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Assessing the suitability of bread fruit flour for product development

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Abstract

Processing the perishable starchy fruit into flour provides a means to expand the use of the bread fruit. The purpose of this research was to develop pasta using breadfruit flour at 10% and 20%, the sensory qualities of the breadfruit pasta product by sensory evaluation and to evaluate the nutritional composition. Sensory evaluation indicates that wheat flour incorporated pasta with breadfruit flour was highly acceptable. Dehydrated chunks from bread fruit was developed by using solar and cabinet drying. The breadfruit pasta product can provide a nutritious, appealing and inexpensive food source.

Keywords: Breadfruit, breadfruit flour, pasta, incorporation, sensory evaluation

Introduction

Breadfruit (*Artocarpus altilis*) or popularly known as Kolo or Rimas here in the Philippines, is a species of flowering tree in the mulberry family, Moraceae, that is a native of the Pacific Islands. Its name is derived from the fact that, when cooked, the fruit of the breadfruit tree has a potato like flavor, similar to fresh baked bread. Breadfruit is low in saturated fat, cholesterol and sodium and very high in Vitamin C, dietary fiber and potassium. The nutritional value of breadfruit helps you to maintain optimum health. Breadfruit has been considered as a nutritionally beneficial fruit (Pinoyentre, 2015) ^[5].

Breadfruit is an energy-rich food, high in complex carbohydrates, low in fat and good sources of fiber and minerals such as iron, potassium, and calcium. All of the essential amino acids are found in breadfruit protein, which is especially rich in phenylalanine, Leucine, isoleucine and valine. It is a nutritionally higher quality protein than occurs in other staple foods such as corn, wheat, rice, soybean, potato and yellow pea (Ragone and Cavaletto, 2006) ^[6]. Processing breadfruit into a snack such as chips, flour, pulverized starch or even freeze-drying it are all common methods of consuming or preserving it.

Pasta is a popular commercial food product because of its ease of preparation, palatability, versatility, low cost, nutritional value, and long shelf life. Pasta products can be prepared at home or by food service operations, and also provide a practical, portable, and stable storage form. Wheat flour has been extensively used in the production of alimentary pastas such as macaroni, spaghetti, and other

noodle forms. Noodles are an important food product throughout the world. Dehydrated chunks can be used during off season. Process for dehydration and its suitability for product development was assessed.

Materials and Methods

The study was conducted at the Department of Food Science and Nutrition, Community Science College and Research Institute, Tamil Nadu Agricultural University, Madurai, Tamil Nadu, India during the year 2022.

Nutrient analysis

The moisture, fat, fibre, minerals, crude fibre, vitamin C, total carotenoids of the product was analysed as per the procedure prescribed by AOAC, 1980 ^[1]. Calcium by Clark and Collip, (1925) ^[2] phosphorus and iron by (Wong, 1928) ^[7] were carried out using standard methods.

Sensory evaluation

The prepared chutney were subjected to sensory evaluation by a panel of twenty trained and untrained judges using 9 point hedonic scale with a maximum score of 9 for 'like extremely' and minimum of 1 for 'dislike extremely'.

Bread fruit flour

For the preparation of flour, the fruit was cut into quarters and remove the core with a knife. Cut quartered breadfruit into chunks, cut into thin slices less than ¼ inch for drying. The bread fruit chunk was put into a 5% salt solution to reduce the browning. Then it was dried at 60 °C for 6-8

hours until breadfruit pieces are crispy. After dehydration, mill the dried breadfruit using mixie. At 60 °C, minimal browning of the flour via Maillard reaction occurs and as temperature rises, more Maillard reaction was seen. A greater rate of browning by Maillard reaction could indicate a decrease in flour quality.



Fig 1: Bread fruit flour

Results and Discussion

Table 1: Nutritive value of the bread fruit flour

Nutrients	Fresh bread fruit	Bread fruit flour
Fibre (g)	4.0	11.4
Protein (g)	2.0	5.2
Vitamin C (mg)	8.2	6.3
Iron (mg)	9.5	13.13
Calcium (mg)	24.5	294.8
Beta carotene (µg)	780	2200
Moisture (g)	66.5	7.0

Bread fruit flour contained high amount of fibre (11.4 g %), protein (5.2 g %), vitamin C (6.3 mg %), iron (13.13 mg %), calcium (294.8 mg %), β -carotene (2200 µg %). Breadfruit flour is typically made from cooked, dried breadfruit to reduce anti-nutritional compounds before milling and sieving.

