



ISSN (E): 2277-7695
 ISSN (P): 2349-8242
 NAAS Rating: 5.23
 TPI 2023; 12(10): 714-717
 © 2023 TPI
www.thepharmajournal.com
 Received: 08-08-2023
 Accepted: 11-09-2023

Sangma TA
 Research Scholar, Department of
 Food Nutrition and Public
 Health, Ethelind College of
 Community Science, SHUATS,
 Prayagraj, Uttar Pradesh, India

Dr. Dubey PR
 Professor, Department of Food
 Nutrition and Public Health,
 Ethelind College of Community
 Science, SHUATS, Prayagraj,
 Uttar Pradesh, India

Organoleptic evaluation and nutrient composition of pancake developed from a composite flour blend of whole wheat flour, foxtail millet flour and cassava flour

Sangma TA and Dr. Dubey PR

Abstract

Surging trends of opting for healthier food choices had brought forth the need to develop food ingredients which can address health problems and promote sustainability. This study was conducted with the aim to develop and prepare a product (pancake) from the composite flour consisting of whole wheat flour, foxtail millet flour and cassava flour; to assess its organoleptic properties and nutrient composition; and to calculate the cost of the product. The organoleptic properties of the pancake such as color and appearance; body and texture; taste and flavour; and overall acceptability were analyzed and the nutritional composition was also calculated. Four (4) treatments namely T₀, T₁, T₂ and T₃ with varying proportion of the flours were prepared with T₀ as the control. The sensory assessment conducted using the "9-point Hedonic Scale" revealed that T₂ (70:15:15::WWF:FMF:CF) exhibited the highest level of acceptability in terms of color, texture, taste, and overall appeal. To determine the nutritional content of the product, the nutritive values of its ingredients were calculated per 100g. The findings indicated that T₂ (70:15:15::WWF:FMF:CF) boasted superior nutritional attributes compared to the control, T₀. Specifically, T₂ contained higher levels of energy (495.74 kcal), carbohydrates (74.86 g), dietary fiber (4.32 g), and calcium (93.92 mg). The production costs for each treatment were as follows: Rs. 20.61 for T₀; Rs. 22.09 for T₁; Rs. 22.84 for T₂; and Rs. 23.69 for T₃. Consequently, it was evident that utilizing composite flour in the development of this snack had a significant impact on its nutritional profile.

Keywords: Foxtail millet, cassava, whole wheat flour, composite flour blend, pancake, sensory evaluation, nutrient composition, cost calculation

Introduction

Composite flour, a versatile and innovative ingredient, is revolutionizing the culinary world with its unique blend of various flours and grains. This exceptional combination creates a product that not only enhances the texture and flavor of a wide range of dishes but also offers improved nutritional benefits. Such an example is a composite flour blend comprising of whole wheat flour, foxtail millet flour and cassava flour. Foxtail millet (*Setaria italica*) is a nutrient-loaded food which is cultivated in the tropical regions of the world. Incorporating foxtail millet into the diet can be a healthy choice due to its balanced nutritional composition. It offers a wide range of nutrients, promotes satiety, and can be a valuable addition to both traditional and modern culinary creations. It is rich in dietary fibre, provides essential amino acids, contains various vitamins including niacin, thiamine and pyridoxine and is also a good source of minerals such as magnesium, phosphorus and iron. Owing to its low glycaemic index, it has minimal impact on blood sugar levels and is therefore recommendable for diabetics. Numerous epidemiological studies have demonstrated that incorporating more foxtail millets into everyday diets can reduce the likelihood of developing chronic conditions such as disruptions in cholesterol metabolism and type 2 diabetes mellitus. Gluten-free nature of these millets makes it an excellent option for individuals with celiac disease or gluten sensitivity. According to FAO (2009) [2], Cassava is the developing world's fourth most important crop after wheat, rice and maize. Cassava (*Manihot esculenta*) is a staple crop for many people in developing countries, providing a crucial source of calories and sustenance. It is primarily composed of carbohydrates which makes it an excellent source of energy and also contains dietary fibre. Cassava contains several essential vitamins including vitamin C and small amounts of B vitamins like thiamine, riboflavin and niacin. It is also a notable source of minerals such as potassium, magnesium and manganese. Cassava is inherently devoid of gluten, rendering it an appropriate choice for individuals dealing with celiac disease or gluten sensitivity.

