



A STUDY ON DEVELOPMENT AND NUTRIENT ANALYSIS OF READY-TO EAT SNACK INCORPORATED WITH *Borassus flabellifer*

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ABSTRACT:

The aim of this work was to develop a new type of ready to eat snack, for which several tests were performed with different kinds of ingredients and with the different proportion of the ingredients. Here, the snack was made by wheat flour, foxtail millet flour, barnyard millet flour which are healthy and nutritious and helps to maintain several functions in our body. These assays were all performed using a basic ingredients composed of butter, milk, salt and mainly sugar which is replaced by jaggery for its nutrient content. However, in order to increase the nutritional composition of the developed snack, there is increase in its value as recognized by a certain population, a new ingredient was added to the snack, which was palmyra tuber flour and pineapple extract for flavour enhancement. The objective of the study was to prepare ready to eat snack for all age aged people which is highly nutritious, easy to digest, low cost and stable product. The selected product has undergone with sensory evaluation, nutrient analysis, physico-chemical analysis, and statistical analysis evaluation. This shows the feasibility of the consumer because consumers look for the variety, best quality and handy snacks which are nutrient dense and healthy.

Index Terms – Borassus flabellifer, Ready to eat, Snack item, Convenience food.

1.INTRODUCTION

Food fortification has been shown to be an effective strategy to overcome micronutrient and macronutrient deficiency. The aim is to put together various nutrients in the desired proportion and impart the organoleptic qualities through the use of suitable process technology at an acceptable cost. The product is rich in protein and iron, high in fibre content which is helpful in providing energy and gives satiety feeling and cures several disorders. The role of dietary fiber in controlling chronic disorders like diverticulitis, bowel cancer, cardiovascular diseases, diabetes, constipation etc has been well documented. The dietary fibre content of baked goods may be increased by adding various plant components rich in dietary fiber, eg: psyllium husk. *Borassus flabellifer* during the consumption of its fruits, leaves, bark, roots have role to play in promoting as well as disease preventing benefits because of a few substances namely phytochemicals, polyphenols, vitamins, minerals, proteins, etc. The Palmyra tree is the official tree of Tamil Nadu state in India. In Tamil culture it is called karpaha, nungu, celestial tree and is highly respected by the people. All its parts could be consumed. Whole wheat flour possesses several unique challenges to the milling and baking

industries. For instance, milling procedures for traditional flours have been well-established, whole grain flours are produced by a variety of techniques and result in flours with widely different particle sizes and functionalities. Whole wheat flour contains more enzymatic activity, lipids, and antioxidants than wheat flour, which can affect end-use and storage properties of the products. Barnyard millet is the oldest domesticated small millet. There are two main species of Barnyard millet, the one is *Echinochloa esculenta* which is Japanese Barnyard millet or Japanese millet and other is *Echinochloa frumentacea* which is Indian Barnyard millet. The Indian barnyard millet is also known as Billion Dollar Grass. Foxtail millet is non-glutinous, like buckwheat and quinoa, and it is not an acid forming food, so it is soothing and easy to digest. It is considered to be one of the least allergenic and most digestible grains available and it is a warming grain. In today's health-conscious world, everything has a replacement. So now a day's sugar is replaced by jaggery which has many health benefits. Flavour used for the product is pineapple fruit flavour. The pineapple tree belongs to the Bromeliaceae family. It is considered as a functional drink due to its health-promoting properties and has anti-inflammatory, anti-atherosclerotic, anti-aging, and many other healing properties. The objective of this review is to present a ready-to-eat breakfast cereal which is incorporated with rarely consumed ingredients said to be energy dense and less time consumption and make use for working people.

2. METHODOLOGY:

The materials required are Wheat flour, Foxtail millet flour, Barnyard millet flour, *Borassus flabellifer* flour, jaggery, pineapple extract, butter, milk and a pinch of salt.

