

## Development and Analysis of Sorghum Crackers

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### ABSTRACT

Bakery industry is the major food processing industry in India and stands second position in the manufacture of biscuits. Bakery products are the most popular food products consumed by all age groups. The demand for bakery products is increasing in day today life because of easy availability and ready to eat convenient products having better shelf-life. Crackers are crisp baked products, chemically leavened or fermented. These are light in weight with longer shelf life. Now a day's millets are gaining popularity. In the development of sorghum crackers product, the main ingredients used are sorghum, refined wheat flour and basil leaf powder. Refined wheat flour is added in proportions to obtain soft, crispy, light fermented crackers as they cannot be made with whole sorghum flour because it is gluten free and posses less binding nature resulting in harder and heavier product. In general, the higher the gluten content in the wheat the higher the protein content of the flour. The higher the protein content of flour, the better is its ability to trap carbon dioxide gas giving lighter weight to biscuit. In the present study related to product development, sorghum crackers are developed by using sorghum flour and basil leaf powder in different variations. To acquire the beneficial properties of basil, the leaves are vacuum dried, powdered and incorporated in the product. On the whole, the nutritional aspect is increased by developing crackers with sorghum flour and basil leaves powder. Different variations are developed based on refined wheat flour and sorghum flour are 50(S):50(RWF), 60(S):40(RWF), 70(S):30(RWF) and basil powder is taken in same amount for all the variations. By laboratory evaluation of (chemical and sensory) 70(S):30(RWF) variant has got the highest acceptance.

**Keywords :** Sorghum, Basil leaf powder, Refined wheat flour (RWF), Ferment.

### I. INTRODUCTION

In India, bakery industry is considered as one of the major food processing industry. India stands second in manufacturing of biscuits, first being USA. Bakery products are consumed by all age groups. They are gaining popularity as processed foods because of their convenience, ready to eat and good shelf life.

Crackers are a category of crisp baked products, chemically leavened or fermented. Soda crackers, or saltines are a traditional type of fermented cracker, produced from laminated dough.

Snack crackers are prepared by laminating dough with added flavouring and less fermentation time.

The term cracker can be used when the baked product has a cereal base where the proportion should be at least 60% and a low moisture content of 1-5% which is the distinguishing factor. Crackers usually have a higher fat content than other baked products and a longer shelf life. Crackers are used as a base for savoury toppings most commonly cheese and tomato but they may also have enough flavour from tasty coatings to be eaten alone.

Their low moisture content was a desirable feature for better shelf-life as there was no medium for mould growth. This property of low moisture content factor makes the crackers to have a long shelf life making them a very versatile and desirable product.

#### **Types of crackers:**

1. Fermented – For example: soda crackers, saltines and cream crackers.
2. Chemically leavened – For example: snack cracker.

As consumer demand strengthens for versatile, healthy ancient grains, sorghum's popularity is seeing resurgence. With its wonderful nutty taste, sorghum is a terrific substitute for traditional grains consumed in everyday diets. Sorghum is an excellent source of energy. The consumer food industry is a growing marketplace for sorghum. With so many healthy benefits packed in every delicious grain, consumers are finding creative ways to use sorghum in recipes for breakfast, lunch, dinner and even snacks.

In this study, crackers are developed by using 70% of sorghum flour and basil leaf powder. Due to the presence of sorghum and basil leaf powder the nutritional content of the product is increased.

Considering this nutritional profile, crackers were improved by using sorghum flour and basil powder. There is significance increase in protein, fibre and iron.

As sorghum is gluten free and it is used in larger amounts, gluten content is reduced and fibre content is also increased by adding basil powder in varying amounts for different proportions.

Different variations based on refined wheat flour and sorghum flour are 50(S):50(RWF), 60(S):40(RWF), 70(S):30(RWF). And basil powder is taken in same amount for all the variations.

#### **Objectives:**

The present study was carried out with the following objectives:

- To standardize the formulation for the preparation of product based on sensory and textural characteristics.
- To increase the nutritional value of the product.
- To make traditional food ingredients more appealing and palatable.
- To make the regular snacks healthier.

## **II. METHODS AND MATERIAL**

### **Materials**

#### **Raw materials:**

Sorghum, Refined wheat flour, Basil leaves, Active dry yeast, Sugar, Salt, Ammonium bicarbonate

#### **Raw materials procurement:**

Sorghum, Refined wheat flour, Active dry yeast (Blue bird), Butter (Amul), Sugar, Salt, Ammonium bicarbonate were procured from the Retail Store in Hyderabad.

### **Methods**

#### **Processing of Raw material:**

#### **Sorghum Flour:**

Sorghum grains are milled by miller with sieve size-2, in the laboratory at Loyola academy, Hyderabad.

#### **Basil Powder:**

Basil leaves (Rama Tulasi) are collected from a rural area of Kukunoorpally village of Siddipet District which comes under Telangana state. The leaves are cleaned thoroughly and dried in vacuum oven (Food technology laboratory at Loyola Academy) where moisture is removed under vacuum without major discolouration and nutrient loss. The dried leaves are powdered using pestle and mortar and sieved.

