EAS Journal of Nutrition and Food Sciences
Abbreviated Key Title:EAS J Nutr Food Sci
ISSN: 2663-1873 (Print) & ISSN: 2663-7308 (Online)
Published By East African Scholars Publisher, Kenya
Volume-2 | Issue-6 | Nov-Dec; 2020 | DOI: 10.36349/easjnfs.2020.v02i06.003

OPEN ACCESS

Research Article

Production and Acceptability of Jam Produced from Pineapple, Watermelon and Apple Blends

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Article History
Received: 07.12.2020
Accepted: 18.12.2020
Published: 23.12.2020

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: The aim of the study was to prepare an acceptable jam from pineapple, apple and watermelon blends. The proximate composition of the jam samples was determined. Jams were produced from a blend of pineapple, apple and watermelon in the ratio 100:0:0, 70:20:10 and 60:20:20 respectively. The proximate composition result of the jam produced indicated moisture content between 40.32-65.21%, ash content of 0.30-0.63%, fat content of 0.02-0.18%, protein content of 0.23-0.99% and carbohydrate content of 33.00-58.96%. The sensory properties of the jam sample B showed significant ($p \leq 0.05$) different in colour, aroma, taste and overall acceptability of the jam. Sample B (70% pineapple, 20% apple and 10% watermelon) was preferred in terms of colour, aroma appearance taste and texture. The findings reveal that pineapple, apple and watermelon could be used in the preparation of a quality jam without any adverse effect on the nutritional quality.

Keywords: Pineapple, watermelon, apple, jam, composite ingredients, proximate composition.

INTRODUCTION

Jam is characterized as a sweet spread made after boiling grated or chopped fruits pulp with adequate amount of sugar, gelatin, citric acid, and other ingredients, for example, preservatives, and flavouring agent to a gel like consistency which is sufficiently firm to hold the fruit tissues in position [1]. Jams contain about 68.5% complete soluble substances and 45% of the fruits pulp [2], uncovered that jam ought to contain over 65% all out dissolvable solids in finished product [3]. Jam and jelly is one basic natural product prepared from fruits [4].

Apple (*MalusSylvestris*) belongs to *rosaceae* family and sub-family *pomoidae*. Apple contains 84.7% water, 13.9g carbohydrates, 0.3g lipids, 0.4g protein and vitamin C 8mg per 100 from of consumable fruit. Apples are rich wellspring of cell reinforcements including flavonoids and polyphenols mostly happens in its skin. In this way, eating entire apple is recommended to obtain full health benefits [5].

Apple has high nutritional benefits and it is a decent source of vitamin C, Potassium and fiber. It contains 11% sugar, 0.3% proteins, 14% starches, 4% nutrients and minerals and remaining piece of apple contains water [3]. Apple has a great mending power for maintaining wellbeing and helps to relief the body from numerous infections such as diabetes, cardiovascular sicknesses, joint inflammation, blockage, disease, ailment, looseness of the bowels, Alzheimer and furthermore lessens chances for gallstones arrangement [6-9].

Watermelon belongs to the family known as *cucurbitaceae*, and it is a warm-season crop identified with squash, cucumber and pumpkin [10]. The entire watermelon is consumable, including the skin. It is low in calories however profoundly nutritious; it contains Vitamin C and Vitamin A in form of the disease battling beta-carotene. Potassium is likewise accessible in the watermelon which helps in the control of blood pressure and perhaps forestalls strokes [11].

Pineapple (*Ananas comosus)*, is a tropical fruit which could be eaten raw, juice or stewed [12]. The pulp is yellow to intense yellow, sweet, and succulent, pineapple might be made into confections, and consolidated into cooked dishes and pastries. The fruit is a decent wellspring of dietary fiber, stacked with nutrients and minerals, and particularly plentiful in vitamin C and manganese [12]. The purpose this

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research work was to produce an acceptable jam from pineapple, apple and watermelon.

MATERIALS AND METHODS

Source of raw material

The pineapple, pawpaw and apple were obtained from Kumasi central Market, the Ashanti Region of Ghana. Other materials such as ginger, sugar, and lemon were obtained from Tafo Market.

Sample preparation

Samples of pineapple, watermelon and apple were sorted, washed with potable water to remove adhering soil, and peeled manually with stainless steel knife. The peeled fruits were washed with portable water and sliced into 2 mm thickness with a manual stainless steel knife, and the peeled sample were milled using an electric hand mill and sieved using conical mesh. The various sample obtained from the pineapple, watermelon and apple was packaged separately, sealed and stored at 5 °C.

