



Standardizing the Processing Techniques of Value Added Banana Products

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ABSTRACT: *Banana is a rich source of carbohydrate, vitamins particularly Vitamin-B, potassium, phosphorous, calcium and magnesium. Objectives of the study were to standardize processing techniques of value added banana products, estimating the nutrient contents and storage life of the processed products. Value added banana products like banana bar, banana fig, banana jam, banana sauce, banana squash, banana thokku, banana pickle, were standardized by trial and error methods. Raw banana flour incorporated noodles and chocolate were developed with different variations and were standardized. Biochemical analysis was carried out for Banana Bar and Banana Fig and banana squash. The nutrient content of 100g of banana bar contains 20.22 % of moisture, 1.2% of ash, 20.84g of Carbohydrate, 0.2 g of Crude fibre, 14.6 mg of Vitamin-C, 20µg of β-Carotene, 2.06µg of Total Phenol, 0.1% of Flavanoids, 21.7 mg of Phosphorous, 217.7mg of Potassium, 70.34mg of Magnesium, 1.094 mg of Manganese, 360mg of Sodium. The nutrient content of 100g of banana fig and squash were Moisture- 16.24% and 20.22 %, ash- 1.4% and 0.9% ,Carbohydrate- 27.16g and 24.68 gm, Crude fibre 0.3 g and 0.4 gm, Vitamin-C, 12.4 mg and 18 mg β-Carotene 22µg and 24 µg, Total Phenol -2.08µg and 2.06 µg , Flavanoids-0.2% and 0.2 % .The storage life of the processed banana products was carried out and it was found out that all the products showed low level of contamination for a period of 15 days at ambient and low temperature.*

Key words-Banana, Banana Bar, Banana Fig, banana squash.

INTRODUCTION

Ripe, rich and delicious bananas are one of most popular fruits that are easily available throughout the year. It is also fourth important food crop in terms of gross value after paddy, wheat and milk products and forms an important crop for subsistence farmers. Among fruits, banana (*Musaceae* family) is the most valued fruit crop for its nutritive value with high carbohydrates, fiber, protein, less fat and water.

Fruits are also processed into products such as juice, syrup, jams, squash, RTS beverages and dehydrated slices (Man *et al.*, 2007). People are not familiar with various value added banana products. Value addition in banana is simple, easy to process with small machinery and man power and cost effective. Besides Agro- processing activities have good potential as an effective tool for women empowerment in rural as well as urban areas (Gopalan, 2001). On considering these aspects the researcher has undertaken a study to standardize the processing techniques of value added banana products.

OBJECTIVES:

- To standardize the processing techniques of value added banana products.

- To estimate the nutrient contents and shelf life of the processed value added banana products.

2.METHODOLOGY

The methodology followed for the project entitled “Standardizing the Processing Techniques of Banana products” is high lightened here.

Osmotic dehydration is a useful technique for the production of safe, stable, nutritious, tasty, economical and concentrated food obtained by placing the solid food, whole or in pieces in sugar or salt solution under high osmotic pressure (Rashmi *et al.*, 2005). Using osmotic dehydration various value added banana products such as Banana Bar, Banana Fig, Banana jam, Banana Sauce, Banana squash, Banana Thokku, Banana pickle were prepared. In addition, Raw banana flour incorporated Products like noodles and chocolate were also prepared and standardized in the Food Processing laboratory of Department of Food processing and Quality Control, V.V.Vanniaperumal College for Women, Virudhunagar. The processed banana products were subjected for Sensory evaluation, Nutrient and microbial analysis, Microbial analysis was carried out to find out the shelf life of the products.

2.1. PREPARATION AND STANDARDIZATION OF VALUE ADDED BANANA PRODUCTS.

Robusta variety banana was selected for value addition for its quantity and low cost. By trial and error method, the process of value added banana products such as Banana bar, Banana fig, Bananasauce, Banana squash, Banana jam, Banana thokku, Banana pickle and Banana powder incorporated noodles and chocolate were standardized.