- Selection of Wheat, foxtail millet and barnyard millet. Wash and clean with water to remove impurities. Dry under the sun for about one day. Grind to a powder form and store it in airtight container
- Selection of *Borassus flabellifer*. Peel off the skin and wash it with water and remove the non-edible part and cut into slices. Dry under the sun for one day. Grind into powder form and store it in airtight container
- Selection of Pineapple fruit. Peel off the skin and cut the fruit into small slices. Grind the slices into smooth paste. Sieve and extract
- Mix all the dry ingredients such as wheat flour, foxtail millet flour, barnyard millet flour and palmyra tuber flour into a bowl.
- Now add pineapple pulp, butter and jaggery. Add pinch of salt and milk mix it into a dough and keep aside for 10 mins.
- Make desired shapes from the dough and place it in a tray which is coated with butter already. Cook the shaped product in the oven for 10 mins at 160 degree Celsius.
- The product is cooled and weighed. Testing of sensory evaluation, nutrient analysis, statistical analysis and physico-chemical analysis is done.

3. RESULT AND DISCUSSION :

TABLE- 1: STANDARDIZATION OF READY TO EAT SNACK:

| Ingredients | V1 | V2 | V3 | V4 | Control |
|-----------------------------------|-------------|-------------|-------------|-----|---|
| Wheat flour | 30g | 25g | 20g | 15g | Refined wheat flour (31g), Maida (31g), Sugar (33g) & Cocoa solids (5g) |
| Foxtail millet flour | 10g | 15g | 20g | 25g | |
| Barnyard millet flour | 10g | 15g | 20g | 25g | |
| <i>Borassus flabellifer</i> flour | 5g | 10g | 15g | 20g | |
| Jaggery | 40g | 30g | 20g | 10g | |
| Pineapple extract | 5g | 5g | 5g | 5g | |
| TOTAL | 100g | 100g | 100g | | 100g |

TABLE-2: ORGANOLEPTIC EVALUATION OF READY TO EAT SNACK:

Calculated mean and standard deviation with help of scores provided by 25 panel members according o following criteria.

| CRITERIA | CONTROL | V1 | V2 | V3 | V4 |
|--------------------|------------|------------|------------|------------|------------|
| APPEARANCE | 8.56±0.812 | 8.48±0.614 | 8.7±0.544 | 7.22±0.996 | 6.86±1.143 |
| COLOUR | 8.62±0.753 | 8.34±0.823 | 8.62±0.697 | 7.18±1.101 | 6.7±1.359 |
| TASTE | 8.64±0.598 | 8.16±0.842 | 8.52±0.677 | 6.7±0.909 | 6.58±1.071 |
| TEXTURE | 8.56±0.733 | 8.4±0.881 | 8.62±0.635 | 7.16±1.167 | 6.94±1.202 |
| OVERALL ACCEPTANCE | 8.62±0.635 | 8.16±0.650 | 8.64±0.563 | 6.9±0.789 | 6.82±0.748 |

Sensory analysis of ready to eat snack showed that the products of overall acceptability of quality attributes the variation – 2 has got the highest mean score of 8.64.

