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Quality characteristics of Biscuits Produced from wheat-African-Locust Beans Pulp Flour Blends.

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ABSTRACT

In search for plant protein and vitamins substitute, the African locust beans (Parkia biolobosa) have found very popular used for condiment, baby's formulation diets and animal meals. The aim of this study was to produce biscuits from African locust beans pulps flour and wheat flour. The matured and ripped African locust beans pods purchased from Bauchi market. The pods were manually cleaned and milled. The wheat/locust bean pulp flour were mixed in the ratio; 100:0%, 90:10%, 80:20%, 70:30% and 60:40% respectively. The proximate composition of the biscuit samples were analyzed with standard methods. There was decrease in protein contents of the biscuits as African locust bean flour is added and increase in moisture content. This result revealed that African locust beans flour can be added up to 30% substitution level without altering quality characteristics and organloletic properties of the biscuits.

Keywords: Biscuits, Wheat Flour, African Locust Bean Flour, Blends, Quality.

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1. INTRODUCTION

Biscuits may be regarded as a form of confectionery, dried to very low moisture content. Biscuits are usually produced from cereal flours (mainly wheat) and consumed extensively all over the world. According to Agu et al. (2007), a biscuit is defined as a small thin crisp cake made from unleavened dough. Okaka (1997) described the biscuits as a mixture of flour and water, often with the addition of fat, sugar and other ingredients, mixed together into dough which is rested for a period of time and then passed between rollers to make a sheet that is cut in smaller pieces and baked.

Biscuits are ideal for nutrient availability, palatability, compactness and convenience. They differ from other baked products like bread and cakes because of low moisture content, comparative freedom from microbial spoilage and long shelf-life (Mian et al., 2009). Biscuits may be classified either by the degree of enrichment and processing or by the method adopted in shaping them. Based on the enrichment criterion, biscuits may be produced from hard dough, soft dough or from batter (Fayemi, 1981). The nutritional content however varies with the type of flour used. Soft wheat flour is the best flour for biscuit making, because of the composition of its storage proteins, gliadins and glutenins, which undergo hydration in the presence of water, salt and sugar. These proteins form a visco-elastic matrix known as gluten, which is responsible for the rising nature of dough and permits substantial increase in the volume of baked product with its gas retention capability (Agu et al., 2007).

Nigeria, a tropical country, cannot grow wheat in commercial quantity due to its hot climatic condition. Therefore, for the survival of biscuits and other confectionery products, the use of locally available grains or legumes to substitute wheat flour is essential (Kent, 1984). A lot of work involving the use of non-wheat flour from various cereals and legumes has been done to substitute wheat in baked products (Eneche, 1999, Nochera and Caldwell, 1992). In search for plant protein and vitamins substitute, the African locust beans (*Parkia biolobosa*) have found very popular use especially in fermented “Dawadawa” which is the products of the seed. Similarly, the African locust beans pulp is a primary source of reducing sugar (19%), non-reducing sugar (9%) and other complex carbohydrate (36%). The African locust bean (*Parkia biglobosa*) fruit pulp, which has been found to have good nutritional value (protein 6.56, fat 1.8, CHO 67.30, ash 4.18 and crude fibre 11.75%) and low anti-nutrients/toxins (phytic acid 60.00, crude saponin 17.80 and tannin 18.00 mg/100 g), has not been widely exploited as raw materials in confectionery products (Gernah et al., 2007; Akoma et al., 2002, Musa et al., 2005).

Locust beans pulp is sweet to taste which indicates the presence of natural sugar and thus potential energy source, (Young, 2001). The attractive yellow clouration indicates the presence of phyto-nutrients, possible carotenoids are important precursors of retinol (Vitamin A). The pulp has sour taste which indicates the presence of ascorbic acid (vitamin C), (Gernah, 2007). The use of locust bead pulp flour for production of baked products will reduced total independence on importation of wheat and increase the utilization of pulp and create variety. The research is aimed to evaluate quality characteristics of biscuits produced from wheat-African-locust beans pulp flour blends.

2.0 MATERIAL AND METHODS

2.1 Source of African locus beans

The matured and ripe Africa locust beans (*Parkia biolobosa*) fruit pods were purchased from Muda Lawan market in Bauchi metropolis and other ingredients were purchased in food chemical store in Wunti market, Bauchi State, Nigeria.

2.2 Preparation of locust bean fruit pulp flour

The preparation of locust bean fruit pulp flour was done using the method of Gernah et al. (2007). The outer brown cover of the pods was manually stripped open and the yellow fruit pulp was separated from seeds embedded within the pulp. The yellow pulp was dried in a hot air oven (model T1211, Genlab Widnes, UK) at 60°C for 9 h to a moisture content of 10%. The dried powder was milled with a laboratory hammer mill (Christy Hunt, UK), and sieved through a 0.5 mm mesh screen to obtain a fine flour, which was packaged in low density polythene bags, and stored in air-tight container at room temperature.