Standardization of Bread fruit pasta

Bread fruit flour pasta was prepared with different combinations to standardize the product. The combinations are as follows:

Table 2: Formulation of bread fruit flour pasta

SI. No.	Ingredients	Control	Breadfruit incorporated pasta @ 10%	Breadfruit incorporated pasta @ 20%
1.	Wheat flour (g)	-	250	200
2.	Refined wheat flour(g)	300	-	200
3.	Bread Fruit flour (g)	-	50	100
4.	Salt(g)	2	2	2

100% wheat flour incorporated pasta served as control. Bread fruit flour incorporated pasta was developed by using refined wheat flour by adding 20% bread fruit powder and whole wheat flour by adding 20% bread fruit powder.

Preparation of bread fruit flour incorporated pasta

Other than the breadfruit flour, all the ingredients (wheat flour, refined wheat flour, salt) were purchased commercially. The dry ingredients were combined in the hopper of a pasta extruder. With the machine running slowly, the oil was added followed by the water. The mixture was kneaded for about five minutes resulting in a coarse and crumbly batter. The batter was then extruded using pasta die. The resulting breadfruit pasta was dried in a cabinet drier.

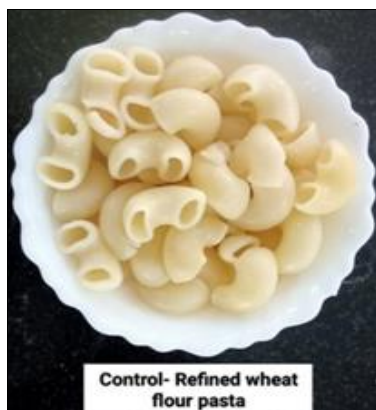


Fig 2: Control-Refined wheat flour pasta



Fig 3: Breadfruit flour incorporated with wheat flour pasta

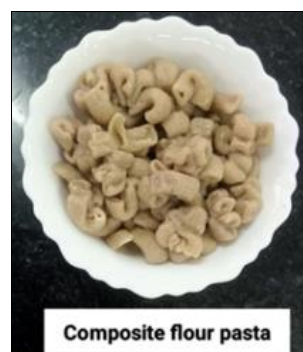
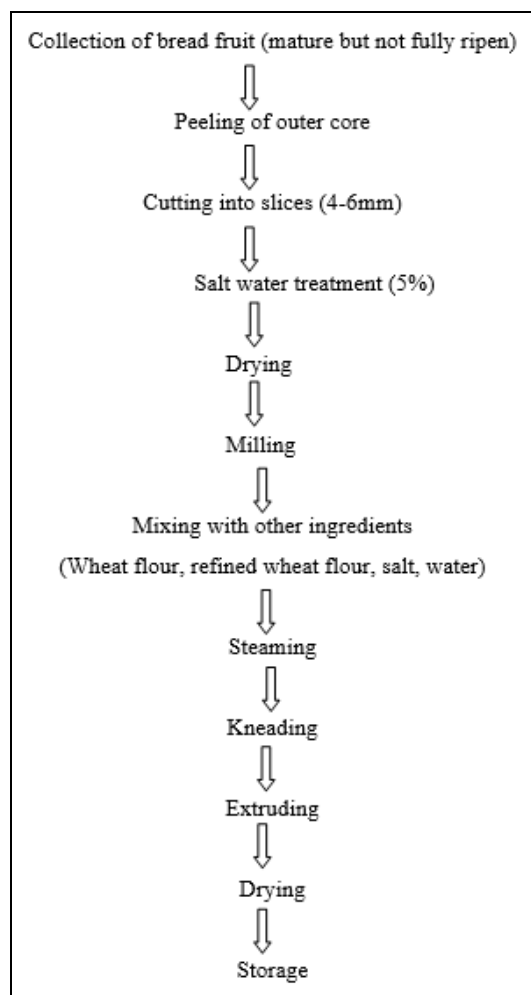


Fig 4: Composite flour pasta

Development of the product

The flow chart for the preparation of bread fruit flour pasta:

**Table 3:** Nutritive value of the pasta products developed using bread fruit flour

SI. No.	Nutrients	Nutritive value/100 g			
		Control	Breadfruit incorporated pasta @ 10%	Breadfruit incorporated pasta @ 20%	
1	Protein(g)	3.2	2.32	2.4	0.786
		a	b	b	
2	Fibre (g)	3	9.3	10.2	1.878
		c	b	a	
3	Iron(mg)	1.1	3.5	2.36	0.057
		c	a	b	
4	Calcium(mg)	32	34	83	NS
5	Moisture (%)	4	5	5	0.141
		b	a	a	

Pasta developed using 20% bread fruit flour had higher amount of fibre (10.2 g %) and calcium (83 mg %) followed

by Pasta developed using 10% bread fruit flour and control pasta.