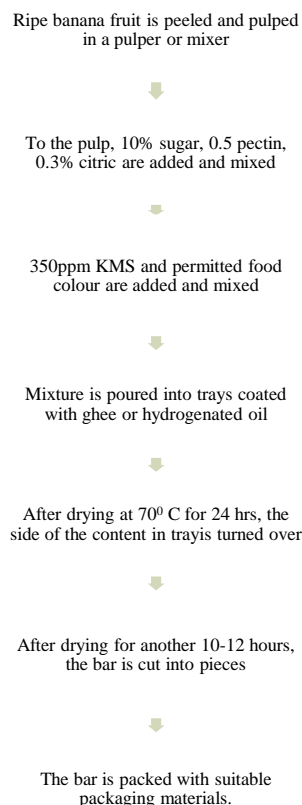
2.1.1. BANANA BAR

Introduction

The banana bar is a confectionary prepared by drying ripe banana pulp with appropriate quantities of sugar, pectin and acid. Banana bar is nutritious and highly tasty. It can be stored for seven months without deterioration in quality when dried below 20% moisture.

FIGURE:1

PREPARATION STEPS FOR BANANA BAR

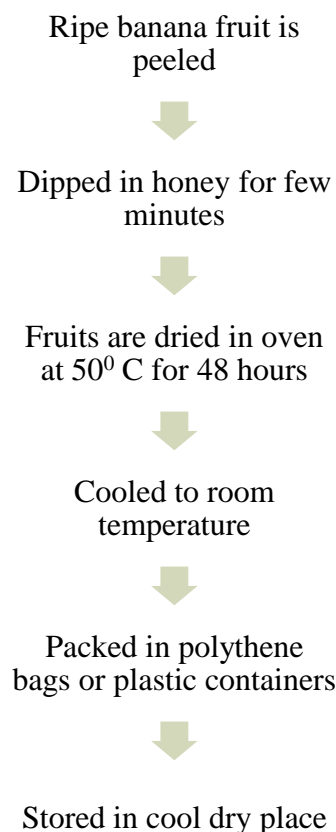


2.1.2. BANANA FIG

Preservation of fruits by drying is one of the oldest methods of preservation. Dried fruits are a more concentrated form than fruits preserved in other ways. They are cheaper than canned to produce because of lower labour cost and no sugar requirement. Besides this dried fruits require less storage space and lesser transportation cost. Banana fig is a dehydrated product prepared from ripe fruit. Banana fig can be eaten directly or incorporated in cakes, biscuits, payasam, kesari, and ice-creams as a substitute for raisins.

FIGURE: 2

PREPARATION STEPS FOR BANANA FIG

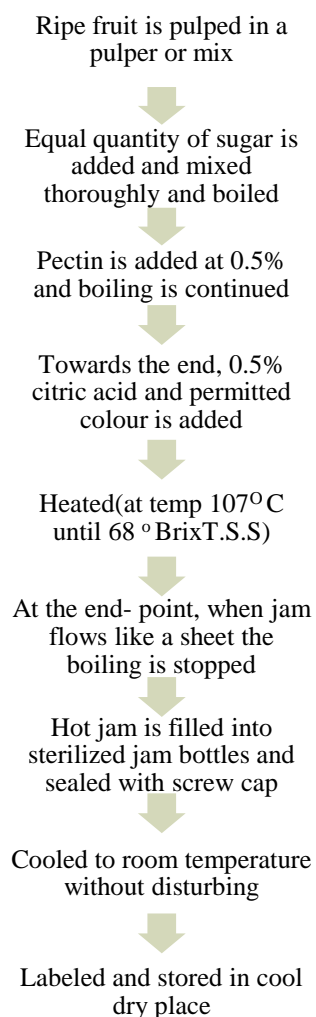


2.1.3. BANANA JAM

Banana fruit can be processed easily into excellent jam similar to that of other fruit jams. The finished jam should contain 30-50 % invert sugar or glucose to avoid crystallization of cane sugar in the jam during storage. If invert sugar is more than 50%, the jam will develop into a honey like mass due to formation of small crystals of glucose. If the percentage of TSS becomes very high, the jam becomes gummy and sticky. Appropriate combination

of pectin, sugar and acid is essential to give a proper 'set' to the jam. Colours and flavours should be added at the end of the boiling process.