2.3 Formulation of blends and Preparation of biscuits

The ingredients used were wheat flour, locust bean fruit pulp flour, baking fat, granulated sugar, baking powder, milk powder, salt, egg (whole egg) and water. Wheat flour and the locust bean fruit pulp flour were the ingredients varied in the research.

To prepare blends of different proportions of wheat flour (WF) and locust bean fruit pulp (LBFP), the WF/LBFP flours were mixed in the ratio of 100:0, 90:10, 80:20, 70:30 and 60:40%, respectively. Control biscuits with wheat flour and experimental biscuits with flour blends were prepared using a modified method of Jane and Emma (1998). The ingredients were mixed for 10 min to form dough, kneaded into stiff dough. The dough was rolled out on a sheeting board to a sheet of uniform thickness of about 0.4 cm, and the sheet was stamped out in circular shapes of about 5.8 cm diameter, using a biscuit cutter. The biscuit cuts were placed on greased baking trays, covered, rested for about 15 minutes and baked for 20 min at 180°C. The biscuits were then removed and allowed to cool on a rack, packaged in low-density polyethylene bags and kept in an air-tight container.

2.4 Determination of proximate composition

Proximate composition, including crude protein, fat, moisture content, crude fibre and ash of the cookie samples were determined using standard methods (AOAC, 1995). Carbohydrate was determined by difference (i.e.100 -% Protein, % Moisture, % Fibre, % Fat, % Ash). The energy value of the biscuit was calculated from percentages of major nutrients in kilojoules per 100 g and the values were converted to kcal by dividing them by the conversion factor (4.184) according to Maclean *et al.,* (2003)

Energy value (kcal) = (% carbohydrate x 17 + % protein × 17 + % fat x 37) 4.184

2.5 Statistical Analysis

All generated data, in triplicate were subjected to statistical analysis using statistical package for social sciences (SPSSversion23). Separation of means was carried out ($P \leq 0.05$) using one way ANOVA t- test.

3. RESULTS AND DISCUSSION

3.1 Proximate composition of biscuits blended composite flour of wheat and African locust beans flour

Table 1: Proximate composition of biscuits blended wheat and African locust beans flour.

Parameters	100:0% (A)	90 :10% (B)	80:20% (C)	70:30% (D)	60:40% (E)
Protein (%)	10.08± 0.12	9.22 ± 0.06	8.64 ± 0.10	8.44 ± 0.16	7.84 ± 0.04
Moisture (%)	12.23 ± 0.02	12.88 ± 0.08	12.98 ± 0.03	13.26 ± 0.01	14.08 ± 0.04
Ash (%)	1.54 ± 0.11	2.19 ± 0.14	2.78 ± 0.10	3.08 ± 0.09	3.66 ± 0.16
Crude fibre (%)	2.33 ± 0.02	2.89 ± 0.04	3.32 ± 0.06	3.56 ± 0.05	3.84 ± 0.04
Fat (%)	1.28 ± 0.01	1.09 ± 0.03	0.94 ± 0.02	0.90 ± 0.04	0.82 ± 0.02
Carbohydrate (%)	68.22 ± 0.08	66.20 ± 0.04	64.15 ± 0.10	62.10 ± 0.14	61.35 ± 0.10

The results are presented as mean ± standard deviation of triplicate observation. A: 100:0% Wheat flour (control), B;90% Wheat flour and 10% African locust beans flour, C;80% Wheat flour and 20% African locust bean flour, D; 70% Wheat flour and 30% African locust beans four and 60% wheat flour and 40% African locust bean flour. The proximate composition of biscuits produced from blend of composite flour of wheat and African locust beans flours are presented in table 1.The protein contents ranged from 7.84%- 10 .08. The biscuits produced from 100% wheat flour (control) have highest protein content. A decrease in protein content was observed with increased addition of African locust bean flour.

The decrease could be attributed to substitution effect, since the African locust bean flour has lower protein content. The moisture content (%) of the biscuits samples ranged from; 12.23-14.08%. The increase in moisture content with an increase in proportions of African locust bean flour could be attributed to the high sugar content of the locust beans pulp, which made the biscuits more hygroscopic (Gernah et al., 2010).. The ash content varied from 1.54-3.66%, increase in ash content is an indication of high level of mineral contents in African locust bean pulps. Crude fibre of the products also increased. Since the fibre level was high, the biscuits produced from the blends could be considered as functional biscuits: their fibre will add bulk to the food and thereby facilitate bowel movement and help in preventing many gastrointestinal diseases in man (Sudha et al., 2007). There was slight decrease in percentage of fat and carbohydrate with increase in proportion of locust bean flour.

4. CONCLUSION

The result of this study revealed that African locust bean pulp flour can be blended wheat flour as composite flour to produced biscuits. However, African locust beans flour can be utilized in composite with wheat flour up to 30% substitution level in the production of biscuits without altering quality characteristics and consumer acceptability. This research show case the potential of African locust bean pulp flour in the production of other confectionaries, baby's formulation and animal meals.

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