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Dr. W. B. BELLO, Dr. M. A. MOSOBALAJE

Dr. G. O. OYELERE, Mr. R. A. AJAO

PROXIMATE ANALYSIS AND CHEMICAL ANALYSIS OF FLOUR AND SNACKS MADE FROM BREADFRUIT

Olatunji, I. I., Mojeed, A. M. and Olaoye, S. O.

Department of Home and Rural Economics, Oyo State College of Agriculture and Technology, Igboora Oyo State

Abstract

The study focused on chemical analysis of flour and cookies from breadfruit to determine their nutrient contents and also, evaluate the acceptability of these products. The breadfruit flour and cookies were in the Food Production Unit of Home and Rural Economics Department of Oyo State College of Agriculture and Technology, Igboora and taken to the laboratory for analysis, while acceptability was determined by the staff and students of Home and Rural Economics Department using nine hedonic scale. The result showed that 100% Breadfruit flour and its cookies had 80% overall acceptability while both 50:50 wheat - breadfruit flour cookies and 100% wheat flour had 100% overall acceptability. The chemical analysis result showed that 100% wheat flour cookies had the highest protein content (6.56 ± 0.01) while breadfruit flour cookies had the highest carbohydrate content (18.015 ± 0.007) as well as highest potassium (6.512 ± 0.014) and magnesium (18.015 ± 0.007) content but 50:50 wheat flour and breadfruit flour cookies had the highest phosphorus (4.541 ± 0.018) content. In conclusion breadfruit flour and breadfruit flour cookies were found to be very nutritious and well accepted in the study area. It is recommended that breadfruit can be turned into flour and be preserved to prevent its vulnerability to rapid spoilage and encourage its usage in snacks and dishes to promote its production.

Introduction

Breadfruit is a traditional and huge tree that produces a lot of fruits with an average size of 400 to 600 fruits per year. It is planted with the root cuttings and produce first fruit between 4 to 6 years. It cultivates fruit twice in a year, from March to June and from July to September with some fruiting throughout the year. (Colin 2016, NTBG, 2009). It is produced in over 90 countries but yet considered underutilized crop. Breadfruit is highly nutritious, cheap and readily available in overwhelming abundance during its season, it has limited industrial usage in food industries (Ishera, 2020). The fruit has been described as an important staple food of a high economic value (Turi 2015). It is commonly cultivated in several other tropical countries like West Indies, Ghana, Sierra Leone, Jamaica and Nigeria. The breadfruit pulps are made into various dishes; it can be pounded, fried, boiled or mashed to make porridge; it can also be processed into flour and used in bread and biscuit making (Amusa *et al*, 2002). Cookies are common, fast, convenient and economical snacks consumed popularly by all age group and its inclusion in Nigerians has increased greatly, especially among children.

The use of non wheat flour is capable of playing complementary roles in reduction of protein-energy malnutrition and capable of alleviating associated social problems (Adegoke *et al* 2020, Ishera *et al* 2021). Breadfruit has also been reported to be rich in fat, ash, fibre and protein. (Needham *et al*, 2020). One of the major problems of breadfruit production in developed countries is the post harvest loss due to shelf life. This usually lead to loss of the fruit in the store.

Objectives of the Study

The study is aimed at assess flour and snacks made from breadfruit.

Materials and Methods

This study was carried out at Food Production Unit of Home and Rural Economics Department, Oyo State College of Agriculture and Technology Igboora.

Processing of breadfruit into flour

The breadfruits were processed into flour. The breadfruits were thoroughly washed to remove any dirt and unwanted materials. Then peeled and washed with clean water. The breadfruits were sliced, blanched for about 15 minutes and sun dried, milled into flour, sieved and then used to produce snacks. Experimental design was employed. Three cookies was prepared with breadfruit flour used 10%, 100% and 50% of wheat flour constituting treatment A, B, and C, respectively. The composition of the cookies is presented below:

Method of preparation of Cookies

Ingredient	Quantity
Sample A: Breadfruit flour	500g
Sample B: Wheat Flour	500g
Sample C: 50 % Breadfruit,	125g
50% Wheat flour	125g
Baking powder	2 level tablespoons
Salt	pinch of salt
Sugar	300g
Fat	250g
Eggs	12big size
Flavour	10g

Methods of Data Analysis

Proximate analysis of the three cookies was carried out to obtain crude protein, crude magnesium, potassium, carbohydrate, and data collected were subjected to descriptive tools such as frequency, percentages. In addition, the questionnaire was based on flavor, texture, taste, color, and overall acceptability carried out using 9- hedonic scale

Results and discussion

Table1 showed the respondent view about the colour of the blended breadfruit flour, 12% of the respondents like the colour of the flour slightly, 24% like moderately, 20% of the respondents like very much while 44% of the respondent like the colour of the flour extremely respectively. Furthermore, the table also showed the respondent view on the texture of the blended breadfruit flour, 4% of the respondents like slightly, 36% also like the flour moderately, 44% of the respondents like the flour very much while 16% of the respondents like extremely. On the view of the respondents on the flavor of the breadfruit flour 8% like slightly, 20% like moderately, 56% like very much and 16% like extremely Overall acceptability of the flour which goes thus; 20% of the respondents like the flour moderately, 15% of the respondents also like slightly 15% of the respondents like moderately, 32%

of the respondents like the flour very much while 48% of the respondents like the blended breadfruit flour extremely respectively.