FIGURE -3PREPARATION STEPS FOR BANANA JAM

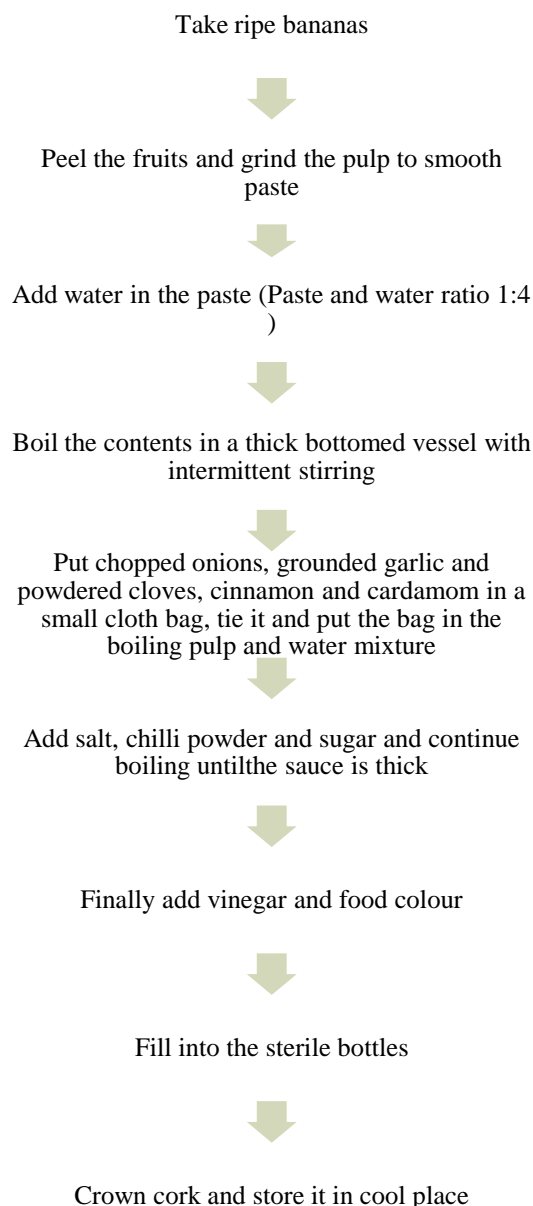


2.1.4. SAUCE

Sauce is a spicy product generally made from tomato. Sauce can be of sweet and hot depending upon one's taste. This ready-to-eat sauce can be used as moistening, flavouring and garnishing agent in food. The sauce has a strong banana taste and flavour and a dull yellow-red colour. The total soluble solid content of banana sauce varies from 39-40° Brix depending upon the varieties of bananas used for processing. It has a shelf-life of one year when stored in air tight bottles at low temperature.