#### **Vacuum Oven:**

The vacuum dryer is an equipment used for drying of the heat sensitive and hygroscopic food materials.

At the pressure of about 0.03 to 0.06 bars vacuum oven is operated generally. At this pressure water boils at 25 -35 degree centigrade.

**Principle:**

In vacuum dryer material is dried by the principle or applications of vacuum. The water boils at a lower temperature when the pressure is lowered by creating the vacuum, evaporation of water takes place faster.

**FORMULATION OF CRACKERS :**

**Table 1**

INGREDIENTS	FORMULATIONS		
	1	2	3
SORGHUM	50	60	70
REFINED WHEAT FLOUR	50	40	30
BASIL POWDER	2	2	2
YEAST	1.5	1.5	1.5
SALT	1	1	1
SUGAR	2	2	2
AMMONIUM BICARBONATE	1	1	1
BUTTER	6.5	6.5	6.5
WATER	40	40	40

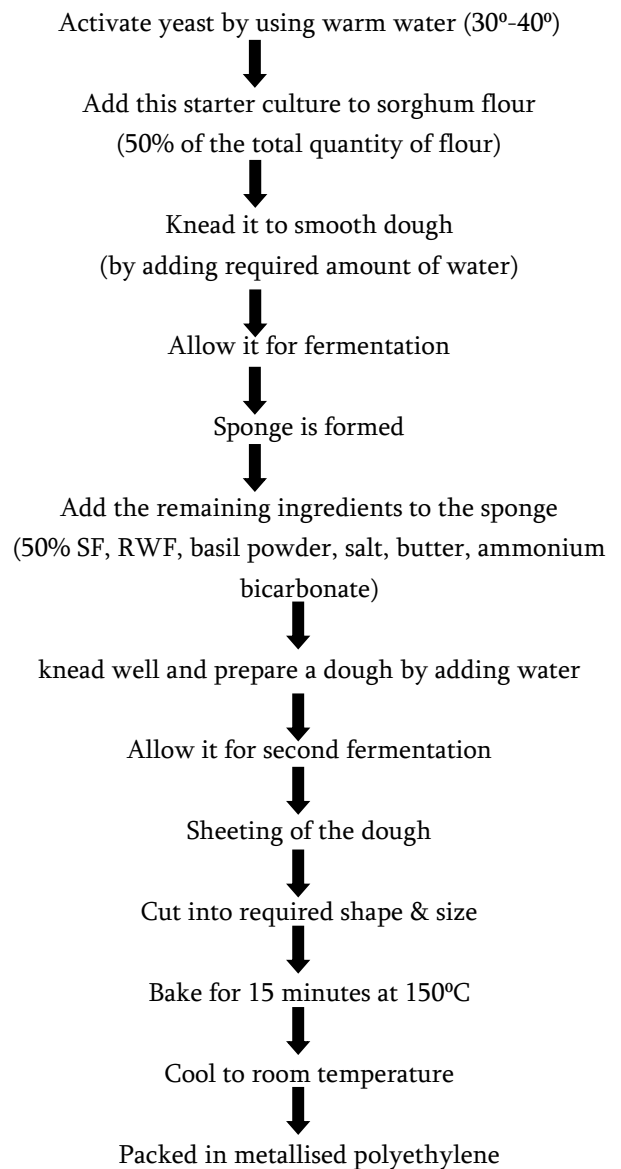
**PREPARATION OF CRACKERS:**

“Sponge and Dough” method is followed for the preparation of crackers. There are two stages in this method. (i) Preparation of sponge (ii) preparation of dough.

For sponge, Yeast is activated by using warm water and sugar which acts as food for yeast to grow and allow it to rest. Add this starter culture to 50% of sorghum and refined wheat flour and knead it to smooth dough with required water. Keep it aside in warm condition for the fermentation to occur.

For Dough, the sponge is added to the remaining ingredients like sorghum flour, salt, sugar, butter, ammonium bicarbonate, basil powder mixed and formed into dough and allow it for second fermentation. The fermented dough is sheeted to the thickness of about 1mm and cut into circular shape by using a mould, butter is greased and salt is sprinkled on the surface then docking is done. Baked at 150°C for 10-12 minutes. The baked crackers are cooled to room temperature and packed in metallised polyethylene pouches.

**Process flow chart:**



### III. RESULTS AND DISCUSSION

In contrast to the regular crackers (with RWF) the product is developed by decreasing the quantity of RWF and replacing it with sorghum flour, consisting of high nutritional value compared to other plain crackers.

The nutritional and healthy facts of basil are incorporated, hence enriching the value of the product along with nutritive aspects.

Due to the addition of sorghum and basil, the crackers obtain the fibre aspect. The fat/ butter quantity is also very less compared to regular crackers. On the whole, the nutritional aspect is increased by developing crackers with sorghum flour and basil leaves powder.

