

Utilization of Multi-Mix Flour in the Preparation of Snacks

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Abstract: The present study entitled “utilization of multi-mix flour in the preparation of snacks” was undertaken with the objective to develop snacks. Made from safe, hygienic and healthy food materials. The product developed was Muruku, and Cracker are the products that are highly nutritious and healthy. The research was conducted during the year 2022 in Food lab of Department of Food Nutrition and public health, Ethelind College of Home science, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The present study was undertaken with the objectives to develop a multi-mix flour “Muruku and Cracker” by the incorporation of Rice flour, Brown rice flour and Sorghum flour at different levels of Muruku 40, 45, 15 percent and cracker 40, 30, 30 percent respectively. Sensory evaluation with respect to color and appearance, body and texture, taste and flavor and overall acceptability was done by five panel members using the nine-point Hedonic scale. Proximate chemical analysis of the developed food products for moisture, total ash, protein, crude fiber and fat were determined by AOAC (2005) method, calcium and iron was estimated by colorimeter. The value of carbohydrate and energy was calculated by difference method. On the basis of results, it was concluded that the sensory attributes of the prepared products with different treatments T2 (Rice flour 40%), (Brown rice flour 45%) and (Sorghum flour 15%) of Muruku and T2 (Rice flour 40%), (Brown rice flour 30%) and (Sorghum flour 30%) of Cracker were highly accepted by the panel members, muruku and cracker were good sources of energy, calcium, fiber, protein and fat content, it shows that nutritive composition of the prepared products were significantly increased as the incorporation level increased.

Keywords: Rice flour, Brown rice flour, Sorghum flour Muruku, Cracker Chemical Composition, Organoleptic, Nutritional Composition, Cost calculation

1. Introduction

Snacks are defined as small servings of simple, convenient, easy-to-prepare food that can be consumed between regular meals, whereas snacking is described as the act of eating a snack, regardless of whether healthful choices or snack foods are consumed, the change of life style pattern and demand for convenience foods have increased the market for snack foods. Snack foods are popular products that are highly appreciated and consumed throughout the world. Different types of snack foods are available in market and are designed to be less perishable, more durable and more appealing. Frying is commonly used method for the production of snack food both commercially and at household level. Fried foods are considered as concentrated sources of energy and fat and imparting characteristic color, texture, and flavor to the product (Susheelamma *et al.*, 2004).

Rice (*Oryza sativa*. L) is the most widely consumed cereal crop for a large part of the world's human population. It is most popular staple food grain and an important source of fibre, energy, minerals, vitamins, and other biomolecules (Sciarini *et al.*, 2010).

Sorghum (*Sorghum bicolor* L.) is ranked five cereal crop worldwide. It belongs to the *Poaceae* family and is formally part of plant-derived food. Nutritionally, it is composed of carbohydrates, proteins, polyunsaturated fatty acids (PUFA), fibres and resistant starch. Sorghum is used in three different fields: food, feed, and biomass production. Phenolic compounds including phenolic acid, flavonoids,

stilbenes and tannins, vitamins including B-complex, A, D, E and K and the minerals (potassium, phosphorus, magnesium and zinc) were involved in the bioactivity of sorghum. The functional composition of sorghum plays an essential role in human health by inhibiting the risk of chronic diseases. Available epidemiological evidence suggests that tannin sorghum acts as an antioxidant protecting from inflammation and cancer. Its fibre content can reduce blood cholesterol and glucose level, and is also helpful in celiac disease. (Mutegi *et al.*, 2010).

Objectives

- 1) To evaluate proximate chemical composition of flour.
- 2) To prepare snacks by incorporation of rice flour, brown rice flour and sorghum flour.
- 3) To assess sensory attributes of prepared snacks.

2. Materials and Methods

The entire study was conducted in the Nutrition Research laboratory, Department of Food Nutrition and public Health, Ethelind College of Home Science, Sam Higginbottom university of Agriculture, Technology & Science, Allahabad (Prayagraj) Uttar Pradesh. Procurement of raw materials such as Rice flour, Brown rice flour and Sorghum flour were purchased from the local market of Naini prayagraj Allahabad Uttar Pradesh.

Procurement of Raw Material

The raw materials for the preparation of Gluten free food products like Rice, Brown Rice, Sorghum and other

ingredients were procured from the local market of Prayagraj.

