

# Development and analysis of cookies made by using sorghum millet, pearl millet and unripe banana flour a Complete replacement for wheat flour

Charudershini.R<sup>1</sup>, Rashmi.R<sup>2</sup>, Manaali.M Patel<sup>3</sup>

SINI JADEESH HOD Mop Vaishnav college for women

<sup>1,2,3</sup>Mop Vaishnav College for Women (Autonomous)

*Abstract—Incorporating millets and banana flour into cookie production offers a promising avenue for creating nutritious snacks. The cookies provide a convenient and tasty option for students, combining the nutritional benefits of millets with the fiber-rich properties of banana flour. Sensory evaluation indicated favorable acceptance of the cookies, particularly the type A variant. Proximate analysis further elucidated the nutritional profile of type A cookies, showcasing their energy content, macronutrient composition, and micronutrient levels. Overall, this study underscores the potential of millet-based snacks as a wholesome dietary choice, catering to both taste and nutrition preferences among consumers. Further research can explore additional formulations and applications of millets in snack production to promote healthier eating habits among students and the wider population.*

## I. INTRODUCTION

Millets are staple crops widely consumed across India and beyond for their nutritional value and resilience in harsh conditions. They offer low carbohydrate content, high protein, essential amino acids, fiber, vitamins, minerals, and are gluten-free. Varieties include finger millet, proso millet, pearl millet, foxtail millet, and sorghum millet, each with distinct flavors, textures, and nutrients. Traditionally ground into flour, millets are used in flatbreads like roti.

Banana flour, rich in fiber and nutrients, is increasingly used in baking. Produced from green bananas, it is gluten-free and high in potassium, magnesium, vitamins, and minerals, with the added benefit of resistant starch for improved digestion and blood sugar control.

Pearl millet, or bajra, is a staple warm-season crop in Asia and Africa, thriving in hot, dry climates with

minimal water. Rich in fiber, protein, calcium, iron, and zinc, it aids digestion, regulates blood sugar, and offers higher nutritional value than wheat and rice.

Sorghum millet, or jowar, is similarly cultivated world wide and favored for its gluten-free nature and rich nutrient profile. Used in various foods like porridge, flour, and alcoholic beverages, it provides protein, fiber, minerals, and vitamins, potentially offering protection against chronic diseases like heart disease and cancer.

These millets are incorporated into cookies, providing a healthy snack option for students. With their gluten-free nature and rich nutritional content, including protein, fiber, vitamins, and minerals, these cookies offer a convenient and nutritious option for school-goers. The cookies boast pleasing texture and flavor profile due to the incorporation of these three millets.

## II. METHODOLOGY

For this study, two variations were performed to analyse the different sensory using the two types of millets and banana flour. The millets were cleaned and milled into a fine flour using grinder. These banana flour millet cookies are rich in fibre and is a great snack which has nutritional value. Type A of cookies was produced from 30% sorghum millet flour and 30% pearl millet flour, type B of cookies produced from 30% sorghum millet flour and 40% pearl millet flour. The other ingredients were similar for both the type cookies such as, banana flour, cardamon powder, and brown sugar. The steps and the composition of ingredients are similar for both the types of cookies.

Ingredients	Measurement	Measurement
	Type A	Type B
Banana flour	40 grams	40 grams
Pearl millet flour	30 grams	40 grams
Sorghum millet	30 grams	30 grams
Unsalted butter	90 grams	90 grams
Brown sugar	70 grams	70 grams
Cardamom powder	3 grams	3 grams

Ingredients for cookies

Procedure:

All the ingredients were washed to clean the dust and other extraneous material. Sun drying of these ingredients is done by spreading them in a single layer on a clean surface exposed to direct sunlight. Ensure good air circulation and turn the ingredients regularly for even drying. Cardamom was used to provide aroma. The cereal grains apart from all the ingredients were procured in one lot from the local market of Chennai.

Type A cookies:

Take a bowl, add 90 grams of unsalted butter and then add all three flours simultaneously (by sifting) by the proportion of 40 grams of banana flour, 30 grams of sorghum millet flour and 30 grams of pearl millet flour. Add 70 grams of brown sugar and a pinch of cardamom powder and combine the dough and keep it to refrigerate for 15 mins. Then bake it in a preheated oven for about 15-20 mins at 180 degree celsius.

Type B cookies

Take a bowl, add 90 grams of unsalted butter and then add all flours i.e. 40 grams of banana flour, 30 grams of sorghum millet flour and 40 grams of pearl millet flour. Add 70 grams of brown sugar and a pinch of cardamom powder and combine the dough and keep it to refrigerate for 15 mins. Then bake it in a preheated oven for about 15-20 mins at 180 degree Celsius.

### III. SENSORY EVALUATION

The cookies prepared using the different combinations of millet flour were subjected to sensory evaluation for various quality attributes such as appearance, texture, flavor (taste and aroma), aftertaste, and overall acceptability. A total of 20 consumer panelists carried out the evaluation. A 9-point Hedonic scale was

employed in which 1 represented the least score (dislike extremely) and 9 the highest score (like extremely).