Corresponding Author:
Sangma TA
 Research Scholar, Department of
 Food Nutrition and Public
 Health, Ethelind College of
 Community Science, SHUATS,
 Prayagraj, Uttar Pradesh, India

Nonetheless, it is crucial to handle cassava with care and follow appropriate processing methods to remove potentially harmful compounds called cyanogenic glycosides, which can pose risks if not dealt with correctly. The inclusion of whole wheat flour, foxtail millet flour, and cassava flour provides a broader spectrum of nutrients, including dietary fiber, vitamins, and minerals, compared to traditional pancakes made solely from wheat flour which provides a more balanced and nutritious meal.

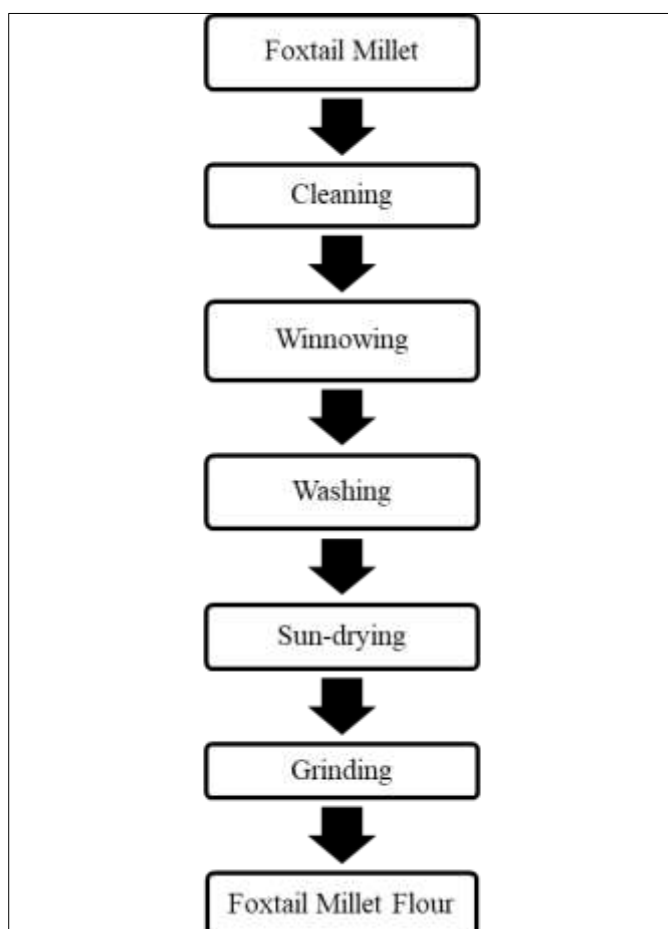
Materials and Methods

Selection of ingredients

The raw materials including whole wheat flour and miscellaneous ingredients were sourced from the local market in Prayagraj. Cassava flour and foxtail millet were procured from Garo Hills, Meghalaya.

Preparation of composite flour

The foxtail millet grains were processed into flour for the preparation of the composite flour. The whole wheat flour, foxtail millet flour and cassava flour were weighed according to the ratio of the different treatments and blended together to make composite flour. The treatments were formulated using different ratios of composite flour as follows: 80:10:10 (T_1), 70:15:15 (T_2), and 60:20:20 (T_3), respectively.



Source: Poongodi V. T. and Jemima B. M. (2009), Formulation and Characterization of Millet Flour Blend incorporated Composite Flour

Fig 1: Flowchart for the preparation of foxtail millet flour

Preparation of Pancake

The ingredients used for the pancake were – whole wheat flour, foxtail millet flour, cassava flour, eggs, buttermilk,

sugar and ghee. The dry ingredients (flours and sugar) and wet ingredients (eggs and buttermilk) were mixed separately and then combined together to form a batter. A pan was heated on the stove and greased with ghee. The batter was added to the pan once heated one scoop at a time. The pancakes were cooked till bubbles formed on the surface and then flipped to cook the other side for about 1-2 minutes.