FIGURE: 4

PREPARATION STEPS FOR BANANA SAUCE

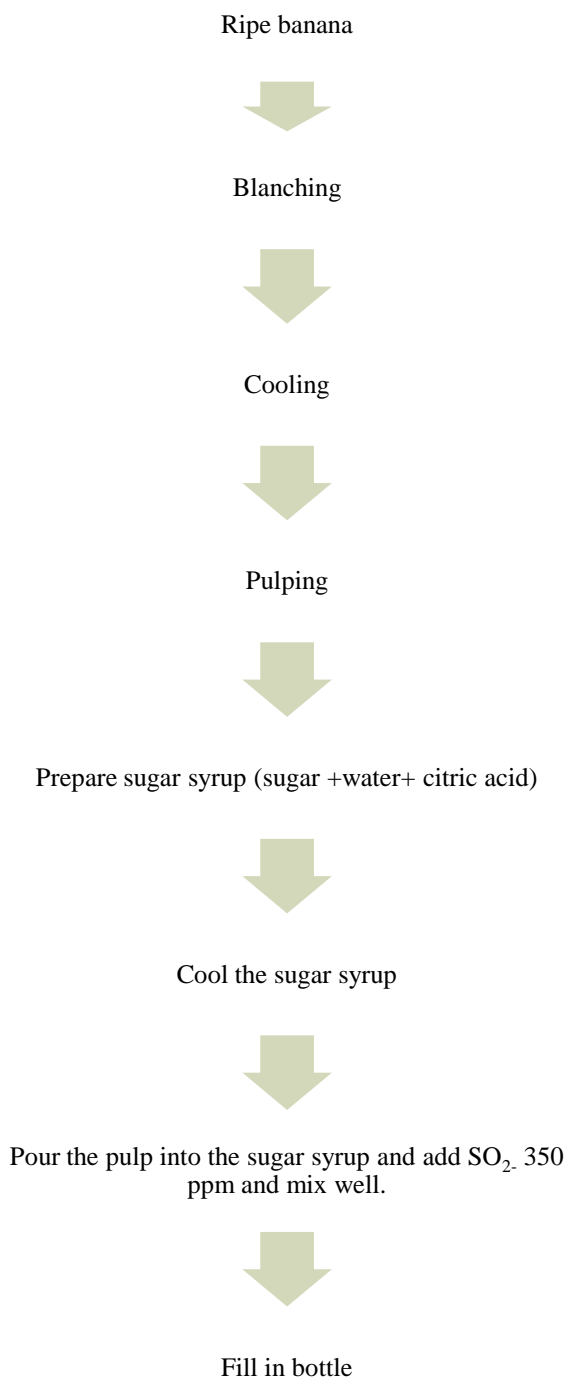


2.1.5. BANANA SQUASH

India being a tropical country, always has a favorable market for thirst- quenchers like fruit based juices. Ready to serve (RTS) banana squash is prepared from ripe banana; it is a nutritious and refreshing drink. The nutritive value of fresh fruit beverage is far greater than that of bottled synthetic products.

FIGURE-5

PREPARATION STEPS FOR BANANA SQUASH

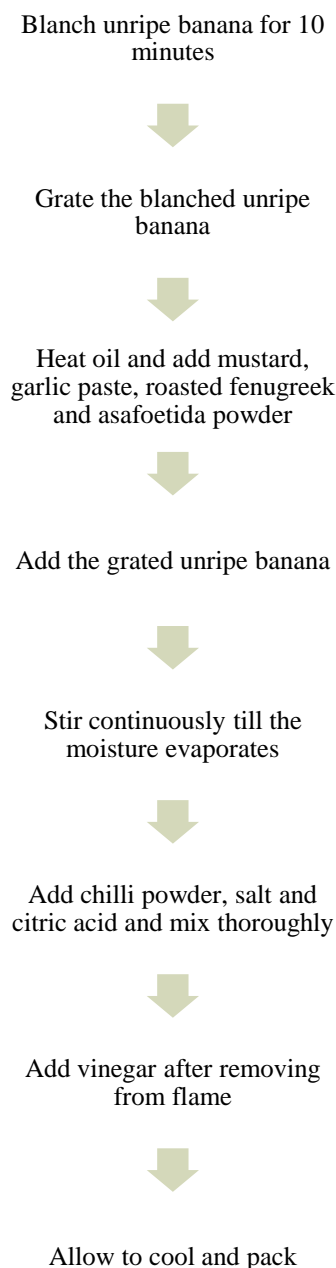


2.1.6.BANANA THOKKU

Thokku is a ground pickle made from unripe banana pulp along with the peel. ‘Thokku’ describes a spicy cooked pickle that resembles chutney.

