

Production and sensory evaluation of Nigerian Snacks (Cake & Chin-Chin) food from composite flour blends of African Yam Bean (*Sphenostylis stenocarpa* Hochst ex A Rich Harms) and wheat flour

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ABSTRACT

Snacks such as cake and chin-chin were prepared from the composite flour blends of wheat flour and African yam bean flour at different proportions such as 100:0, 90:10, 80:20, 70:30, 60:40, 50:50 respectively. The snacks produced from the 100% wheat flour served as control. The African yam bean seeds were sorted, washed, soaked, dehulled, sundried and milled into fine flour. The sensory evaluation of the snacks were carried out using ten (10) panelists on a nine (9) Hedonic scale using the sensory attributes such as texture, taste, colour and general acceptability. The results showed that all the samples had high rating for all the attributes. The 10% and 20% African yam bean flour supplement compared favorably with the control sample prepared from 100% wheat flour.

Keywords: *Snacks, Composite flour, Sensory evaluation, Sphenostylis stenocarpa.*

INTRODUCTION

According to the Oxford Advanced Learners Dictionary (2007), a snack is a small meal or food that is usually eaten in a hurry. In developed countries, snacks are not eaten as main meals but as a stopgap to briefly check hunger before the main meal is eaten later. At times snacks are consumed because the consumer enjoys the taste. Oke *et al.* (1995) reported that snacks serve as a source of macronutrients and are used for refreshment at homes and parties. Their production creates employment especially for women in developing countries. Snacks often contain substantial amounts of sweeteners, preservatives and appealing ingredients such as chocolate, peanut, etc. An indication of the ever growing importance and dependence of consumers on snacks bitter complaint about increases in the prices of staples such as milk and bread but they willingly pay disproportionately large sums for snack items.

Nigerian snack such as chin-chin, puff-puff (Akubor, 2004), fried bean cake and roasted maize have received less attention than bread even though they offer important advantages which include wide consumption, relatively long shelf and good eating quality. In Nigeria, snacks are mainly produced and consumed in their areas of production. This leads to possession of variable characteristics (Ingbian and Akpapunam, 2005). Snacks vary with people, culture and geographical locations. Some of the problems associated with the local production of snacks include non-standardization of equipment; inadequate hygiene during and after production; and inadequate packaging. In many situations, the snacks are stacked in containers without proper storage, these problems result in poor preservation techniques and high levels of contaminants in the food resulting in food-borne illnesses (Ingbian and Akpapunam, 2005). These problems are applicable not only to snacks but also to other traditional foods. The production of fermented foods in Nigeria is still largely done traditionally in families and homes by crude means (Achi, 2005). Consequently the production has not increased beyond cottage industry level. Among the various factors militating against traditional fermented foods are inadequate raw material, inefficient grading

and cleaning, leading to the presence of foreign matter (such as insects and stones) in the final product; crude handling and processing techniques; lack of durability; lack of homogeneity; and unattractive presentation.

African yam bean (AYB) is one of the lesser known legumes (Apata and Ologhobo, 1990) and widely cultivated in the southern parts of Nigeria. AYB is rich in lysine but deficient in sulphur amino acids. The importance of AYB in the socio-cultural life of Africans is significant owing to its long use. The seed grains and the tubers are the two major organs of immense economic importance as food for Africans. It is a very significant substitute for cowpea (*Vigna unguiculata*) in the rainforest belt of Nigeria. The Igbos extensively explored the crop as a good source of dietary protein in feeding the displaced and severely malnourished refugees during the Nigerian Civil war of 1967-1970 (Nwokolo, 1996). The dry seeds when cooked are very delicious (Obizoba and Nnam, 1992). In Western Africa, they are often preferred over other grain legumes. There is a widespread use of AYB in the Nigerian diet, especially in southern states (Obizoba and Nnam, 1992). Meals from AYB are choicest and mostly desired by the labourers during the various farm operations. According to Okigbo (1973), the reason for its preference above other meals by the farmers and farm labourers during the cultivation period was that it fills and sustains them for long working hours when the meal is consumed. A special meal made from AYB features during marriage ceremony among the Ekitis in Nigeria (Potter, 1992). AYB is consumed in different forms, mostly in the eastern part of Nigeria and the whole country at large. Various types of products are traditionally produced from it through soaking, dehulling, grinding, boiling, steaming and frying or by combination of any two or more of these methods. The tender crisp pods are eaten both fresh and when cut into short sectors, used for cooking purposes. The mature seeds can be utilized as cooked beans or converted into paste or flour for subsequent use in 'Akara' (by frying) or moi-moi (by steaming).