Table 4: Cooking quality of bread fruit incorporated pasta products

SI.NO	Parameters	Control	Breadfruit incorporated pasta @ 10%	Breadfruit incorporated pasta @ 20%
1	Weight(g)	10	10	10
2	volume of water(ml)	100	100	100
3	Weight after cooking(g)	31.9	27.08	25.9
4	Cooking time (mins)	12	9	11
5	Water intake(ml)	75	74	54
6	Gruel loss (%)	2	5.05	6.45

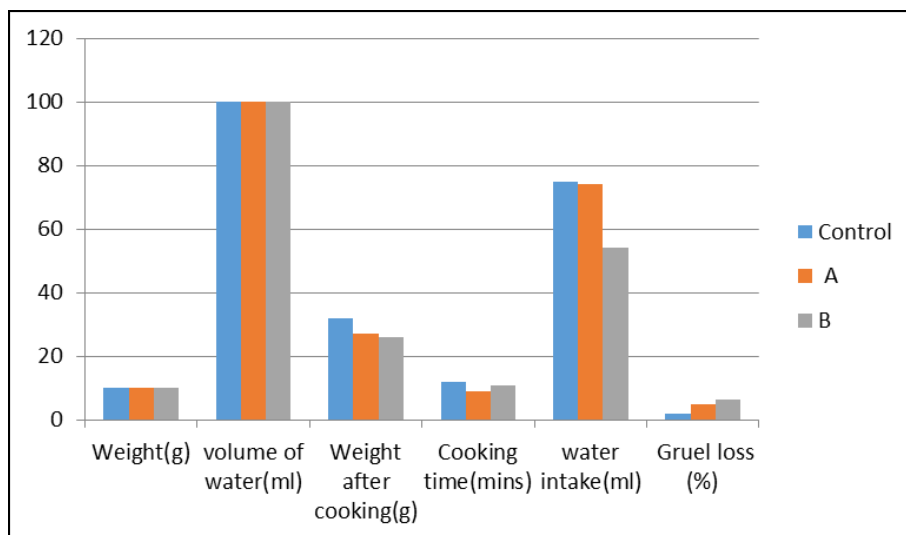


Fig 6: Cooking quality of bread fruit incorporated pasta products

The gruel loss was higher in Pasta developed using 20% bread fruit flour. Among the bread fruit flour incorporated pasta, cooked weight was higher in 10% bread fruit flour pasta followed by pasta made using (20%) and Control pasta recorded higher cooked weight. Bread fruit incorporated pasta (10%) had lower cooking time (9 mins) followed by bread fruit pasta (20%) and control. Hence from the cooking quality of pasta it could be inferred that bread fruit pasta (10%) had a good cooked weight short duration cooking time with minimum cooking loss.

