

Formulation and Standardisation of Pineapple Jam Incorporated with Ragi Milk and Buckwheat Milk

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Abstract

Pineapple is the third most important tropical fruit in the world. Finger Millet is one among the most nutritious cereals and is a good source of natural calcium which helps for bone strengthening and helps in reducing the risk of bone fractures. Buckwheat is one of the pseudo cereals and minor cereals grown annually in hilly regions of India. The food processing industry in India exhibits a bright outlook. The demand for new variety of products is increasing gradually now-a-days and also based on the consumers taste. Based on this the millet incorporated pineapple jam is prepared. Three different proportions were formulated with different ratios of ragi milk and buckwheat milk incorporated pineapple jam. The products were analyzed for physico chemical parameters such as total soluble solids, titrable acidity, moisture and pH. To determine the shelf life, microbial count was done on 15th day. All the samples were subjected to sensory evaluation to determine their acceptability, using 9 point hedonic scale rating method. The result showed that 10% ragi milk incorporated pineapple jam was preferred by most of the panel members.

Keywords: Buckwheat Millet, Formulation of Recipes, Organoleptic Evaluation, Physico Chemical Parameters, Pineapple, Ragi Millet, Storage and Statistical Analysis

1. Introduction

Pineapple (*Ananas comosus* L. Merr.) belongs to family Bromeliaceae, non-climacteric, parthenocarpic, multiple fruit often called as syncarp or sorosis and composed of some 100–200 berry-like fruitlets¹. Pineapple is rich in vitamins, minerals needed to maintain proper health and develop resistance to disease².

Pineapple is also a good source of vitamin B₁, vitamin B₆, copper, dietary fibre and is a digestive aid and a natural anti-inflammatory fruit³.

Finger Millet (FM), a member of the millet group also known as ragi or tamba, is so called due to its growth form of panicles which takes the form of several fingers⁴.

Finger Millet grains are also reported to be associated with lowering the risk of diabetes, reduction of blood pressure and cardiovascular diseases⁵. Phytates, phenols and tannins in millets are important in healing, prevents deterioration of human health, cancer and cardiovascular diseases, lowers blood pressure, diabetes and decreases tumor⁶.

Buckwheat (*Fagopyrum esculentum* Moench) is an annual crop, it is a pseudo cereal but its grains belong to cereals because of their similar use and chemical composition⁷. The main producers of buckwheat are China, Russian Federation, Ukraine and Kazakhstan. It is also produced in Slovenia, Poland, Hungary and Brazil⁸. Buckwheat is a very nutrient-rich, gluten-free

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plant source that helps to boost heart health, reduces blood pressure, aid in weight loss, prevents certain cancers, useful for management of diabetes, improved digestion and cholesterol levels, and stronger immune system⁹. Buckwheat grains have more B-complex group of vitamins, especially riboflavin (vitamin B2) and niacin (vitamin B3)¹⁰. Buckwheat is a powerhouse of wide range of nutrients comprising of carbohydrates, vitamins, minerals, sugar, soluble and insoluble fiber, sodium and amino acids¹¹.

2. Methods and Materials

2.1 Procurement and Processing

Pineapple and ragi milk were procured locally available shop and the buckwheat wheat was purchased from Amazon (online shopping, India) as it was not locally available. In the pineapple fruit the skin was peeled while the eye was removed and the fruit was cut into small pieces and blended in a mixer to obtain fine pulp. The ragi millet was soaked in water for six hours, grounded in a mixer and filtered the ragi milk. Similarly buckwheat was also soaked for six hours, grounded in a mixer and filtered the milk and used for jam preparation.

2.2 Preparation of Jam

Table 1 presents the proportion of ingredients used in jam preparation.

Table 1. Ingredients used in jam preparation

Ingredients	Standard	Ragi milk incorporated jam			Buckwheat milk incorporated jam		
		10%	20%	30%	10%	20%	30%
Pineapple pulp	400 ml	360 ml	320 ml	280 ml	360 ml	320 m	280 ml
Ragi milk	-	40 ml	80 ml	120 ml	-	-	-
Buckwheat milk	-	-	-	-	40 ml	80 ml	120 ml
Sugar	320 g	320 g	320 g	320 g	320 g	320 g	320 g
Citric acid (lemon juice)	4 ml	4 ml	4 ml	4 ml	4 ml	4 ml	4 ml

Pineapple pulp and ragi milk/buckwheat milk were added in the ratio of 100:0, 90:10, 80:20, 70:30. The jam was prepared by cooking pulp and buckwheat milk after mixing sugar and citric acid (Figure 1). The prepared jam was filled hot in glass jars, cooled, screw capped and stored at refrigerator.