Sample formulation

Three different jam samples were produced and coded as A, B, and C. Sample A served as control and contained 100% pineapple. Samples B 70% pineapple, 20% watermelon and 10% apple, and sample C 60% pineapple, 20% watermelon and 10% apple.

Table-1: Formulation of ingredients for Jam Preparation

INGREDIENTS	SAMPLE A	SAMPLE B	SAMPLE C
Pineapple	100g	70g	60g
watermelon	-	20g	20g
Apple	-	10g	20g
Sugar	100g	100g	100g
Lemon (ml)	10	10	10
Water (ml)	500	500	500
Ginger	5g	5g	5g

Sample A 100% Pineapple, sample B = 70% pineapple, 20% watermelon and 10% apple, Sample C= 60% Pineapple, 20% watermelon and 20% apple

Preparation of the jam

An acceptable jam was prepared using the method described by [13] with minor modifications. The fruits were washed twice with potable water and wiped with a clean dish cloth. Fruits were then cut and peeled manually with while wearing non-medicated gloves. The seeds were removed manually. The pulps (400g) were blended separately for 4minutes using an electric blender (Panasonic MX-GX 1021). Sugar (400g) lime juice (10ml) were added to each of the pulp. The mixture was left at room temperature for 20minutes and subsequently cooked slowly with infrequent stirring for 15 minutes. The jam was poured into a sterilized bottle and allowed to cool at a room temperature (290 C-320 C) for further analysis.

Proximate Analysis

Proximate composition analysis of the jam was carried out at The experiment was conducted at the Mycotoxin and Food Analysis laboratories, Department of Food Science and Technology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. The overall content of moisture, ash, fat, protein, and carbohydrate of jam sample was determined [14].

Sensory Analysis

The jam samples were served along with a sliced of tea bread and was presented to 50 untrained consumers to indicate their observations and rate the samples parameters; colour, texture, aroma, taste, aftertaste, appearance and overall acceptability. The analysis was carried out on the three (3) samples.

STATISTICAL ANALYSIS

All analytical determinations were conducted in duplicates. Means and standard deviations were calculated. Data obtained was subjected to analysis of variance (ANOVA) where significant differences exist; Tukey's test was used in separating the means.

RESULTS AND DISCUSSION

Table-2: the sensory analysis of the jam

Samples	Colour	Texture	Aroma	Taste	Level of acceptability
A	4.40±0.7	4.10±0.80	4.3±0.80	4.40±0.80	4.50±0.70
B	4.80±0.44	4.20±0.60	4.70±0.54	4.6±0.60	4.60±0.53
C	4.50±0.70	4.00±09	4.20±0.80	4.50±0.70	4.50±0.60
LSD	0.42	0.24	0.56	1.462	0.04

(Source: field survey, 2020)

Sample A (100% pineapple) Sample B (70% pineapple, 20% apple and 10% watermelon) Sample C (60% pineapple, 20% apple and 20% watermelon)

Colour

The colour of the composite sample B (70% pineapple, 20% apple and 10% watermelon) was significantly ($p<0.05$) different from the control samples A (100% pineapple) with the highest mean score of approximately 4.80, that is "liked very much". The control sample had the lowest mean score of 4.40. The likeness of the colour of composite jam may be as a result of the combination of low quantity of watermelon and apple into the jam.

Texture

It was observed that the texture of the composite sample B, had the highest mean score of approximately 4.2 as compared to the control sample 4.10. There were no significant ($p<0.05$) different between the control and the composite sample B. The present findings are in agreement with observed values of [15], who observed a gradual decline in the texture properties of strawberry jam. The present value for texture are found to be slightly lower than the findings of [16], who observed a decrease in the value of texture of grape and apple marmalade during storage. Similarly, [17], analyzed decrease in texture score from 9.00 to 6.70 in apple jam. Texture comprises those properties of product which is judged visually or by touch.

Aroma

The aroma of any product normally influence its acceptability. The composite sample (B) had the high mean score of approximately 4.70 whilst the control sample recorded 4.30. The observation indicates a significant difference between the aroma of the control and that of sample B.

Taste

The composite sample B, had the highest mean score of approximately 4.6 against the control with 4.40 least mean score. However, there were significant ($p<0.05$) different between the control sample and the composite sample B. Conversely, the study is in line with [18] as well as [19] whose work revealed that the taste of jam processed from blends of pineapple, tomato and pawpaw showed superiority over the control (commercial strawberry jam). They recorded (7.85 point) of taste compared slightly low to jam from apple (8.3 point) and coconut based jam (9.0 point) [20] further recorded a high mean score for taste of the composite jam produced.