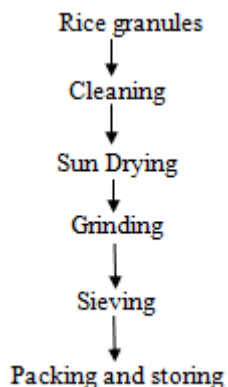


Figure 1: Flow Chart for the Preparation of Rice Flour

Source: Ajayi (2017)



Plate No. 1: Rice Flour



Plate No. 2: Brown Rice Flour

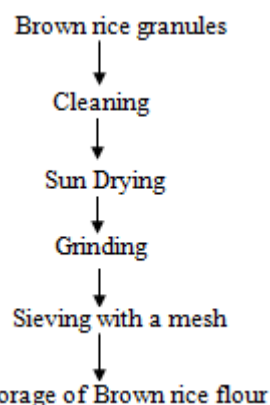


Figure 2: Flow Chart for the Preparation of Brown Rice Flour:

Source: Sathe (2020))



Plate No. 3: Sorghum Flour

Plate No. 5: Sorghum Flour development of food products

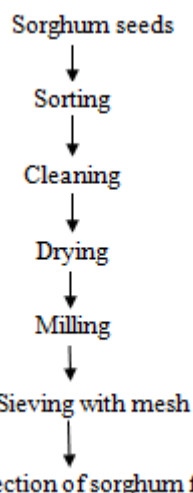


Figure 1.3: Flow Chart for the preparation of Sorghum Flour

Source: Azeez (2021)

Muruku and Cracker were developed by the incorporation of Rice flour, Brown rice flour and Sorghum flour. The standard recipe of selected products was served as control. The treatment combination was fixed on trial basis.

Preparation of Muruku with incorporation of Rice flour, Brown rice flour and sorghum flour

- To (control) In this treatment, product was prepared by using only White rice flour without any incorporation.
- T1 (SM) In this treatment, 60 percent of White Rice flour, 20 percent of Brown rice flour, 20 percent of sorghum flour was used.
- T2 (SM) In this treatment, 40 percent of White Rice flour, 45 percent of Brown rice flour, 15 percent of sorghum flour was used.
- T3 (SM) In this treatment, 30 percent of White Rice flour, 60 percent of Brown Rice flour, 10 percent of sorghum flour was used.

Preparation of Cracker with incorporation of Rice flour, Brown rice flour and sorghum flour

- To (control) in this treatment, product was prepared by using only White rice flour without any incorporation.
- T1 (SM) in this treatment, 60 percent of White Rice flour, 20 percent of Brown rice flour, 20 percent of Sorghum flour was used.

- T2 (SM) in this treatment, 40 percent of White Rice flour, 30 percent of Brown rice flour, 30 percent of Sorghum flour was used.
- T3 (SM) in this treatment, 20 percent of White Rice flour, 50 percent of Brown Rice flour, 30 percent of sorghum flour was used

Sensory Evaluation

Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The score card based on the 9-point Hedonic Scale was used for sensory evaluation on the basis of evaluation of attributes like Color and Appearance, Body and Texture, Taste and Flavor, overall Acceptability (Srilakshami, 2018).

Chemical Analysis of Flour

A standardized procedure of AOAC (2005) were followed to estimate for moisture, ash, total carbohydrates, fat, and protein, calcium, Iron, fiber and total energy of the developed food products.

Cost Calculation of Prepared Product

Cost of the prepared product was calculated by taking into account the cost of individual raw ingredients used in the preparation of food products as the prevailing market price.

Statistical Analysis

The data were analyzed by Analysis of Variance Technique (ANOVA). Two way classification with 'n' observations per cell and Critical Difference also found (Gupta *et al.*, 2002)

3. Result and Discussion

Sensory Evaluation

Sensory evaluation of the food products for their acceptability was done by a panel of 5 judges. The score card based on the 9-point Hedonic Scale was used for sensory evaluation on the basis of evaluation of attributes like Color and Appearance, Body and Texture, Taste and Flavor, overall Acceptability (Srilakshami, 2018).

Table 1 shows that mean of sensory score obtain and analyzed for Muruku. According to the different sensory attributes, T2 has the highest score, regarding the color and appearance, it gains 8.7, for body and texture it gains 8.5, for taste and flavor 8.8 and for overall acceptability it obtained 8.8 scores.