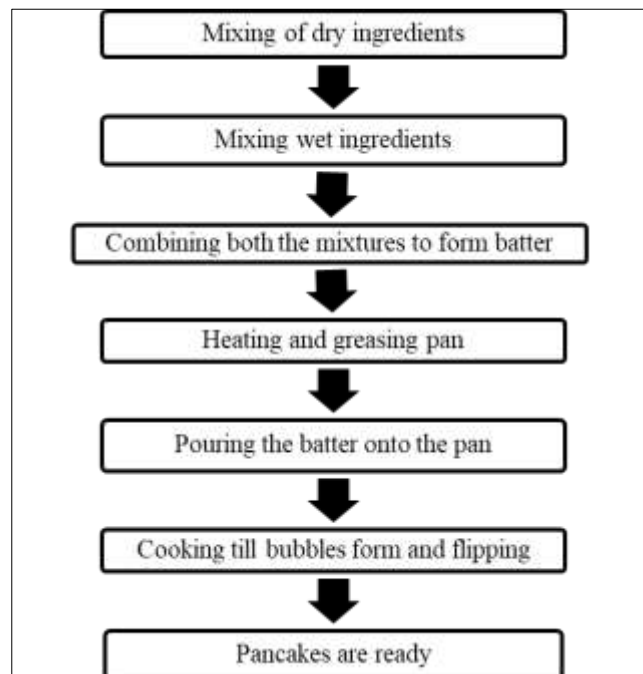


Fig 2: Flowchart depicting preparation of pancake



Fig 3: Prepared pancakes

Sensory Evaluation

A sensory evaluation of the food products was carried out by a panel of five judges using a scorecard that employed a 9-point Hedonic Rating Scale. The judges assessed various attributes, including color and appearance, texture, taste and flavor, as well as the overall acceptability of the developed food products, assigning scores accordingly (B. Srilakshmi, 2018)^[13].

Nutritional Composition

The nutritional content of the food products was determined using the food composition table outlined in the booklet "Nutritive Value of Indian Foods" by C. Gopalan *et al.* (2010)^[3].

Formula used

$$\text{Nutrient per 100 g of product} = \frac{\text{Ingredient used in (g)} \times \text{Nutritive value of the ingredient}}{100}$$

Cost Calculation

The product expenses were calculated by totalling the costs of each individual raw ingredient per kg or L used in preparing the pancake, taking into account the prevailing market prices.

Statistical Analysis

The statistical data analysis encompassed the utilization of methods such as Analysis of Variance (ANOVA), Critical Difference evaluation, and other relevant statistical techniques. Subsequently, the gathered data was interpreted to derive significant insights and conclusions (Gupta et al., 2018)^[4].

Results and Discussion

Sensory Analysis of Pancake

According to the organoleptic assessment results depicted in Fig. 4, the treatment T₂ (70:15:15::WWF:FMF:CF) obtained

the highest score in terms of all the attributes – color and appearance; body and texture; taste and flavour; and overall acceptability. In terms of color and appearance the combination of the flours introduces a natural variation in color and speckling that can be visually appealing. Foxtail millet flour, for instance, adds a slight golden hue. The blend of flours results in a balanced texture that is not too dense (from whole wheat) or too light (from cassava and foxtail millet). Cassava flour contributes to a soft and delicate texture. Foxtail millet flour introduces a nutty and earthy flavor profile that adds richness and intricacy to the pancakes. Pancakes made from a composite flour blend of whole wheat flour, foxtail millet flour, and cassava flour offer a harmonious balance of color, texture, and flavor. This blend not only enhances the visual appeal and mouthfeel but also brings a nutritional advantage and accommodates dietary preferences.