FIGURE-6

PREPARATION STEPS FOR BANANA THOKKU

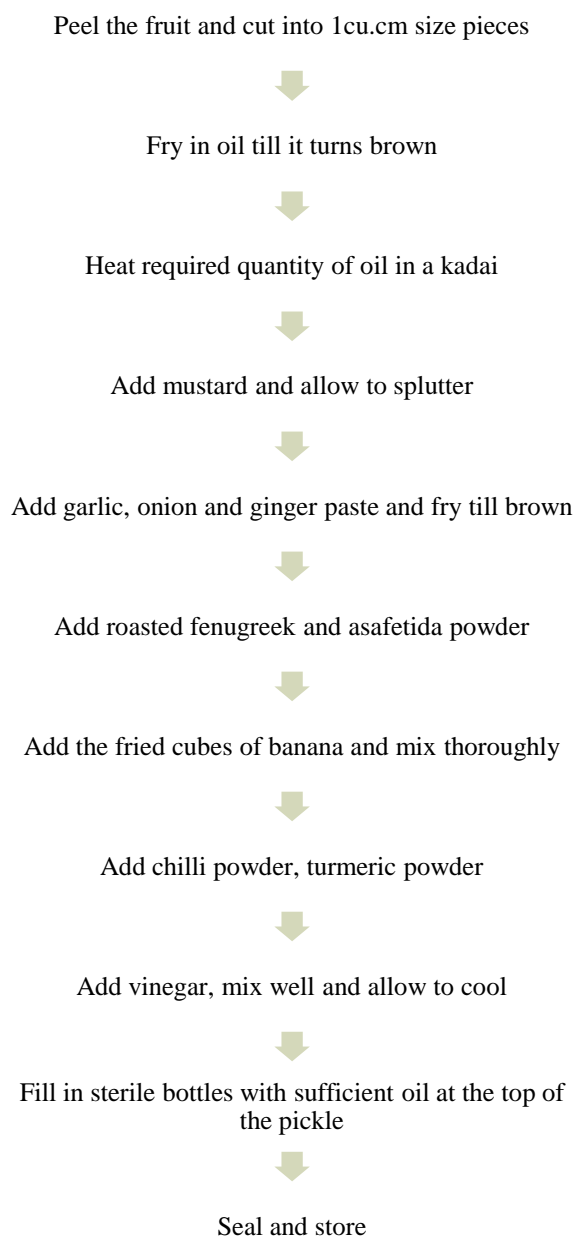


2.1.7. BANANA PICKLE

In simple words the preservation of food in common salt or vinegar is known as pickling. In other words pickling is preserving fruits, vegetables in salt alone, with or without the addition of oil and spices. Pickles are good appetizers and add palatability to the meal. Banana fruit pickle was made using Robusta variety. The fruits were peeled, cut into 1-cu.cm cubes and fried in oil. The fried cubes were mixed with the following ingredients:

FIGURE -7

PREPARATION STEPS FOR BANANA PICKLE



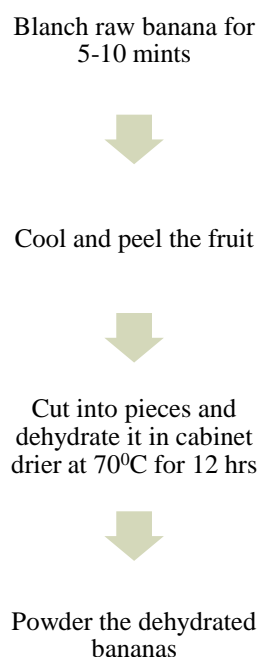
2.1.8. PREPARATION OF RAW BANANA POWDER

Generally banana flour is made by drying and powdering either the green or ripe fruit. This Banana powder has great potentials for commercialization (Shinde and Bansode, 2012).

Since banana powder has high sugar and low starch content it is generally used in snacks and bakery items.