The possible contribution of AYB to improving the lives of subsistence farmers and his family in Africa is obvious. The excellent flavour of the cooked seeds makes it superior to other pulses in southern Nigeria (Nwokolo, 1996). It was remarked to be exceptionally nutritious. Different forms of local recipes are prepared from the crop to meet the dietary needs of the people. In most West African communities, the seed grains are boiled and eaten with other staples such as yam, plantain, cassava, corn/maize etc. A popular snack is produced from the grains through roasting particularly in Enugu/Nsukka area of Nigeria. In Togo, Ghana and Nigeria, there are pharmacological evidences of the use of AYB in treating some ailments. The paste made from the seeds is used to cure stomach ache and when the paste is mixed with water, it is traditionally used for the treatment of acute drunkenness. AYB has a great potential due to its rich nutritive value in reducing malnutrition and hunger.

ANTI-NUTRITIONAL FACTORS OF AYB AND THEIR ELIMINATION

Anti-nutritional factors (ANF) in food legumes are chemical substances present in products, although non-toxic but generate adverse physiological responses in animal that consumes them. In most cases, ANF interferes with the utilization of nutrients in legume products (Nwokolo, 1996) when such products are consumed. Some workers (Okeola and Machuka, 2001), have identified the presence of some ANF such as alkaloids, flavonoids, saponins, lectin, trypsin inhibitors, phytate and oxalate in the seeds of AYB. The list of ANF in the raw beans of AYB includes trypsin inhibitor, haemagglutinin, tannic acid (tannins), phytic acid, oxalate. Nwinuka *et al.* (1997) identified some flatulent factors to include sucrose, raffinose and stachyose.

Many food nutritionists (Wokoma and Aziaba, 2001) have employed various processing methods including soaking, blanching, dehulling, heating, soaking with potash etc. to attain satisfactory cooking, reduce the ANFs content, overcome the hardness of the seed coat and improve (by shortening) the cooking time of the seeds. Maximum hydration of the seed was attained at 12 hrs of soaking in water. Cooking time could be lowered with 12 hrs pre-soaked treatments; moreover, a dramatic 50% reduction in cooking time was attained for seeds pre-soaked with 1% potash or 4% sodium chloride (Njoku *et al.*, 1989).

Food processing techniques provide alternative means of improving the quality of foods and the digestibility of protein in leguminous grains. Long time cooking gave the highest digestibility value in AYB; the thermal process destroys protease inhibitors and opens the protein structure through denaturation, breaks down the ANFs, denatures the proteins/enzymes and gelatinizes the starch for adequate digestibility. In essence, long cooking using moist heat treatment is a way to rid AYB seeds of ANF (Fasoyiro *et al.*, 2006). Dehulling of the seeds significantly improved the digestibility of AYB protein compared to whole seed.

MATERIALS AND METHODS

The African yam bean seeds and the wheat flour were purchased from Ogbete main market in Enugu North Local Government Area of Enugu State and the other raw materials (margarine, granulated sugar, baking powder, milk, vanilla flavour, yeast and eggs) were also purchased from the same market. The African yam bean seeds were sorted, washed, soaked, dehulled, sundried and weighed. The seeds were milled and sieved into fine flour with a muslin sieve cloth. The purchased wheat flour was sieved using the same muslin sieve cloth to get fine flour.

About 500g of margarine and 100g of sugar were creamed together until it became fluffy. The eggs and the vanilla flavour were added to the creamed sugar and margarine, and later the flour was added gradually and turned in that same direction. The batter was put in a cake pan that was already greased with margarine and was baked in an oven and was cooled for few minutes before removing from the pan. For the production of chin-chin, the flour and the margarine were mixed in a bowl, later sugar and milk were also added to the mixture and were mixed very well till a smooth dough was obtained and it was placed on a flat surface and was knead gently with a dough roller and it was cut into desired sizes and was deep fried in a hot vegetable oil and was stirred continuously till a golden brown colour was obtained.

