluble solid content increase during 8 weeks storage at room temperature.

Table (4.6) indicates the physico-chemical characteristics of prepared pineapple-watermelon jam. These characteristics were found to be acceptable limit.

Table (4.7) displays the effect of storage period on vitamin C (ascorbic acid) of pineapple-watermelon jam product. From this table, it was observed that vitamin C (ascorbic acid) content of all mixed fruits jam decreased during storage. Ascorbic acid deceases because it is easily oxidized in presence of oxygen by both enzymatic and enzymatic catalyst. Assuming that glass containers are impermeable to oxygen, the principal causes of L-ascorbic acid destruction are oxidation by residual oxygen in the headspace followed by anaerobic decomposition and destructive influence of light (Maeda E.E and D.M.D.N Mussa, 1986).

In the presence of free oxygen (e.g., oxygen present in the headspace and dissolved in the jam) ascorbic acid would be oxidized to dehydro ascorbic acid and this might be followed by ring cleavage and the formation of di-ketogulonic acid. Once the free oxygen has been consumed by the chemical reactions, degradation of ascorbic acid might proceed an aerobically. Under

anaerobic conditions, ascorbic acid degrades by several steps to form furfural (Nagy, S. and J. M. Smoot, 1980).

Table(4.1): Physical and Chemical Characteristics of Raw Pineapple and Watermelon

Sr. No	Characteristics	Pineapple	Watermelon
1	Soluble Solids Content (°Brix)	8	9
2	Moisture Content (%)	83.4	89.4
3	Ash Content (%)	3.4	0.2
4	Fibre Conrent (%)	5.5	2
5	Acidity (v/w%)	1.7	0.03
6	pH	4.62	6.91
7	Vitamin C	10.6	35.2

These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.2): Effect of Sugar Concentration on Characteristics of Pineapple - watermelon Jam

Watermelon	-200g	Sodium Carboxymethyl Cellulose	-1.2g
Pineapple	-100g	Potassium Sorbate	-0.1g
Citric acid	-0.5g	Salt	-1.5g

Sample No.	Sugar (w/w%)	Acidity	H	°Brix	Flavour	Colour
1	25	0.25	4.53	70	Slightly sweet	Red
2	30	0.29	4.20	65	Sweet	Red
*3	35	0.28	4.45	70	Good Sweet taste	Red
4	40	0.27	4.12	65	More sweeter taste	Red
5	45	0.21	4.48	70	More sweeter taste	Red

* Suitable sugar concentration

These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.3): Effect of Chemical Preservative on the Properties of Pineapple-watermelon Jam

Watermelon	-200g	Sodium Carboxymethyl Cellulose	-1.2g
Pineapple	-100g	Salt	-1.5g

Characteristics	Pineapple-watermelon jam		
	*PS (w/w%)	SB (w/w%)	PMBS (w/w%)
pH	4.43	4.15	4.21
Acidity	0.17	0.15	0.13
Soluble Solid Content	70	70	70
Colour	Red	Red	Red
Shelf-life	6months	6months	3months
Odour	Good smell	Good smell	Sour smell

* PS = Potassium Sorbate (Suitable Preservative)
SB = Sodium Benzoate, PMBS = Potassium Metabisulphite
These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.4): Effect of Heating Temperature on the Properties of Pineapple-watermelon Jam

Watermelon	- 200g	Sodium Carboxymethyl Cellulose	- 1.2g
Pineapple	- 100g	Potassium Sorbate	- 0.1g
Citric acid	- 0.5g	Salt	- 1.5g
Sugar	- 35g		

Temperature (°C)	Pineapple-watermelon jam			Colour	Time (hours)
	°Brix	pH	Acidity		
80	70	4.45	0.28	Red	1: 25
*90	70	4.43	0.17	Red	1:15
100	70	4.39	0.15	Deep red	1: 00

* Suitable temperature
These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.5): Effect of Storage Time on Acidity, pH and Soluble Solid Content of Pineapple-watermelon Jam

Watermelon -200g Pineapple - 100g

Stroage Time (weeks)	Sugar (w/w%)	PS (w/w%)	SCMC (w/w%)	Salt (w/w%)	CA (w/w%)	Acidity	pH	Soluble Solid Content (°Brix)
Initial	35	0.1	0.4	0.5	0.17	0.21	4.42	70
2	35	0.1	0.4	0.5	0.17	0.21	4.42	70
4	35	0.1	0.4	0.5	0.17	0.28	4.44	70.5
6	35	0.1	0.4	0.5	0.17	0.35	4.45	71
8	35	0.1	0.4	0.5	0.17	0.36	4.46	72
10	35	0.1	0.4	0.5	0.17	0.36	4.46	72
12	35	0.1	0.4	0.5	0.17	0.36	4.46	72

PS = Potassium Sorbate
SCMC = Sodium carboxymethyl cellulose
CA = Citric acid
These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.6): Effect of Storage Period on Vitamin C (ascorbic acid) of Prepared Pineapple-watermelon Jam

Sr.No.	Storage Period	Pineapple-watermelon jam
1.	Initial	4.8
2.	1 months	3.9
3.	2months	3
4.	3months	2.5
5.	4months	1.9
6.	5months	1.76
7.	6months	1.74

These data were determined at the Department of Industrial Chemistry, East Yangon University.