#### QUALITY ANALYSIS

Results for 1<sup>st</sup> variant 50 : 50 (S : RWF)

Parameters	Result
Moisture %	3.9
Ash %	1.4
Sugars %	0.10
Carbohydrates %	38.64
Fibre %	0.42
Protein %	4.82
Fat %	10.4



Figure 1

Results for 2<sup>nd</sup> variant : 60 : 40 (S : RWF)

Parameters	Result
Moisture %	3.7
Ash %	1.6
Sugars %	0.12
Carbohydrates %	42.58
Fibre %	0.51
Protein %	6.23
Fat %	10.6



Figure 2

Results for 3<sup>rd</sup> variant 70 : 30 (S : RWF)

Parameters	Result
Moisture %	2.5
Ash %	1.2
Sugars %	0.09
Carbohydrates %	58.68
Fibre %	0.92
Protein %	7.25
Fat %	9.4



Figure 3

**Carbohydrates:**

The carbohydrate in crackers comes from the sucrose or sugar. It also comes from the flour. Average carbohydrate content in regular crackers is 72- 78% but in this variation it is 58% (snack crackers).

**Protein:**

The crackers developed with sorghum flour contains 7.25% protein (3<sup>rd</sup> variant) than other two variants ranging from 4-6%.

**Fat:**

The fat content in the crackers ranges from 9- 10 % in the 3 variants. The fat used also adds to the fat percentage variation. Butter is used in the sorghum crackers.

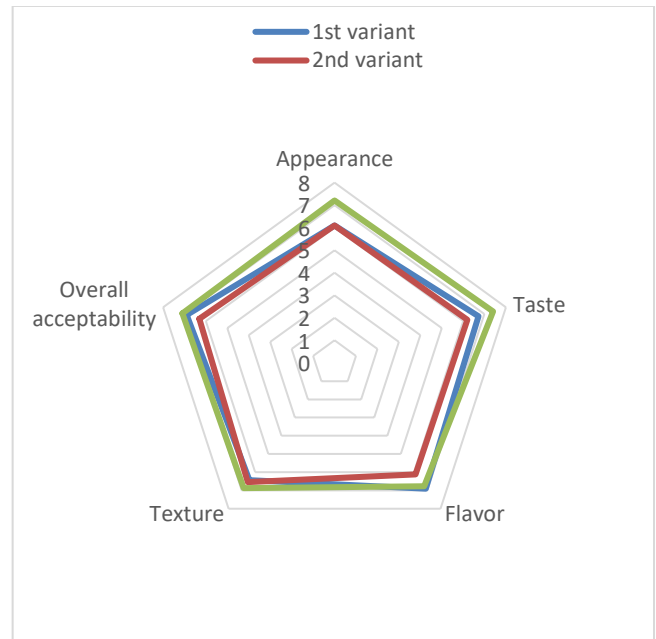
**Ash:**

Ash indicates minerals such as mineral content and leavening agents (chemical leavening agents) used. General saltine and snack crackers averaged about 3% ash. Sorghum crackers contain about 1.2 - 1.6% ash content.

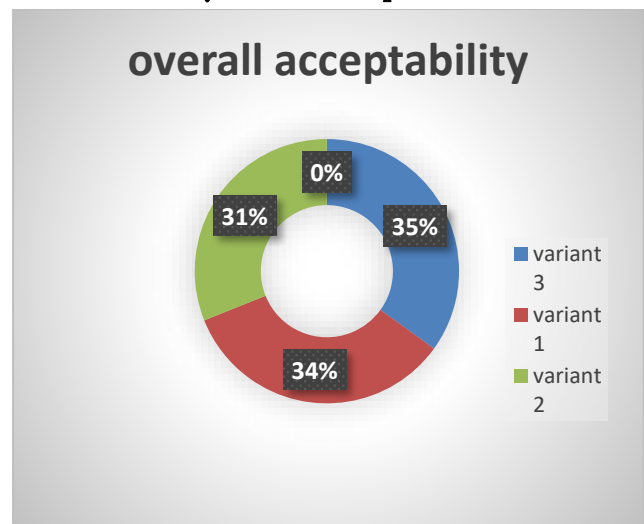
**Moisture:**

Crackers contain less moisture compared to other baked products. Snack crackers are fermented, proofed and baked. During baking maximum amount of moisture is evaporated hence, crackers are light, crunchy with low moisture content. Sorghum crackers contain about 2.5- 3.9 % moisture, which helps to store for long duration. Appropriate and

suitable packaging which controls moisture absorption adds to increase in shelf life.



Sensory evaluation representation



Overall acceptability of the product variations.

**IV. CONCLUSION**

As stated in the objectives, the 3<sup>rd</sup> variant formulation 70:30 (S:RWF) is standardized based on sensory and nutritional analysis. As sorghum is in higher proportion, its grainy taste is accepted by most of the panel members. Generally sorghum and basil are not consumed because of their taste, which is not acceptable by many consumers, keeping this in mind product is formulated in an appealing way, where

product does not give any off flavour yet providing palatable flavour and nutritious. As a variant with high sorghum is accepted, traditional taste and nutritional profile are achieved making the product healthier.

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