

The Proximate Composition and Sensory Evaluation of the Flours of Breadfruit (*artocarpus altilis*), Benth Seed (*adenopus breviflorus*) and their Composite Bread.

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Abstract

The proximate composition and sensory evaluation of breadfruit (*Artocarpus altilis*), benth seed (*Adenopus breviflorus*) and wheat flour (*Triticum aestivum*) were analysed. The proximate composition of the seed flour revealed that breadfruit flour had the lowest protein content (6.35%) while benth seed flour had the highest protein content of 28.37%. The percentage ash and crude fibre were high in breadfruit and benth seed when compared with wheat flour. The highest value for crude fat was recorded in benth seed flour (47.60%). However, the protein and fat content of the bread produced increased with increase in the level of substitution of the non-wheat flour. The sensory evaluation also revealed that wheat flour can be substituted with breadfruit or benth seed flour up to 20 % level without any significant difference in taste, appearance and colour of the resulting composite bread and that of the commercially available bread but their flavours and textures were quite different at all levels of substitution.

Keywords: Proximate composition, Sensory evaluation,

1. INTRODUCTION

The tendency to eat bread is increasing among populations in many parts of the world where previously, bread was not an item of the daily diet. However, most of the wheat required to satisfy the demand for bread is grown in only few countries. This is due to the fact that climate/or soil are less suitable for its cultivation in other countries. If people in their areas nevertheless wish to change to the consumption of bread, they will need to import wheat and pay for it in foreign currency. This is an adverse economical factor for nearly every developing country.

A partial substitution of wheat flour by non-wheat flour does in fact save some foreign exchange. The consumption of cereal based foods such as bread and biscuits have also become popular in Nigeria. These food therefore provide an excellent means of improving nutritional quality through incorporating of proteins. Idowu et al (1996) studied the use of cocoyam flour as composite with wheat flour in bread and biscuit production. They found that up to 10% and 80% substitution with cocoyam flour produced acceptable breads and biscuit, respectively.

This present study therefore seek possibilities for the use of underutilized indigenous raw materials in the production of bread.

2.0 MATERIALS AND METHODS.

The fruits of Breadfruit were obtained from Erijayan-Ekiti, a town in Ekiti state and Benth seeds were bought from Edo-state.

The proximate analysis of the samples and the composite bread were carried out according to AOAC 1990. Sensory evaluation were conducted by trained panellist consisting of staff and graduate students from the department of science Technology and Food Technology at the Federal polytechnic Ado-Ekiti. The trained panel consist of ten members, they were trained to evaluate the appearance, colour, taste, texture and flavour of the composite bread and the control samples i.e. the commercial bread and 100%wheat flour bread on a hedonic scale of 9 where 1 represent 'dislike extremely'and 9 "like extremely"(Ihekoroye et al 1985).

The data collected during sensory evaluation were subjected to analysis of variance(ANOVA) using SPSS 10 computer program.

3.0 DISCUSSION

The proximate composition of the raw flours and the composite bread produced from them is represented in Table 1.0, 2.0, 3.0. The result showed that the moisture content of both flours were lower than the 13% recommended for storage stability of flours but were significantly different from one another. Benth seed flour recorded the highest protein content (28.37%) while the breadfruit has the lowest protein content (6.35%) but has

a high carbohydrate content (76.59%). The results are comparable with those reported by Oshodi 1996, Kayode et al 1995. there was no significant difference in the ash contents of breadfruit (3.28%) and benth seed (3.55%) though higher in both samples than the wheat flour (0.90%). The high values of the ash is an indication that these flours are good sources of minerals. The high crude fat of benth seed (47.60%) suggests that it is an oil seed. The appreciable amount of carbohydrate in breadfruit flour and protein in benth seed flour suggests that the flours may find use in the manufacture of bakery foods.

Table 1.0 Proximate composition of benth seed, breadfruit and wheat flours.

Samples	% Moisture	% Ash	% Crude protein	% Fat	% Crude fibre	% CHO
Benth Seed (A)	2.48±0.29 ^a	3.55±0.09 ^b	28.37±0.43 ^c	47.60±0.02 ^c	4.37±0.35 ^b	13.60±0.04 ^a
Breadfruit (B)	7.52±0.25 ^b	3.28±0.66 ^b	6.35±0.44 ^a	1.10±0.05 ^a	5.16±0.08 ^c	76.59±0.08 ^c
Wheat flour	12.60±0.01 ^c	0.90±0.01 ^a	13.80±0.03 ^b	1.30±0.02 ^b	0.02±0.01 ^a	71.20±0.21 ^b

The proximate composition of the composite bread showed that the moisture content of breadfruit/wheat composite bread increased as the level of substitution increased while that of benth seed /wheat bread decreased with increase in the level of substitution this may be due to high fat content. Nevertheless, the moisture content of the composite bread fell within recommended values for moisture content of bread (40% maximum) NIS 1976

The protein content also increased significantly with increase in the level of substitution of the non-wheat flour for the samples but was generally higher than the bread produced from 100% wheat flour the commercial bread.