Overall acceptability

The quality of the jam (Aroma, colour, texture, appearance and taste) had indeed influenced the overall acceptability of the jam. There was no significant ($p\leq0.05$) difference between the control and the composite samples (B and C) in the overall acceptability. The composite sample B, had the highest mean score of 4.6 with the control sample recording the mean score of 4.5. The study therefore disagrees with the findings of [16] who recorded a decreased in the overall acceptance of grape and apple marmalade from 8.8 to 7.96 during the storage interval. Similarly, [21] also examined similar results of decreasing trends (9.00 to 7.00) in overall acceptability in fruit jam. Moreover, [22] established decline in the overall acceptability of lemon and watermelon jam.

Table-3: proximate composition of pineapple, watermelon and apple jams

Samples	Moisture %	Ash%	Fat%	Protein%	Carbohydrate%
A	40.32±0.95	0.30±0.07	0.18±0.01	0.23±0.11	58.96±0.92
B	63.46±0.71	0.63±0.01	0.07±0.01	0.97±0.34	34.87±0.40
C	65.21±0.20	0.60±0.04	0.02±0.01	0.99±0.64	33.00±0.88

(Source: Lab. Test, 2020)

Sample A (100% pineapple) Sample B (70% pineapple, 20% apple and 10% watermelon) Sample C (60% pineapple, 20% apple and 20% watermelon)

The result of the proximate analysis of the composite jam is presented in Table 3. The moisture content ranged from 40.32 to 65.21%. The control sample has lowest moisture content of 40.32% different from the composite jams. However, the moisture content may also be as a result of boiling temperature and the variation of ingredients used. Sample C had highest moisture content which may be as a result of combination of the fruits (pineapple, watermelon and apple in high proportion) or the presence of the watermelon may have caused that. The moisture high content can cause microbial infection in the jam. The results were not in line with [21] who studied grape fruit apple marmalade and reported decreasing trend in % moisture [23], observed decreased in % moisture from 79% to 77 % after 60 days of storage in dried apricot jam.

The ash content of the pineapple jam is 0.30%, which is lower compared to 0. 60 % of the composite blends of 70:20:10 fruits. The sample (B) had the highest ash level of 0.63% when compared to other samples. The ash content of the composite jam samples were higher compared to the data obtained for prickly pear jam [24]. Ash content gives an indication of minerals composition of food sample is very important in many biochemical reactions which aid physiological functioning of major metabolic processes in the body [25]. This might be attributed to the ratio of composition of the fruit pulps. There was a significance ($p\leq0.05$) difference between the control sample A

(100% pineapple) and the jam blends B (70% pineapple, 20% apple and 10% watermelon) Sample C (60% pineapple, 20% apple and 20% watermelon).

The control sample A (100% pineapple) had the highest fat content of 0.18% followed by sample B (70% pineapple, 20% apple and 10% watermelon) with 0.07% and sample (C) with 0.02%. This observation can be concluded that, the increase in percentage of fruits may cause the fall in the fat level of jams in sample B and C respectively.

The protein content of the pineapple jam ranged from 0.23% to 0.99%. Sample B, made up of (70% pineapple, 20% apple and 10% watermelon) recorded high protein content of 0.99%. The protein content increased with increase in the substitution level of the fruits in sample (B and C).

CONCLUSION

The study revealed that acceptable jams could be produced from pineapple, watermelon and apple in the ratio 70:20:10 without adverse effects on the nutritional value. This will help in reducing wastage of these fruits but also boost its productions, utilization as well as the income of farmers and reduce the pressure on the use of other fruits for jam production.

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This result indicated that the blend samples had high protein content which was similar to the protein content of prickly pear pulp (7.02 - 8.51%) [24]. There was a significant ($p \leq 0.05$) difference between the control sample A (100% pineapple) and the composite jam samples B (70% pineapple, 20% apple and 10% watermelon) with 0.07% and sample (C) with 0.02%.

The carbohydrate content of the control (A) is 58.96%. However, the carbohydrate content of the composite jams ranged from 34.87%-33.00% for sample B and C respectively. The highest carbohydrate content observed in sample 'A' might be attributed to the high carbohydrate content in pineapple [26]. A significance ($p \leq 0.05$) difference was observed in the control and the composite samples; A (100% pineapple) Sample B (70% pineapple, 20% apple and 10% watermelon) Sample C (60% pineapple, 20% apple and 20% watermelon)

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