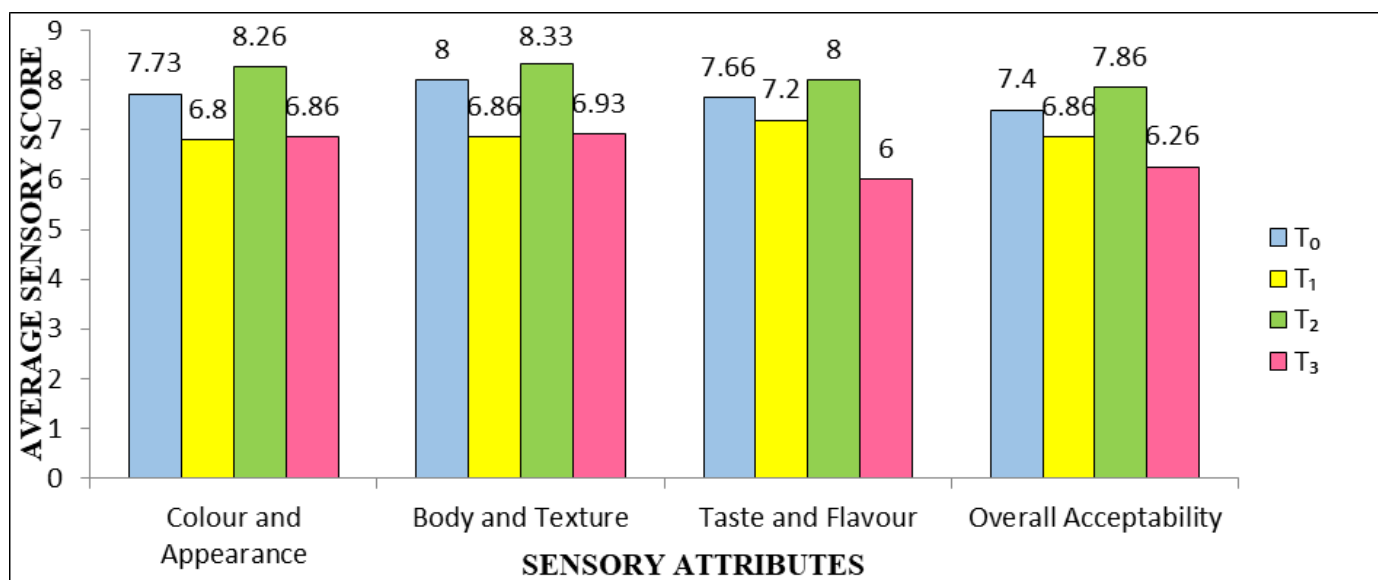


Fig 4: Average sensory scores for various attributes of pancake.

Nutritional profile of pancake treatments

The composite flour blend offers a wider spectrum of nutrients, including dietary fiber from whole wheat and foxtail millet, while cassava contributes carbohydrates. As seen in Table 1, treatment T₃ with the highest ratio of foxtail

millet and cassava flour had an elevated level of nutrients density in comparison to T₁ and T₂. Thus, it can be stated that there is an increase in nutrients such as energy, carbohydrates, dietary fibre and calcium with increase in the ratio of foxtail millet flour and cassava flour incorporation.

Table 1: Nutritional composition of control and treated samples of pancake

Nutrients	T ₀	T ₁	T ₂	T ₃
Energy (kcal)	490.7	493.22	494.48	495.74
Protein (g)	12.84	12.28	12.01	11.73
Carbohydrate (g)	73.62	74.24	74.55	74.86
Fat (g)	23.07	22.97	22.96	22.91
Dietary Fibre (g)	4.28	4.3	4.31	4.32
Calcium (mg)	92.32	93.12	93.52	93.92
Iron (mg)	2.53	2.39	2.33	2.26

Cost Calculation

It is evident in Table 2 that the cost of preparing the pancakes increases with increase in the ratios of foxtail millet and

cassava flours with T₀ at Rs. 20.61; T₁ at Rs. 22.09; T₂ at Rs. 22.84; and T₃ at Rs. 23.69.

Table 2: Cost of preparing pancakes per kg/L of ingredients

Ingredients	Actual Rate/kg (Rs.)	T ₀		T ₁		T ₂		T ₃	
		Amt. (g)	Cost (Rs.)	Amt. (g)	Cost (Rs.)	Amt. (g)	Cost (Rs.)	Amt. (g)	Cost (Rs.)
Wheat Flour	54	40	2.16	32	1.72	28	1.51	26	1.40
Foxtail Millet Flour	300	-	-	4	1.2	6	1.8	8	2.4
Cassava Flour	180	-	-	4	0.72	6	1.08	8	1.44
Sugar	40	30	1.2	30	1.2	30	1.2	30	1.2
Ghee	630	15	9.45	15	9.45	15	9.45	15	9.45
Buttermilk	30	60	1.8	60	1.8	60	1.8	60	1.8
Egg	120	50	6	50	6	50	6	50	6
Total			20.61		22.09		22.84		23.69