SENSORY EVALUATION

Ten (10) untrained panelists from the department of Food Science and Technology in Federal Polytechnic Oko. The sensory attributes such as taste, texture, colour and general acceptability of the cake and chin-chin samples were assessed using a nine (9) point Hedonic scale in which one (1) represents the least score (disliked extremely) and nine (9) the most desirable score (liked extremely) for any attribute. The panelists were provided with sachet water to rinse their mouth after eating each sample before tasting another.

RESULTS AND DISCUSSION

The mean scores of the attributes by the panelists are stated in the Tables 1 and 2. Table 1 shows the mean scores for cake samples while Table 2 shows the mean scores for chin-chin samples respectively. The cake and chin-chin samples produced from the blends of

composite flour of wheat flour and African yam bean flour compared favorably with that of the controls (samples 101 and 201 which is 100% wheat flour respectively). For cake sample, the mean scores for taste ranged from 7.8 to 4.7, texture mean scores ranged from 7.5 to 4.8, colour and general acceptability ranged from 7.9 to 4.8 and 8.1 to 4.6 respectively. In terms of taste, texture, colour and general acceptability for the formulated cake product, the sample 102 (90% wheat flour and 10% African yam bean flour) compared favorably with the control sample with the panelists rating it high. Similar result was obtained in the chin-chin product, sample 202 (90% wheat flour and 10% African yam bean flour). This could be due to the high quantity of wheat flour in the snacks. The trend may even be attributable to the fact that the panelists are very conversant with snack products made from wheat flour. The mean score decreased as the proportion of African yam bean flour increased in both chin-chin and cake. Similar trend was obtained by Akubor (2004).

Table 1
Mean scores for the (wheat /African yam bean) cake

Samples	Texture	Taste	Colour	General acceptability
101	7.5±0.85	7.8±1.03	7.9±0.88	8.1±0.99
102	7.0±1.76	7.4±1.84	7.4±2.06	7.8±1.23
103	6.9±1.45	6.8±1.93	7.4±1.08	7.4±0.97
104	6.2±1.40	6.1±1.60	6.8±1.14	6.4±0.97
105	5.1±1.37	5.2±1.40	5.0±1.83	5.3±1.70
106	5.9±1.20	5.1±1.76	5.1±1.91	5.7±1.42

101= 100% wheat flour

102= 90% wheat flour: 10% African yam bean flour

103=80% wheat flour: 20% African yam bean flour

104= 70% wheat flour: 30% African yam bean flour

105= 60% wheat flour: 40% African yam bean flour

106= 50% wheat flour: 50% African yam bean flour

Table 2
Mean scores of the (wheat/African yam bean) chin-chin

Samples	Texture	Taste	Colour	General acceptability
201	7.7±1.25	7.5±1.27	7.7±1.06	7.0±1.56
202	8.0±1.33	8.4±0.97	7.8±1.03	7.9±1.45
203	6.9±1.52	6.7±1.77	7.2±1.03	7.0±1.33
204	6.3±1.42	5.9±1.73	6.9±1.10	5.9±1.45
205	5.8±2.25	6.0±2.06	6.2±1.23	6.1±1.85
206	5.6±1.90	5.1±2.08	6.1±1.58	4.9±2.23

201= 100% wheat flour

202= 90% wheat flour: 10% African yam bean flour

203=80% wheat flour: 20% African yam bean flour

204= 70% wheat flour: 30% African yam bean flour

205= 60% wheat flour: 40% African yam bean flour

206= 50% wheat flour: 50% African yam bean flour

CONCLUSION AND RECOMMENDATION

This study has shown that an acceptable snacks such as cake and chin-chin can be produced from the composite blends of wheat flour and African yam bean flour and hence it is recommend that further regular research should be carried out on the proximate composition of the snacks in order to ascertain the level of the nutrients in the formulated snacks.

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