This actually showed that the breadfruit flour is absolutely accepted and excellent according to the respondents view in the study area.

The colour of the cookies from 100% breadfruit-flour, 8% of the respondents like the colour slightly, 28% like the colour of the cookies moderately, 20% like the colour of the cookies very much while 44% like the colour extremely. The table also shows the respondents view on the taste of the cookies, 4% neither like nor dislike the taste of the cookies, 8% like slightly, 12% like moderately 40% 45% of the respondents like very much while 36% of the respondent like the cookies extremely . Furthermore, the table also shows the respondent view on the texture of the 100% breadfruit cookies, 12% of the respondents like slightly, 8% also like the cookies moderately, 52% of the respondents like the cookies very much while 28% of the respondents like extremely. On the respondents view about the flavor of the cookies 4% neither like nor dislike the flavor of the cookies while 8% like the flavor slightly, 24% like moderately, 32% like very much and another 32% like extremely Lastly the overall acceptability of the cookies goes thus; 4% of the respondents neither like nor dislike the cookies, 16% of the respondents like slightly, another 16% of the respondents also like moderately, 24% of the respondents like the cookies very much while 40% of the respondents like the cookies extremely respectively.

This actually showed that cookies produced from 100% breadfruit flour is highly accepted and appreciated by the respondents in the study area.

Respondents view about the colour of the cookies from 100%wheat flour, 4% of the respondents like the colour of the cookies slightly, 16% like moderately, 44% of the respondents like very much while 36% of the respondents like the colour of the cookies extremely respectively. Furthermore, the table also shows the respondent view on the taste of the cookies 4% like slightly, 36% like moderately, 44% like very much while 16% like extremely. On the view of the respondents on the texture of the cookies, 20% of the respondents like moderately, 32% of the respondents like the cookies very much while 48% of the respondents like extremely. On the view of the respondents on the flavor of the cookies 8% like slightly, 20% like moderately, 56% like very much and 16% like extremely Lastly, the table above, shows the overall acceptability of the cookies which goes thus 20% of the respondents like the cookies moderately, 32% of the respondents like the cookies very much while 48% of the respondents like the cookies extremely respectively.

This actually showed that the cookies from 100% wheat flour is absolutely accepted and excellent according to the respondents view in the study area.

Respondents view on the cookies produced from 50:50 composite flour of breadfruit and wheat, 4% of the respondents like the colour of the cookies slightly, 12% like moderately, 24% of the respondents like very much while 60% of the respondents like the colour of the cookies extremely respectively. Furthermore, the table also shows the respondents view on the taste, 20% like moderately, 44% like very much and 36% like extremely, 4% of the respondents dislike the texture slightly, 12% like the texture of the cookies moderately while 32% like the texture of the cookies very much and 52% like the cookies extremely. On the respondents view on flavor, 4% like the cookies moderately, 56%% of the respondents like the cookies very much while 40% of the respondents like extremely. On the view of the respondents on the overall acceptability of the cookies 12% like moderately, 28% like very much and 60% like extremely.

This actually showed that the cookies produced from the composite flour was highly accepted and excellent according to the respondents view in the study area



Breadfruit Flour											Sample A: Cookies from Breadfruit flour									
Hedonic scale	Color		Texture		Appearance		Flavour		Overall accept		Color		Taste		Texture		Flavour		Overall accept	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Like extremely	11	44	8	32	9	36	8	32	10	40	11	44	9	36	7	28	8	32	10	40
Like very much	5	20	10	40	11	44	8	32	6	24	5	20	10	40	13	52	8	32	6	24
Like moderately	6	24	3	12	4	16	6	24	4	16	7	28	3	12	2	8	6	24	4	16
Like slightly	3	12	3	12	-	-	2	8	4	16	2	8	2	8	3	12	2	8	4	16
Neither like or dislike	-	-	1	4	1	4	1	4	1	4	-	-	1	4	-	-	1	4	1	4
Dislike slightly											-	-	-	-	-	-	-	-	-	-
Dislike moderately											-	-	-	-	-	-	-	-	-	-
Dislike very much											-	-	-	-	-	-	-	-	-	-
Dislike extremely											-	-	-	-	-	-	-	-	-	-
Total	25	100	25	100	25	100	25	100	25	100	25	100	25	100	25	100	25	100	25	100
Sample B: Cookies from 100% Wheat Flour											Sample C: Cookies from 50%breadfruit flour & 50%wheat flour									
Hedonic scale	Color		Taste		Texture		Flavour		Overall accept		Color		Taste		Texture		Flavour		Overall accept	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Like extremely	9	36	4	16	12	48	4	16	12	48	15	60	9	36	13	52	10	40	15	60
Like very much																				
Like moderately	11	44	11	44	8	32	14	56	8	32	6	24	11	44	8	32	14	56	7	28
Like slightly	4	16	9	36	5	20	5	20	5	20	3	12s	5	20	3	12	1	4	3	12
Neither like or dislike	-1	-4	-1	-4	-	-	2	-8	-	-	-1	-4	-	-			-	-	-	-