Table (4.6): Physical and Chemical Characteristics of Prepared Pineapple-watermelon Jam

Sr. No.	Characteristics	Pineapple-watermelon jam
1	Soluble Solid Content (°Brix)	60
2	Moisture Content (w/w%)	36.4
3	*Sugar Content (%)	53
4	Ash Content (w/w%)	2.8
5	Fibre Content (w/w%)	0.9
6	Acidity (v/w%)	0.11
7	pH	4.9
8	Vitamin C	4.8
9	*Colour	4 Red, 50 Yellow

*Sugar content and colour were determined at Laboratory of Small Scale Industry Department, Ministry of Co-operative . The others were determined at the Department of Industrial Chemistry, East Yangon University.

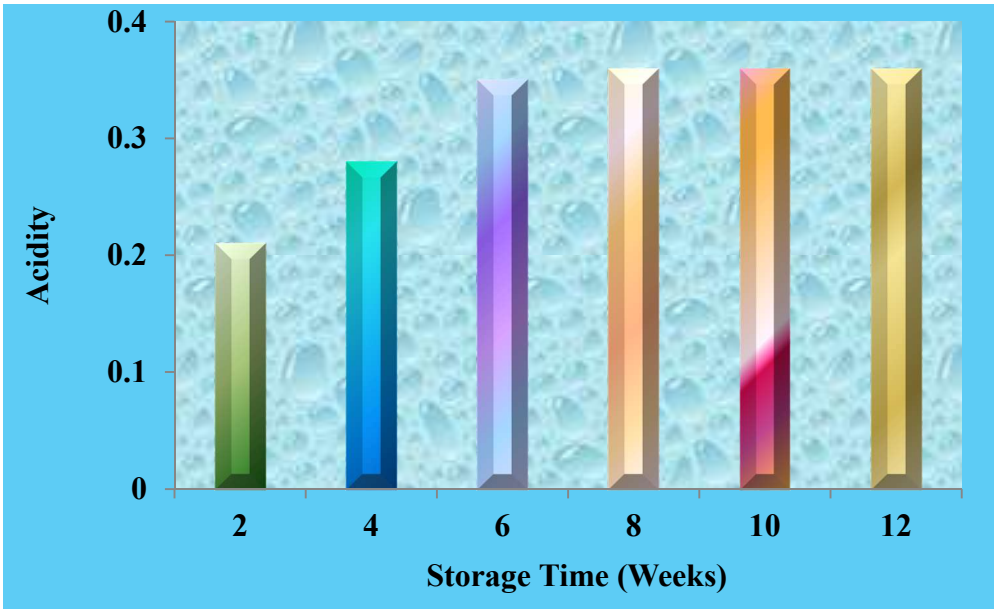
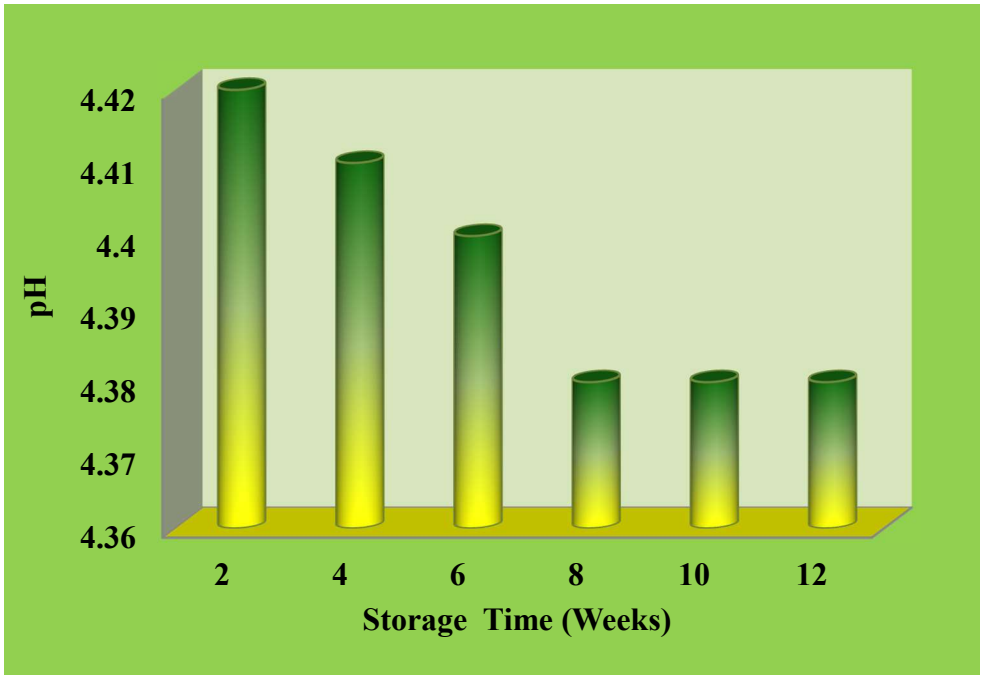


Figure (4.2): Effect of Storage Time on Change in Acidity of Pineapple-watermelon Jam



Figure(4.3): Effect of Storage Time on Change in pH of Pineapple-watermelon Jam

Figure (4.3): Pineapple - Watermelon Jam

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