Conclusion

The combination of foxtail millet flour and cassava flour with whole wheat flour offers a diverse array of nutritional benefits in addition to enhancing its flavour and texture. The use of this composite flour for the preparation of pancake adds richness to the colour and complexity to the flavor as well as elevating the nutritional profile of the pancakes as opposed to traditional pancakes. Furthermore, these pancakes cater to dietary inclusivity by being gluten-free owing to the inclusion of cassava flour. This makes them a safe and enjoyable option for individuals with gluten sensitivity or celiac disease. Their versatility shines through in their creative possibilities, accommodating various flavors and toppings to suit diverse palates and preferences. Whether served with fruits, syrups, or savory accompaniments, these pancakes are a canvas for culinary experimentation. Based on the findings of sensory analysis, T₂ with the flour blend ratio of 70:15:15 (whole wheat flour, foxtail millet flour and cassava flour respectively) was the most accepted sample among the sensory panellists. The composite flour blend offers a wider spectrum of nutrients, including dietary fiber from whole wheat and foxtail millet, while cassava contributes carbohydrates.

References

- Divakar SA, Prakash J. Nutritional and Bioactive Properties of Foxtail Millet Based Composite Flour. *Indian Journal of Nutrition*. 2021;8(1):223.
- FAO. Cassava. *Food Outlook*; c2009.
- Gopalan C, Sastri BVR, Balasubramanian SC, Rao BSN, Deosthale YG, Pant KC. *Nutritive value of Indian foods*. National institute of nutrition, Hyderabad, India: Indian Council of Medicine Research; c2010.
- Gupta SC, Kapoor UK. *Fundamentals of applied statistics* 4th edition, Chand and Son, c2018. p. 51-85
- Okoko J, Alonge A, Ngoddy P. High quality-cassava flour (HQCF) composites: Their thermal characteristics in retrospect. *IOP Conf. Ser.: Earth Environ. Sci*. 2020;445:012043
- Verma KC, Joshi N, Rana AS, Bhatt D. Quality Parameters and Medicinal Uses of Foxtail Millet (*Setaria italic* L.): A Review. *Journal of Pharmacognosy and Phytochemistry*. 2020;9(4):1036-1038.
- Kour DP, Sharma S, Gandotra A, Gupta N. Evaluation and development of healthy pancake premix from pseudocereals amaranth and buckwheat. *The Pharma Innovation Journal*. 2022;11(11):2041-2045
- Marak NR, Malemnganbi CC, Marak CR, Mishra LK. Functional and antioxidant properties of cookies incorporated with foxtail millet and ginger powder. *Journal of Food Science and Technology*. 2019;56(11):5087-5096.
- Sachdev N, Goomer S, Singh LR. Foxtail millet: a potential crop to meet future demand scenario for alternative sustainable protein. *Journal of the Science of Food and Agriculture*. 2021;101(3):831-842.
- Regina A, Anthony B, Zhongyi L, Rahman S. Bioengineering Cereal Carbohydrates to Improve Human Health. *Cereal Foods World*. 2007;52(4):182.
- Patangare SS, Pawar VS, Syed HM, Shinde ST. Study on physical properties and nutritional profile of Foxtail Millet. *The Pharma Innovation*. 2019;8(3):286-288
- Sharma N, Keshavan N. Foxtail millet: Properties, processing, health benefits, and uses. *Food Reviews International*. 2017;34(4):329-363
- Srilakshmi B. *Food Science*. 8th Edition, Delhi: New Age International Limited, Publishers; c2023. p. 70- 71.
- Poongodi Vijayakumar T, Mohankumar JB. Formulation and characterization of Millet flour blend incorporated composite flour. *International Journal of Agriculture Sciences*. 2014;1(2):46-54.
- Poongodi Vijayakumar T, Mohankumar JB, Srinivasan T. Quality Evaluation of Noodles from Millet Flour Blend incorporated Composite Flour. *Journal of Scientific & Industrial Research*. 2010;69:48-54.