The crude fibre content for benth/wheat flour bread is low and comparable to that of commercially available bread while that of breadfruit/wheat bread is higher and this is consistent with the result obtained by Kayode et al 1995

However, all the various composite bread of up to 20% level of substitution had closer rating with the control bread sample (100% wheat bread and commercially available royal bread) in all parameters analysed.

Table 2.0 Proximate composition of the composite bread from wheat flour and breadfruit flour.

Samples	%Mc	%Ash	% Crude protein	% fat	% Crude fibre	%CHO
A1	30.62±0.06 ^b	1.13±0.01 ^b	10.07±0.85 ^c	2.86±0.03 ^g	2.25±0.01 ^c	53.07±0.03 ^g
A2	31.03±0.03 ^b	1.20±0.01 ^c	13.35±0.20 ^d	2.83±0.04 ^g	2.26±0.03 ^c	49.33±0.03 ^c
A3	34.23±0.02 ^c	1.53±0.01 ^d	13.60±0.20 ^d	2.75±0.02 ^f	2.42±0.02 ^d	45.40±0.05 ^d
A4	36.81±0.03 ^d	1.58±0.01 ^d	14.23±0.62 ^c	2.64±0.02 ^c	2.45±0.01 ^c	42.28±0.02 ^c
A5	37.80±0.04 ^e	1.62±0.01 ^e	14.55±0.53 ^e	2.58±0.01 ^d	2.61±0.03 ^f	40.83±0.03 ^b
A6	41.06±0.03 ^f	2.67±0.02 ^g	15.38±0.08 ^f	2.44±0.01 ^c	2.23±0.06 ^c	36.22±0.03 ^a
C.R.B.	34.28±0.04 ^c	1.87±0.01 ^f	8.51±0.02 ^b	1.13±0.07 ^a	0.53±0.02 ^b	53.66±0.05 ^h
W.F.B	36.85±0.04 ^d	0.52±0.02 ^a	7.89±0.34 ^a	1.83±0.15 ^b	0.03±0.02 ^a	52.69±0.02 ^f

Values are means of three replicates

Values = the same column having different superscript are significantly different. (P<0.05)

A1 – 90% Wheat flour and 10% breadfruit flour

A2 – 80% Wheat flour and 20% breadfruit flour

A3 – 70% Wheat flour and 30% breadfruit flour

A4 – 60% Wheat flour and 40% breadfruit flour

A5 – 50% Wheat flour and 50% breadfruit flour

C.R.B. – Commercial Royal Bread

W. F. B – Wheat flour Bread

Table 3.0 Proximate composition of the composite bread from wheat flour and benth seed flour.

Samples	%Mc	%Ash	%Crude protein	%Fat	%Crude fibre	%CHO
B1	31.74±0.05 ^f	0.37±0.01 ^a	14.82±0.27 ^c	6.95±0.02 ^c	0.27±0.01 ^b	45.82±0.02 ^c
B2	30.18±0.03 ^e	0.67±0.01 ^c	15.42±0.31 ^d	7.10±0.03 ^d	0.27±0.01 ^b	46.55±0.05 ^d
B3	27.00±0.02 ^d	0.70±0.04 ^c	15.50±0.12 ^d	8.13±0.01 ^c	0.33±0.01 ^c	48.36±0.03 ^e
B4	23.75±0.03 ^c	1.02±0.01 ^d	17.27±0.09 ^c	8.43±0.01 ^f	0.37±0.01 ^d	49.18±0.03 ^f
B5	23.49±0.03 ^b	1.45±0.03 ^e	20.56±0.15 ^f	8.57±0.03 ^f	0.40±0.01 ^d	45.54±0.04 ^b
B6	16.36±0.17 ^a	2.45±0.04 ^g	26.53±0.44 ^g	10.48±0.01 ^g	0.52±0.01 ^e	43.66±0.02 ^a
C.R.B.	34.28±0.04 ^g	1.87±0.01 ^f	8.51±0.02 ^b	1.13±0.07 ^a	0.53±0.02 ^c	53.66±0.05 ^h
W.F.B.	36.85±0.04 ^h	0.52±0.02 ^b	7.89±0.34 ^a	1.83±0.15 ^b	0.03±0.02 ^a	52.69±0.02 ^g

Values are means of three replicates

Values = the same column having different superscript are significantly different. (P<0.05)

B1 – 90% Wheat flour and 10% benth seed flour

B2 – 80% Wheat flour and 20% benth seed flour

B3 – 70% Wheat flour and 30% benth seed flour

B4 – 60% Wheat flour and 40% benth seed flour

B5 – 50% Wheat flour and 50% benth seed flour

B6 – 100% wheat flour

C.R.B. – Commercial Royal Bread

W. F. B – Wheat flour Bread

Table 4.0 presents the mean sensory ratings of composite bread from 10-50% breadfruit substituted wheat flour.