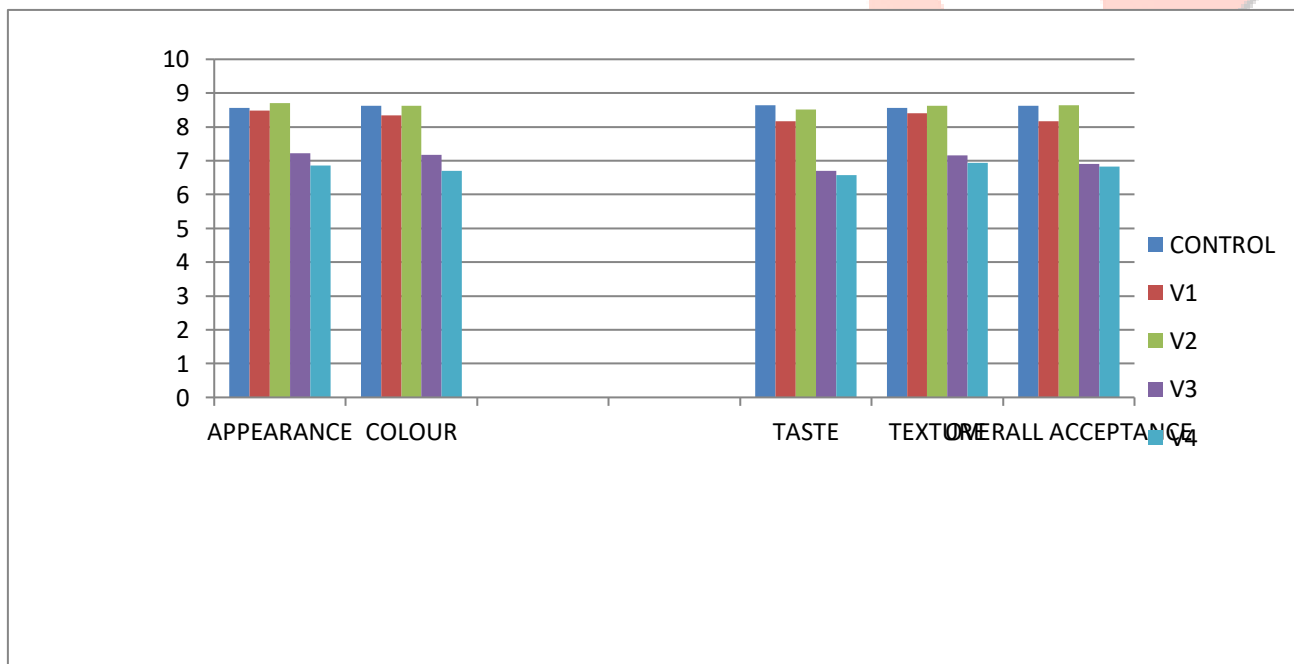
FIGURE-1

TABLE-3: PHYSIO-CHEMICAL ANALYSIS OF READY TO EAT SNACK:

The estimated physical properties like weight,thickness,diameter,moisture and total ash of the selected ready to eat snack are given in below table.

| Parameters | Variation – 2 |
|---------------|---------------|
| Weight(g) | 100g |
| Thickness(mm) | 0.2cm |
| Diameter(mm) | 0.6cm |
| Moisture(%) | 5% |
| Total ash(%) | 1.26% |

TABLE-4: NUTRITIVE VALUE OF THE DEVELOPED PRODUCT:

| NUTRIENTS | COMPOSITION |
|--------------|-------------|
| ENERGY | 461.91Kcal |
| CARBOHYDRATE | 75.63g |
| PROTEIN | 12g |
| FAT | 8g |
| FIBRE | 10g |
| VITAMIN-C | 88µgm |
| IRON | 18.7mg |
| VTAMIN-B12 | 5µgm |
| PHOSPHOROUS | 300mg |
| CALCIUM | 488mg |
| ZINC | 15mg |

- The Macronutrient analysis of Energy content is 461.91Kcal ,Carbohydrate is 75.63g ,Protein is 12g , Fat is 8g and Dietary Fibre is 10g.
- The Vitamin analysis of Vitamin – C is 88µgm and Vitamin –B12 is 5µgm.
- The mineral analysis of Iron is 18.7mg ,Phosphorous is 300mg , Calcium is 488mg and Zinc is 15mg.

It was found that the developed ready to eat snack was nutrient enriched and healthy and protect consumers.

5.SHELF LIFE ANALYSIS OF READY TO EAT SNACK:

The formulated ready to eat snack was kept in air tight zip lock cover for shelf life analysis.It was stored in room temperature for 65 days .But the storage life of the product is analysed to be 60 days.

TABLE-6: MICROBIAL ANALYSIS OF FORMULATED PRODUCT:

The experimental ready to eat snack was kept in a storage period of 60 days and it was subjected to microbial analysis.The microbial analysis was attributed for the count of total yeast ,mould and bacteria.The total bacteria count was analysed and discussed below.

TOTAL BACTERIAL COUNT OF EXPERIMENTAL READY TO EAT SNACK :

Microbes are the main cause of spoilages in food products.The analysis was carried out of using standard procedures.