Preparation of pasta



Fig 6: Refined wheat pasta



Fig 7: Composite flour pasta

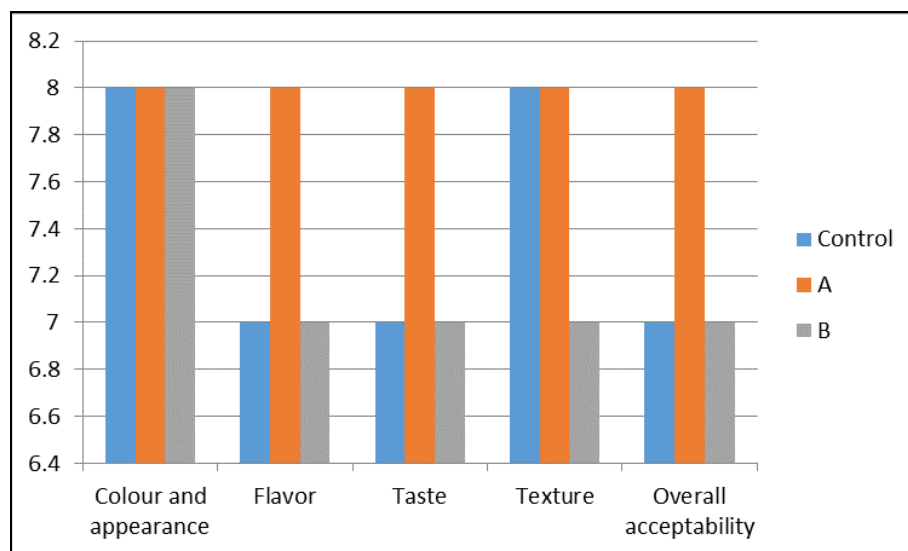


Fig 8: Wheat flour incorporated

Organoleptic Evaluation

The sensory characteristics of the value enriched bread fruit flour pasta with control refined wheat flour pasta and composite flour pasta. The organoleptic acceptance of developed bread fruit flour pasta product was highest in terms of different sensory attributes viz., color, appearance, flavor, texture and taste. Among the pasta (10% incorporated pasta and 20% mix along with other flours) treatment combinations based developed product recorded maximum score values in terms of appearance, color, texture and taste. Likewise, the wheat flour incorporated pasta was found to be highly acceptable. Overall, it is evident that among the different treatments of 10% incorporated pasta had the highest sensory score and it had been recorded as maximum score in overall acceptability.

Sensory evaluation of bread fruit flour incorporated pasta



*A - Breadfruit incorporated pasta @ 10%, B- Breadfruit incorporated pasta @ 20%

The incorporation of 10 g bread fruit flour per 100 g of wheat flour used to prepare chocolate cake, resulted in increase in the protein and ash contents and a decrease in the fat content. The incorporation of bread fruit flour in biscuits resulted in larger amounts of ash and crude fiber. A high ash content corresponds to the amount of mineral matter present in the flour. Since jackfruit seeds are rich in crude fiber, an

increase in crude fiber was found in the biscuits, but the incorporation also resulted in losses in the protein and carbohydrate contents of the biscuits. Bread made with the incorporation of bread fruit flour showed a higher crude fiber content, whereas baked products are normally insufficient in dietary fiber (Islam *et al.*, 2015) ^[3].

Table 5: Dehydration and Rehydration properties of bread fruit chunks

Sl. No.	Parameters	Solar drying	Cabinet drying
1.	Weight of fruit taken (g)	110	110
2.	Temperature (°C)	40	60
3.	Time taken for drying (hrs)	20	6
4.	Weight after drying (g)	8.4	6.3
5.	Volume of water taken (ml)	200	200
6.	Weight taken for rehydration (g)	3	3
7.	Weight of fruit after rehydration (g)	12	13
8.	Water absorption (ml)	66	63
9.	Time taken for rehydration (mins)	30	30
10.	Yield	30	26

Bread fruit is a highly nutritious, but the shelf life of mature bread fruit is 2 to 3 days. The study invested above shows the results of dehydration and rehydration process of bread fruit. It shows that the yield of production was high (30%) in solar dried bread fruit compared to cabinet dried bread fruit.

Preparation of bread fruit curry

The rehydrated bread fruit was added with other ingredients like onion, tomato, green chilli, curry leaves, garam masala, chilli powder, turmeric powder one by one. It was sorted for 4-5mins to make the curry and the sensory property was found to be higher (8.0/9.0)

Conclusion

The wheat flour incorporated pasta was found to be highly acceptable. Overall, it is evident that among the different treatments of which 10% incorporated pasta had the highest sensory score and it had been recorded as maximum score in overall acceptability. Breadfruit is an important tropical staple. Unfortunately, the short shelf-life of the fruit limits the use of this tropical resource for consumption. Processing

breadfruit fruit into shelf-stable flour will extend the use of fresh breadfruit and create a year-round. The results of the present study revealed that beneficial gluten free products obtained from breadfruit flour with health promoting factors has superior proximate, culinary and sensory attributes. Since breadfruit is rich in minerals, fibre and gluten free, it is considered as useful product.

References

1. AOAC. Official Methods of Analysis. 13th ed. Washington DC: Association Official Analytical Chemists; c1980.
2. Clark EP, Collip JB. A study of the Tisdall method for the determination of blood serum calcium with a suggested modification. *Biochem J.* 1925;19:274-284.
3. Islam S, Begum R, Khatun M. A study on nutritional and functional properties analysis of jackfruit seed flour and value addition to biscuits. *Int J Eng Res Technol.* 2015;4(12):139-147.
4. Nochera CL, Caldwell M. Nutrition evaluation of breadfruit composite product. *Foods.* 2019;8(3):110. Available from: <https://doi.org/10.3390/foods8030110>.

5. Pinoyentre. Preparation of a breadfruit production-franchise, business and entrepreneur. Available from: <http://www.pinoy-entrepreneur.com/2011/07/03/breadfruit-production>. Published 2015.
6. Ragone D, Cavaletto C. Sensory evaluation of fruit quality and nutritional composition of 20 breadfruit (*Artocarpus*, *Moraceae*) cultivars. *Econ Bot*. 2006;60:335-346.
7. Wong SY. Colorimetric determination of iron and hemoglobin in blood. *J Biol Chem*. 1928;77:409-418.