The result showed that the composite bread B₁&B₂ are the most acceptable while B₆ was least acceptable. Bread from 100% wheat flour and commercial bread were rated highest in the parameters evaluated. Bread of up to 20% level of substitution had comparable ratings with both the 100% wheat flour bread and the commercial bread in appearance, colour, and taste. However, significant differences were observed in the flavour and textural properties of the composite bread and the control bread. Since breadfruit contain high starch and low protein, the low ratings obtained for the appearance and texture may be due to the degree of starch gelatinization due to nature of starch granules, the air entrapped in the dough during mixing and the carbon dioxide produced by the yeast may not form enough coherent structures to retain them. Part of the gas escaped too early and part of it is retained to form irregular cells (Kent 1990) it may also be due to decrease in gluten content which affected the water absorption capacity of the flour (Bamidele et al 1990).

Table 5.0 showed the mean sensory ratings of composite bread for 10-50% Benth seed flour substituted wheat flour. The panellist evaluation indicated that there was no significant difference in the composite bread of up to 20% substitution in terms of appearance, colour and taste from the control but they differ significantly in flavour and texture at all levels of substitution from the 100% wheat bread and the control. The judgment of the panellist for the texture and flavour followed the same trend with the composite bread form breadfruit as they found significant differences between the composite bread and the control bread. Bread form 100% benth seed flour was rated lowest in all parameters followed by 50% level of substitution. This showed that at higher levels of substitution (above 20%) the composite bread so produced gets more undesirable to the panellists.

Table 4.0 Mean sensory scores for composite bread from wheat flour and breadfruit flour

Sample Code	Appearance	Colour	Taste	Texture	Flavour
A1	7.00 ^{bc}	7.20 ^{bc}	7.20 ^{cd}	6.00 ^c	6.60 ^c
A2	6.80 ^b	6.60 ^{bc}	7.00 ^{cd}	6.00 ^c	6.00 ^c
A3	6.60 ^b	6.80 ^{bc}	6.00 ^{bc}	5.40 ^{bc}	4.80 ^b
A4	6.00 ^b	6.00 ^{ab}	5.80 ^{bc}	5.40 ^{bc}	5.00 ^b
A5	6.00 ^b	6.20 ^{ab}	4.80 ^{ab}	4.60 ^{ab}	4.60 ^b
A6	4.20 ^a	5.20 ^a	4.20 ^a	3.80 ^a	3.40 ^a
X	8.00 ^c	7.60 ^c	8.20 ^d	7.60 ^d	8.00 ^d
Y	8.00 ^c	7.60 ^c	7.20 ^{cd}	7.60 ^d	7.60 ^d

Values in the same column with different superscript are significantly different. (P<0.05)

X – Royal Bread

Y- 100% wheat flour bread

Table 5.0 Shows the mean sensory ratings of bread from 10-50 % benth seed substituted wheat flour.

Sample code	Appearance	Colour	Taste	Texture	Flavour
B1	7.40 ^{cd}	7.20 ^{de}	7.40 ^{de}	6.20 ^c	6.20 ^d
B2	7.00 ^{cd}	6.80 ^{cde}	6.60 ^{cd}	5.80 ^c	5.60 ^{cd}
B3	6.60 ^{bc}	6.40 ^{bcd}	6.00 ^{cd}	5.60 ^c	4.80 ^{bc}
B4	5.80 ^{ab}	5.80 ^{bc}	5.40 ^{bc}	5.00 ^{bc}	4.20 ^{ab}
B5	5.60 ^{ab}	5.40 ^{ab}	4.40 ^{ab}	4.20 ^{ab}	3.80 ^{ab}
B6	5.20 ^a	4.60 ^a	3.80 ^a	3.80 ^a	3.40 ^a
X	8.00 ^d	7.60 ^c	8.20 ^c	7.60 ^d	8.00 ^c
Y	8.00 ^d	7.60 ^c	7.20 ^{de}	7.60 ^d	7.60 ^c

Values in the same column with different superscript are significantly different. (P<0.05)

X – Commercial Royal Bread

Y – Wheat flour Bread

4.0 CONCLUSION AND RECOMMENDATION

Analysis of the nutritional component of the various composite bread showed that they have nutritive value that compared favourably with the 100% wheat flour bread and commercially available bread at all level of substitution. The result of the sensory evaluation also showed that the breadfruit/wheat composite bread and benth seed/wheat flour bread of up to 20% level of substitution has potential for making good quality bread if the problem of flavour and textural properties can be solved. It is therefore recommended that further work be done on this.

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