FIGURE: 8

PREPARATION STEPS FOR RAW BANANA POWDER



2.1.9. Development and Standardization of Raw banana flour incorporated Noodles

PLANTAIN NOODLES

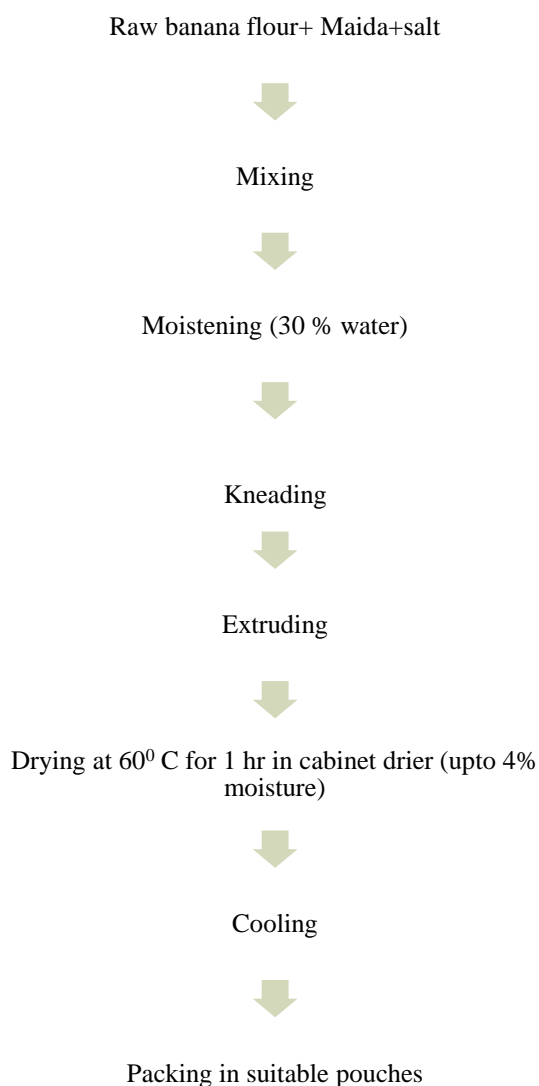
Noodle is made from unleavened dough of durum wheat flour mixed with water and formed into sheets or various shapes, then cooked and served as any number of dishes. It can be made with flour from other cereals or grains, and eggs may be used instead of water.

VARIATION CARRIED OUT

Value added banana flour incorporated extruded noodles was prepared using banana powder, refined wheat flour and 30% water. Control sample was prepared using 100% refined wheat flour. Raw banana flour was incorporated into the standard extruded noodles by replacing maida in the proportions of 60%, 75%, 100% as Sample A, Sample B and Sample C. The variations were subjected for sensory evaluation and sample A (60%) was selected for its sensory attributes.

FIGURE-9

STEPS FOR RAW BANANA FLOUR INCORPORATED NOODLES



2.1.10. DEVELOPMENT AND STANDARDIZATION OF RAW BANANA FLOUR INCORPORATED CHOCOLATE

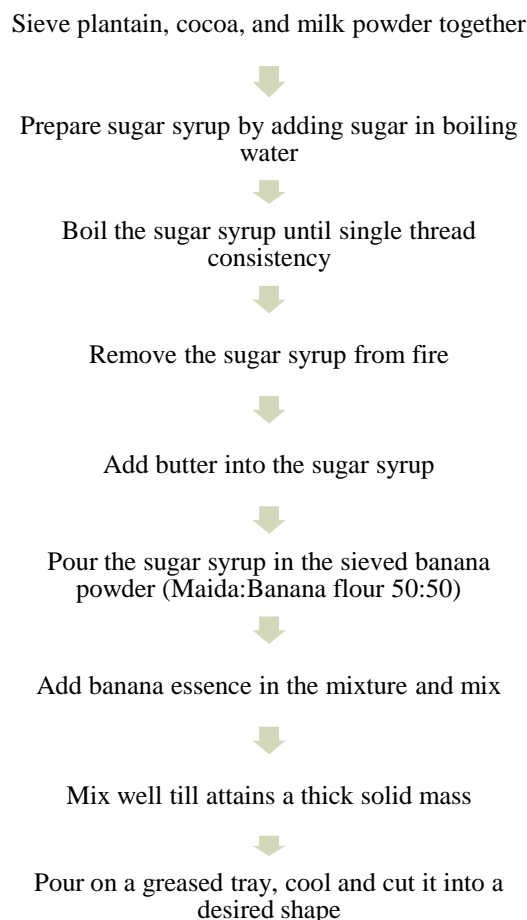
Consumption of chocolate especially DARK CHOCOLATE is growing rapidly because of reported health benefits.