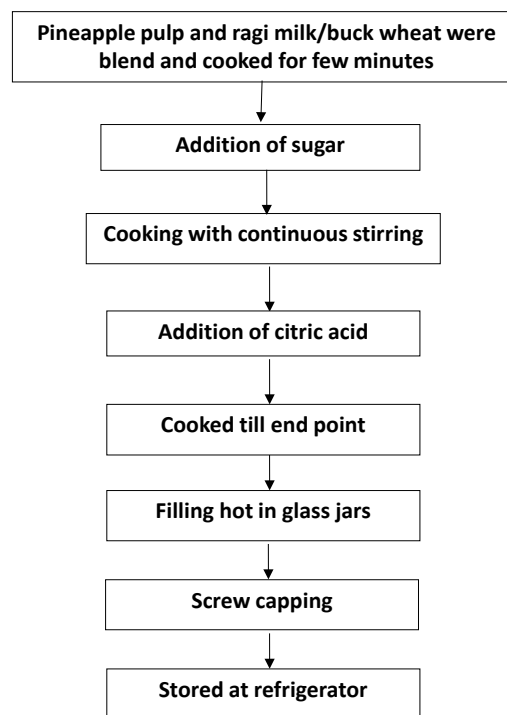


Figure 1. Flow chart for preparation of ragi milk/bulk wheat milk incorporated pineapple jam.

2.3 Organoleptic Evaluation of Jams

Organoleptic evaluation is the common experimental structure evaluating the products for their acceptance. The overall acceptability of jam was based on mean scores obtained for all the sensory characters like appearance, color, texture, taste and flavor. The evaluation was carried by numerical scoring method with the help of 20 semi trained panel members.

The evaluation was done with 9-point hedonic scale. The scale ranged from “like extremely” to “dislike extremely”, corresponding to the highest and lowest score of “9” and “1”, respectively.

2.4 Determination of Physico-chemical Parameters and Storage Stability

The total soluble solids, titrable acidity, pH and moisture were determined for the highly accepted jam variation

and the microbial count of jam was determined on 15th day of refrigerated storage.

3. Results and Discussion

3.1 Mean Acceptability Scores of the Prepared Jams

The mean scores for organoleptic parameters of standard jam, ragi milk and buckwheat milk incorporated jam is given in Table 2.

From the Table 2 it is noted that standard pineapple jam received the maximum score for all the parameters like appearance, color, flavor, taste and texture. Among the test variations, 10% Ragi milk incorporated pineapple jam received the highest mean score because it received the maximum score for flavor. Statistical analysis of ‘t’ value between A and C, A and D showed 1% level of

Table 2. Mean scores for organoleptic parameters of standard and formulated jam

Mean ± Standard deviation							
Criteria	Standard(A)	Ragi milk incorporated jam			Buckwheat milk incorporated jam		
		10%(B)	20%(C)	30%(D)	10%(E)	20%(F)	30%(G)
Appearance	8.9 ± 0.3	8.8 ± 0.4	8.5 ± 0.5	7.5 ± 0.49	8.45 ± 0.49	7.9 ± 0.83	7.45 ± 1.07
Colour	8.9 ± 0.2	8.8 ± 0.35	8 ± 0.6	7.5 ± 0.5	7.95 ± 0.66	7.5 ± 0.5	7.2 ± 0.81
Flavour	9 ± 0	9 ± 0	8.0 ± 0.8	7.75 ± 0.69	8.75 ± 0.43	8.25 ± 0.43	7.35 ± 0.65
Texture	8.7 ± 0.4	8.8 ± 0.4	8.1 ± 0.65	7.55 ± 0.49	8.6 ± 0.48	8.3 ± 0.45	6.95 ± 0.66
Taste	8.7 ± 0.4	8.8 ± 0.4	8.6 ± 0.48	7.75 ± 0.69	8.6 ± 0.3	8.2 ± 0.50	6.8 ± 0.74
Over all acceptability	8.9 ± 0.1	8.8 ± 0.18	8.26 ± 0.32	7.62 ± 0.31	8.53 ± 0.25	8.2 ± 0.12	7.15 ± 0.40
Group compared		A and B	A and C	A and D	A and E	A and F	A and G
‘t’ value		0.31 ^{NS}	4.61*	16.26*	1.98 ^{NS}	5.30*	13.03*