The result is supporting from the findings of **Bolarinwa *et al.*, 2019** brown rice flour increased the lightness and yellowness color of the cookies, as well as the spread ratio of the cookies Sensory evaluation results showed that all the cookies were similarly rated in terms of appearance, color, aroma and taste, with cookies containing 75% germinated brown rice flour.

According to **Mahesh Dindu *et al.*, 2018** Sorghum flour to replace complete wheat flour for sensory attributes like color, flavor and texture and overall acceptability indicating the acceptability by the panelist member.

Table 2 shows that mean of sensory score obtain and

analyzed for Cracker. According to the different sensory attributes, T2 has the highest score, regarding the color and appearance, it gains 8.1, for body and texture it gains 8.93, for taste and flavor 8.8 and for overall acceptability it obtained 8.93 scores.

Chemical Analysis

Table 3 depicts the chemical components of the raw ingredients of the products, it shows that the moisture, ash, protein, crude fiber, fat, carbohydrate and iron of the raw ingredients.

Organoleptic characteristics of Muruku and Cracker

Table 1: Average sensory scores for different attributes of control and treated samples of *Muruku*

Control & Treatment	Attributes			
	Color & Appearance	Body & Texture	Taste & Flavor	Overall Acceptability
T ₀	8.0	7.4	8.0	7.9
T ₁	7.7	7.9	7.9	8.0
T ₂	8.7	8.5	8.8	8.8
T ₃	7.9	7.6	7.5	7.3
F - TEST	S	S	S	S
C. D	0.76	0.17	0.37	0.21

Table 2: Average sensory scores for different attributes of control and treated samples of *cracker*

Control & Treatment	Attributes			
	Color & Appearance	Body & Texture	Taste & Flavor	Overall Acceptability
T ₀	8.06	8.13	8.26	8.13
T ₁	8.66	7.33	7.03	7.53
T ₂	8.1	8.93	8.8	8.93
T ₃	7.4	7	6.73	7
F-TEST	S	S	S	S
C. D	0.58	0.48	0.42	0.64

Table 3: Proximate chemical analysis of flours

Gluten free flour	Rice flour	Brown rice flour	Sorghum flour
Moisture (%)	11.20±0.33	9.61±0.12	11.9±0.36
Ash (%)	0.98±0.1	1.77±0.04	1.67±0.11
Protein (g)	6.58±0.22	8.50±0.14	10.4±0.25
Crude fiber (g)	2.4±0.22	1.23±0.05	1.6±0.28
Fat (g)	0.98±0.1	2.80±0.03	1.9±0.13
Carbohydrate	78.2±0.33	77.31±0.17	72.6±0.34
Iron (mg)	0.35±0.01	1.98±0.43	4.1±86

4. Conclusion

On the basis of findings the study undertaken, it is concluded that the product like Muruku, Cracker and can be successfully made with gluten free flours like Rice flour, Brown Rice flour and Sorghum flour. On comparing the organoleptic attributes of the products prepared "Muruku" T2 treatment was good which consist of 40 percent Rice flour, 45percent Brown rice flour and 15percent sorghum flour on comparing the organoleptic attributes of prepared Cracker T2 treatment was liked very much which consists of 40percent rice flour, 30percent brown rice flour and 30percent sorghum flour and the sensory attributes of prepared increased in Muruku, Cracker and Muruku T₂ cost was 13.74Rs / 100 g cracker T₂cost was 13.74Rs / 100gand on basis of chemical analysis the muruku, Cracker and Iron,

carbohydrates, protein, crude fiber, Ash and moisture and nutritive value of Energy fat calcium iron are increased due to incorporation of Rice flour, Brown rice flour and Sorghum flour, Muruku are deep fried but brown rice and sorghum flour has less absorption of oil and cracker was baked it has unique flavor and rice flour improved the texture of cracker.

5. Recommendations

Rice flour, Brown rice flour and Sorghum flour has many potential nutrients including good amount of calcium, fiber, energy, carbohydrates and protein and iron. Incorporation of gluten free flour mix is recommended for the incorporation in traditionally consumed foods to make them of therapeutic value as well as add variety to the diet of the patients suffering from celiac disease and improves their nutritive intake and it can be serve for who is suffering from diabetes so that it improves their nutritive intake.

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