VARIATION CARRIED OUT

Value added chocolate was prepared using milk powder, cocoa powder, sugar, butter and raw banana flour. Plain chocolate (control) was prepared using standard procedure. Raw banana flour was incorporated in the standardized chocolate by replacing milk powder in the proportion of 25%, 50%, 100% as sample A, sample B, sample C. The variations were subjected for sensory evaluation and sample B (50%) was selected for its sensory attributes.

FIGURE -10

REPARATION STEPS FOR RAW BANANA FLOUR CHOCOLATE





2.2. BIOCHEMICAL ANALYSIS OF THE PROCESSED BANANA PRODUCTS:

The following biochemical analyses were carried out to analyse the nutrient content of the selected processed banana products. Ash, Moisture, Carbohydrate, Crude Fiber, and Vitamin – C (Ascorbic Acid), Vitamin A (B-Carotene), Phenol, Flavanoids, and minerals like Potassium, Phosphorous, Sodium, Magnesium and Manganese were determined. The proximate analysis of processed banana products were done by AOAC method (AOAC,1980).These analyses were carried out in the Food Processing and Quality Control Laboratory, Department of Food Processing and Quality Control, V.V.Vanniaperumal College for Women, Virudhunagar.

2.3. MICROBIAL EXAMINATION OF THE PROCESSED BANANA PRODUCTS:

Microbial analysis was carried out to find out the shelf life of processed value added banana products. The products were preserved in air tight containers, stored at ambient and refrigeration temperature and their shelf life was determined. Total Plate Count (TPC) method was selected to study the microbial load in the products. The microorganism commonly spoils this type of banana products is bacteria. The microbial analysis was carried out at 15 days interval.

RESULTS AND DISCUSSION

3.1. BIOCHEMICAL ANALYSIS

The following analysis were carried out to find out the proximate micro and macro nutrient contents in the newly developed value added banana products such as Banana Bar and Banana Fig and Banana squash.

TABLE-1

NUTRIENT ANALYSIS OF PROCESSED VALUE ADDED BANANA PRODUCTS

S.NO	NUTRIENT ANALYSIS	BANANA SQUASH	BANANA FIG
1.	Ash	0.9%	1.4 %
2.	Moisture	24.59%	16.24 %
3.	Carbohydrate	24.68 gm	27.16 gm
4.	Crude fibre	0.4 gm	0.3 gm

5.	Vitamin-C	18 mg	12.4 mg
6.	β-Carotene	24 µg	22 µg
7.	Total phenol	2.06 µg	2.08 µg
8.	Total Flavonoids	0.2 %	0.2 %

The above table -2 shows that the presence of nutrients like Ash, Moisture, Carbohydrate, Crude Fibre, Vitamin-C, β – Carotene , Total Phenol, Total Flavonoids in the developed value added Banana squash and Banana fig.

TABLE: 2

Nutrient Analysis of Processed Value Added Banana Product-BANANA BAR

S.NO	NUTRIENT ANALYSIS	BANANA BAR
1	Ash	1.2 %
2	Moisture	20.22 %
3	Carbohydrate	20.84 g
4	Crude fibre	0.2 g
5	Vitamin - C	14 mg
6	β –Carotene	20 µg
7	Total Phenol	2 µg
8	Total Flavonoids	0.1 %
9	Phosphorous	21.7 mg
10	Potassium	217.7 mg
11	Magnesium	70.34 mg
12	Manganese	1.094 mg
13	Sodium	360 mg

The table -3 shows the nutrients like Ash, Moisture, Carbohydrate, Crude Fibre, Vitamin-C, β – Carotene, Total Phenol, Total Flavonoids, Phosphorous, Potassium, Magnesium, Manganese and Sodium found in Banana Bar.