Dislike slightly	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dislike moderately	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-1	-4	-	-	-	-
Dislike very much	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dislike extremely	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1: Hedonic Measurement of Breadfruit Flour and Cookies Sample A

Chemical Analyses of the Samples

The crude protein content ($6.56 \pm 0.01\%$) of 100% wheat flour was higher than those of 50: 50 wheat flour and breadfruit flour cookies, and 100% breadfruit flour cookies ($6.24 \pm 0.04\%$), ($6.53 \pm 0.00\%$), respectively.

The total carbohydrate contents (72.29 ± 0.09) of 100% breadfruit flour cookies was the highest, followed by (70.97 ± 0.02) of wheat flour and (70.57 ± 0.02) of 50:50 wheat flour and breadfruit flour cookies.

The Potassium content (6.6 ± 0.014) of 100% breadfruit flour cookies was highest, followed by (3.993 ± 0.006) of 100% wheat flour cookies and lastly (2.604 ± 1.072) of 50:50 of wheat flour and breadfruit flour cookies

The magnesium content (18.015 ± 0.007) of 100% breadfruit flour cookies was highest, followed by (15.88 ± 0.001) of 100% wheat flour cookies and (15.146 ± 0.003) of 50:50 wheat flour and breadfruit cookies.

The Phosphorus content (4.541 ± 0.018) of 50:50 wheat flour and breadfruit flour cookies was highest, (4.234 ± 0.014) of 100% wheat flour cookies and (4.136 ± 0.009) of 100% breadfruit flour cookies respectively.

Table 2.0 Chemical Analysis of Breadfruit Flour and Cookies made from Breadfruit

Samples	1	2	3	Mean	SD	Mean $\pm$ SD
Crude Protein Content						
Breadfruit Flour (100%)	6.01	6.01	6.01	6.01	0.00	6.01 $\pm$ 0.00
Cookies A (100% breadfruit flour)	6.22	6.28	6.21	6.24	0.04	6.24 $\pm$ 0.04
Cookies B (50%Breadfruit.flour. & 50% wheat flour.)	6.53	6.53	6.53	6.53	0.00	6.53 $\pm$ 0.00
Cookies C (wheat flour)	6.55	6.57	6.55	6.56	0.01	6.56 $\pm$ 0.001
Carbohydrate Contents						
Breadfruit Flour (100%)	67.32	66.82	67.3	67.15	0.28	67.15 $\pm$ 0.28
Cookies A	72.32	72.36	72.18	72.29	0.09	72.29 $\pm$ 0.09
Cookies B	70.58	70.55	70.59	70.57	0.02	70.57 $\pm$ 0.002
Cookies C	70.98	70.95	70.97	70.97	0.002	70.97 $\pm$ 0.002
Potassium Content (mg/g)						
Breadfruit Flour (100%)	6.515	6.553		6.534	0.019	6.534 $\pm$ 0.02
Cookies A	6.498	6.525		6.512	0.014	6.512 $\pm$ 0.014
Cookies B	6.498	6.525		6.512	0.014	6.512 $\pm$ 0.014

Cookies C	3.998	3.987		3.993	0.006	3.993±0.006
Magnesium Content (mg/g)						
Breadfruit Flour (100%)	19.276	19.278	-	19.277	0.001	19.276±0.001
Cookies A	8.015	18.025	-	18.020	0.007	18.015±0.007
Cookies B	15.146	15.15		15.148	0.003	15.146±0.003
Cookies C	15.88	15.881		15.881	0.001	15.88±0.001
Phosphorus Content (mg/g)						
Breadfruit Flour (100%)	3.326	3.320	3.311	3.319	0.008	3.319±0.008
Cookies A	4.129	4.146	4.132	4.136	0.009	4.136±0.009
Cookies B	4.532	4.530	4.562	4.541	0.018	4.541±0.018
Cookies C	4.247	4.235	4.235	4.234	0.014	4.234±0.014



CONCLUSION

Breadfruit flour was produced and used to make cookies also cookies were also produced from 100% wheat flour and 50:50 wheat flour and breadfruit flour. The cookies were evaluated by respondents for acceptability, the three cookies were well accepted but cookies from 100 wheat flour was most accepted. The cookies were also analyses for nutrients content, it was observed that !00% wheat flour cookies had the highest protein content while breadfruit flour cookies had the highest carbohydrate content as well as highest potassium content and magnesium but 50:50 wheat flour and breadfruit flour cookies had the highest phosphorus

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