*-Significant at 1% level

NS – Not Significant

significance difference. However the difference between standard and 10% did not show any significant difference, which revealed that the 10% variation was as good as standard jam.

Among the test variations, 10% buckwheat milk incorporated pineapple jam received the highest mean overall acceptability score because it received the maximum score for flavor and taste. Statistical analysis of 't' value between A and C, A and D showed 1% level of significance difference. Further the statistical analysis revealed that 10 percent incorporation of buck wheat though received lower score than standard but the difference was not statistically significant.

It revealed that the 10% ragi milk incorporated pineapple jam has received the high mean overall acceptability score than the 10% buckwheat milk incorporated pineapple jam.

3.2 Physico-chemical Parameters and Storage Stability

The total soluble solids, titrable acidity, pH and moisture were determined for the highly accepted jam variation and the microbial count of jam was determined on 15th day of refrigerated storage and it is given in the Table 3.

When compared with FPO specification, the total soluble solids of ragi milk incorporated pineapple jam was 47% and total soluble solids of buckwheat milk incorporated pineapple jam was 78%.The decrease in

total soluble solids in ragi milk incorporated pineapple jam, may be due to chemical hydrolysis caused by low pH of the jam¹².

Acidity is the measure of shelf life and the acid helps to extract the pectin from the fruit during cooking process and this helps to form a gel. The acidity level of standard pineapple jam was 0.4%, ragi milk incorporated pineapple jam was 0.3% and buckwheat milk incorporated pineapple jam was 0.5%, which matched the recommendations of FPO. When this acidity is above 0.8%, syneresis may occur¹³. The formulated jams did not experience syneresis.

The pH levels of standard pineapple jam was 4.5 whereas ragi milk incorporated jam and buckwheat milk incorporated jam was 5.0. The increase of pH promotes an inhibitory effect on microorganism growth and increasing the useful life of alimentos¹³.

The buckwheat milk incorporated pineapple jam had the lowest moisture content of 12.4%, whereas ragi milk incorporated pineapple jam had a moisture level of 32.8% and 20.8% moisture content was present in standard pineapple jam. Variations in moisture content of jams observed might be because of the heating process involved in processing. Water removal during the processing of jam resulted in a change in the concentration of food nutrients¹⁴. Moisture content has a great impact on the shelf life of products¹⁵.

The storage stability can be determined by assessing the total bacterial count of the jam products on 15th day.

Table 3. Physico-chemical parameters and storage stability of standard jam and formulated jam

S. No	Chemical constituents	Standard pineapple jam	Ragi milk incorporated pineapple jam	Buckwheat milk incorporated pineapple jam	*FPO Specifications
1	Total soluble solids	68%	47%	78%	68%
2	Acidity	0.4%	0.3%	0.5%	0.3-0.4
3	pH level	4.5	5.0	5.0	4.0-4.5
4	Moisture	20.8%	32.8%	12.4%	40.3-65.2
5	Storage stability (Total bacterial count on 15 th day)	36 cfu/g	40 cfu/g	32 cfu/g	50 cfu/g

*FPO – Fruit Product Order

Source – www.egari.org, www.easpublisher.com, www.sciencedirect.com, www.puntofocal

The bacterial count of standard pineapple jam, ragi milk incorporated jam and buckwheat milk incorporated jams were within the permissible limits and was safe under refrigerated storage.

4. Conclusion

From the above study, it is concluded that the 10% ragi milk incorporated pineapple jam was mostly accepted by the panel members than the 10% buckwheat milk incorporated pineapple jam. The bacterial count was also within the permissible limits and was safe under refrigerated storage. Pineapple jam is a nutritious product while incorporating millets in jam, nutrients are enhanced besides provides variety in diet for the consumers.

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