TABLE-3

Microbial analysis of Processed Value Added Banana Products

Name of the Sample	Microbes	Dilution	CFU/ml in Refrigeration temperature		CFU/ml in Room temperature	
			Initial	15 th day	Initial	15 th day
Banana Bar	Bacteria	10 ⁻⁶	4x10 ⁶ CFU/ML	9X10 ⁶ CFU/ML	8x10 ⁶ CFU/ML	18X10 ⁶ CFU/ML
Banana Squash	Bacteria	10 ⁻⁶	5x10 ⁶ CFU/ML	10x10 ⁶ CFU/ML	12x10 ⁶ CFU/ML	17x10 ⁶ CFU/ML
Banana pickle	Bacteria	10 ⁻⁶	7x10 ⁶ CFU/ML	12x10 ⁶ CFU/ML	10x10 ⁶ CFU/ML	20x10 ⁶ CFU/ML
Raw Banana chocolate	Bacteria	10 ⁻⁶	3x10 ⁶ CFU/ML	8x10 ⁶ CFU/ML	9x10 ⁶ CFU/ML	16x10 ⁶ CFU/ML
Banana Sauce	Bacteria	10 ⁻⁶	3x10 ⁶ CFU/ML	10x10 ⁶ CFU/ML	9x10 ⁶ CFU/ML	19x10 ⁶ CFU/ML
Banana Fig	Bacteria	10 ⁻⁶	2x10 ⁶ CFU/ML	5x10 ⁶ CFU/ML	7x10 ⁶ CFU/ML	16x10 ⁶ CFU/ML
Banana Thokku	Bacteria	10 ⁻⁶	5x10 ⁶ CFU/ML	11x10 ⁶ CFU/ML	12x10 ⁶ CFU/ML	22x10 ⁶ CFU/ML

Microbial analysis was carried out to the processed banana products to find out their shelf life. All the products had low contamination and good shelf life for 15 days when stored at ambient temperature and refrigeration temperature with suitable packaging material. The less microbial count may be due to percentage of sugar content and heat treatment (Krishnaveni *et al.*, 1993).

CONCLUSION

A brief summary of this study obtained from the project was given below;

- Banana fig contains high amount of crude fibre (0.3) and carbohydrate (27.16) in comparison to banana bar and also it was noted that there is no much nutrient loss even after processing.
- Banana Bar contains Sodium (360mg), Magnesium (70.34 mg), Manganese (1.094 mg), Phosphorous (21.7 mg) and Potassium (217.7 mg). This innovative product adds variety in our diet and it is a good snack item.
- Banana fig contains 22 µg of β- carotene when compared to banana bar 20 µg, whereas banana bar contains high amount of Vitamin- C (14.6 mg) when compared to banana fig (12.4 mg). In banana fig, Total phenols (2.08µg) and total flavanoids (0.2 µg) were high in comparison to banana bar.
- Banana squash contains high amount of crude (0.4) and carbohydrate (24.68) when compared to banana bar.
- Banana squash has higher amount of vitamin -C (18 mg), β-Carotene (24µg), Total phenol (2.06 µg) and Total flavonoids (0.2 µg) in comparison to banana bar due its dehydration process.
- From the analysis it was found that all the value added banana products show low level of contamination with good keeping quality.
- This ready to serve and ready to eat products will improve the nutritional status of the community since banana is good source of Vitamin -B₆, potassium, manganese.
- Value addition improves the shelf life of highly perishable banana fruits.
- Processing techniques are simple, easy to process requiring small scale machineries, less man power and are cost effective.
- Value addition in banana provides high scope for becoming a successful Entrepreneur.

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<https://www.google.co.in/#q=Fruits+are+also+processed+into+products+such+as+juice%2C+syrup%2C+jams%2C+squash%2C+RTS+beverages>