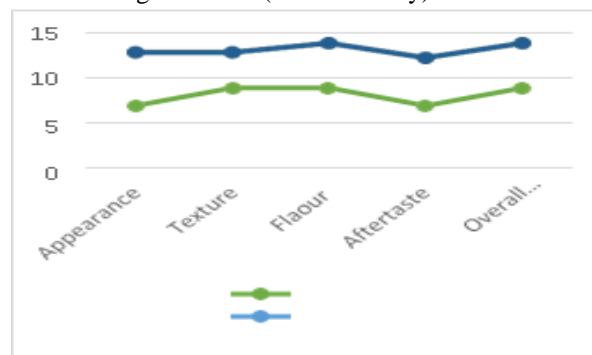
### IV. PROXIMATE ANALYSIS

Proximate analysis is done to determine moisture, energy, fat, carbohydrates, protein, iron, total ash and crude fibre of the sample.

### V. RESULT AND DISCUSSION

Sensory evaluation:

A total of 20 consumer panel lists carried out the evaluation. A 9-point Hedonic scale was employed in which 1 represented the least score (dislike extremely) and 9 the highest score (like extremely).



Proximate analysis for type a mix

Sensory characteristics scores for cookies

Based of the evaluation, type A variant was more acceptable, proximate analysis was carried out for it.

Proximate analysis:

It involves quantifying the content of carbohydrates, fats, proteins, and crude fiber, providing valuable information about its nutritional composition and potential health benefits. This analysis serves as a crucial tool for formulating balanced diets, meeting dietary recommendations, and promoting overall health and well-being.

S. NO	PARAMETERS	TEST METHOD	UNIT	RESULT
1	Energy (kcal)	ALPL/FD/SOP/067	Kcal/100g	499.3
2	Fat(g)	AOAC21stEdn 2016, 920.85	g/100 g	27.10
3	Carbohydrates(g)	ALPL/FD/SOP/065	g/100 g	59.2

4	Protein(g)	IS:7219:1973	g/100 g	4.61
5	Iron(mg)	ALPL/FD/SOP/068	mg/100g	10.48
6	Moisture (g)	FSSAI Lab Manual	g/100 g	7.8
7	Total ash(g)	FSSAI Lab Manual	g/100 g	1.25
8	Crude fibre(g)	AOAC 21stEdn 2016 Chapter32 962.09	g/100 g	6.10

### CONCLUSION

Incorporating millets and banana flour into cookie production offers a promising avenue for creating nutritious snacks. The cookies provide a convenient and tasty option for students, combining the nutritional benefits of millets with the fiber-rich properties of banana flour. Sensory evaluation indicated favorable acceptance of the cookies, particularly the type A variant.

Proximate analysis further elucidated the nutritional profile of type A cookies, showcasing their energy content, macronutrient composition, and micronutrient levels. Overall, this study underscores the potential of millet-based snacks as a wholesome dietary choice, catering to both taste and nutrition preferences among consumers. Further research can explore additional formulations and applications of millets in snack production to promote healthier eating habits among students and the wider population.

### REFERENCES

- [1] Awika JM, Rooney LW. Sorghum phytochemicals and their potential impact on human health. *Phytochemistry*. 2004; 65(9):1199-221.
- [2] [http://www.scielo.org.pe/scielo.php?script=sci\\_arttext&pid=S2077-99172017000400003](http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S2077-99172017000400003)
- [3] <https://www.worldcat.org/title/foodscience/oclc/62253463>
- [4] [https://millets.res.in/m\\_recipes/Nutritional\\_health\\_benefits\\_millets.pdf](https://millets.res.in/m_recipes/Nutritional_health_benefits_millets.pdf)
- [5] <https://www.netmeds.com/healthlibrary/post/jowar-nutrition-health-benefitsayurvedic-uses-uses-for-skin-weight-loss-andrecipes>
- [6] Kamalji K, Baljeet S, Amarjeet K. Preparation of bakery products by incorporating Pea flour as a

functional ingredient. *American Journal of Food Technology*.2010;5(2):130-135.

<https://docsdrive.com/pdfs/academicjournals/ajft/2010/130-135.pdf>

- [7] <https://vikaspedia.in/health/nutrition/nutritive-value-of-foods/nutritive-value-of-cereals-andmillets/finger-millet-ragi-small-seeds-withbigger-health-benefits>
- [8] <https://www.ijstr.org/finalprint/oct2015/Development-Of-Cookies-Using-A-Combination-Of-Foxtail-Millet-And-WheatFlour.pdf>
- [9] <https://www.netmeds.com/healthlibrary/post/bajra-pearl-millet-nutrition-healthbenefits-how-to-make-bajra-flour-at-home-usesand-recipes>