The total bacterial count(TBC) of experimental ready to eat snack (variation-2) is tabulated below

| S.NO | STORAGE PERIOD | EXPERIMENTAL(CFU/gm) 1 x 10 ⁵ |
|------|----------------|---|
| 1 | Initial | NIL |
| 2 | 30 days | NIL |
| 3 | 45 days | NIL |
| 4 | 60 days | 300 count |

*CFU – Colony Forming Unit

The total microbial count of experimental ready to eat snack (variation-2) has no growth occur during 1st 30days of storage period. The growth occurs only after 60 days.

The highly accepted variation -2 of ready to eat snack was subjected to total bacterial count were checked for the period of 60 days and the result was in the initial absence of microbes and after 60 days it occurs.

TABLE-7: STATISTICAL ANALYSIS OF READY TO EAT SNACK:

The statistical analysis for variation – 2 of ready to eat snack was evaluated. The scores given by the panel members taken as data for calculating statistical analysis

| Regression Statistics | |
|------------------------------|--------------------|
| Multiple R | 0.854068661 |
| R Square | 0.729433278 |
| Adjusted R Square | 0.705382903 |
| Standard Error | 0.305475786 |
| Observations | 50 |

| ANOVA | | Significance | | | |
|--------------|-----------|---------------------|-----------|----------|-------------|
| | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>F</i> |
| Regression | 4 | 11.32080448 | 2.8302011 | 30.32939 | 2.93108E-12 |
| Residual | 45 | 4.199195521 | 0.0933155 | | |
| Total | 49 | 15.52 | | | |

When the regression value is 0.6 or more than that the data is acceptable. So the regression value for variation-2 of ready to eat snack is about 0.7 so the product is highly acceptable in all criteria by the panel is found by the statistical way.

TABLE-8: COST CALCULATION OF THE EXPERIMENTAL FOOD PRODUCT:

The production cost of the 100g of experimental ready to eat snack is calculated and listed below.

| S.NO | RAW MATERIALS | QUANTITY | PRICE | QUANTITY | PRICE for 100g |
|------|-----------------------|----------|--------|--------------|-----------------|
| 1 | WHEAT FLOUR | 1000g | Rs.100 | 25g | Rs.2.5 |
| 2 | FOXTAIL MILLET FLOUR | 500g | Rs.189 | 15g | Rs.5.67 |
| 3 | BARNYARD MILLET FLOUR | 1000g | Rs.340 | 15g | Rs.5.11 |
| 4 | PALMYRA TUBER FLOUR | 1000g | Rs.950 | 10g | Rs.9.5 |
| 5 | JAGGERY | 1000g | Rs.100 | 30g | Rs.3 |
| 6 | PINEAPPLE | 1000g | Rs.60 | 5g | Rs.0.3 |
| 7 | BUTTER | 500g | Rs.355 | 5g | Rs.3.6 |
| 8 | MILK | 1 L | Rs.60 | 5ml | Rs.3.03 |
| 9 | SALT | 1000g | Rs.54 | 2g | Rs.0.11 |
| | | | | TOTAL | Rs.32.81 |

RAW MATERIAL COST = Rs.32.81

NET PROFIT(30%) = $32.81 \times 30 / 100 = 9.843$

= $32.81 + 9.843 = 42.65$

TAX CHARGE (Rs.1.98) = $42.65 + 1.98 = 44.63$

PRICE OF THE PRODUCT(100g) = Rs.45

From the above table it is observed that the cost of the ready to eat snack per 100g is about **Rs.45.00**.

5.CONCLUSION:

The study was carried to provide a healthy and nutritious traditional convenience food to all aged people. In today's world people prefers healthy ready to eat food products due to the lack of time. Thus the formulated and developed ready to eat snack possess major nutrients such as energy, carbohydrate, protein, fat, fibre, iron and vitamin-c. From the above findings it is found that the developed product ensures best quality, nutrients enriched and affordable for all group people.

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