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EFFECT OF PRE-COOKING ON THE PROXIMATE AND MICROBIAL ANALYSES OF BREADFRUIT FLOUR (*Treculia africana*)

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ABSTRACT

Breadfruit is an underutilized crop in Nigeria, there is needs to diversify and enhance its uses as a fruit. The main objective of this study is to determine the effected of different temperature on breadfruit flour. The effect of pre-cooking on proximate and microbial analysis of breadfruit flour at different temperature were investigated. Three samples were prepared at different precooking temperatures 60^{0}C (453), 80^{0}C (325), 100^{0}C (128) and 524 [control poundo yam flour (Ayoola)]. The analysis carried out was determined using standard procedures (AOAC,2000), the result of the proximate analysis showed that the moisture content ranged from 10.42%-10.73% with no significant different (P≤0.05), the protein content ranged from 11.97%-13.84%, the fat content ranged from 5.84%-6.62% with little or no difference, the ash content 3.62%-3.72% with no significant different (P≤0.05), the fibre content ranged from 3.93%-4.14%, carbohydrate content ranged from 61.25%-64.00%. The total plate and mould counts of the breadfruit flour samples ranged from 17× 10^4 -24 × 10^4 CFUg respectively. There is little or no significant differences in the samples when compare to the control (Ayoola Poundo Yam Flour) used.

Key words: Breadfruit, Microbial analyses, Proximate composition, Pre-cooking

1.0 INTRODUCTION

African breadfruit is an important traditional edible fruit in Nigeria, whose importance is due to the potential use of its seeds, leaves, timber, roots and bark (Okafor, 1985). It is known by various bridal names in the country, such names include “afon”(Yoruba), Barafuta” (Hausa), “Ize” (Bin), “eyo”(Igala), “ediang” (efik) and “ukwa” (Igbo) (Irvine, 1981; Onweluzo and Odume, 2008). Hence, it is an underutilized crop in Nigeria, and adequate information on its composition, nutritional importance and the behaviour of its flour is not fully tapped also during cooking, there important requirements for enhancing its utilization and in its diverse utilization of these fruit. It contribute to part of our diet, some parts of Nigeria consume it as snacks. Baiyeri and Mbah (2006) described it as an important natural resource which contributes significantly to income and dietary intake of the poor. African breadfruit can be processed and utilized in various ways; it can be cooked as a pottage or roasted and eaten with palm kernel or as side snacks when fried. The seeds are used for cooking and are highly nutritious (Okafor and Okolo, 1974; Okafor, 1985; Onyekwelu and Fayose, 2007). Apart for being consumed as a main dish, the seeds are also processed into flour which has high potential usage for pastries (Keay, 1989). The oil from the seeds can be used for cooking, preparation of soaps in the pharmaceuticals, production of hair shampoo, production of alkyl resin used in paints and preparation of varnishes due to the drying nature of African breadfruit oil (Ajiwe *et al*, 1995). African breadfruit is rich in some minerals notably magnesium, potassium, and calcium, but it is poor in sodium, iron and copper (Oyenugo, 1968; Edet, 1982; Ejidike and Ajileye, 2007).

Materials and Method

The breadfruits (*Artocarpus altilis*) were obtained from Sayedero market in Yewa South, Ilaro, Ogun state, Nigeria. Knife, pot, bowl, sieve and all other equipment and apparatus used for sample preparation were gotten from Food Technology Department, Federal Polytechnic, Ilaro, Ogun State.

Production of Flour from a Precooked Bread Fruit

Bread fruits were sorted to remove the spoilt ones, washed thoroughly with a clean water, air dried and weighed before peeling. The peeled bread fruits were then sliced into 2mm thick. The bread fruit slices were precooked at different temperatures (60^{o}C, 80^{o}C and 100^{o}C) for 15 minutes. After which water was drained from the pre-cooked samples with the aid of sieve before drying in the cabinet dryer at a temperature 80^{o}C, when properly dried breadfruit becomes brittle. Attrition machine was used to mill the dried breadfruit into flour which is passed through sieve mesh (1.5^{n}) size for fine powdery product. Packed in polypropylene bags and properly sealed using a sealing machine.

Analyses

Proximate compositions (moisture, ash, crude fats, crude fibre, and crude protein) were determined by using AOAC (2000) methods,

Microbial Analysis

Conventional colony count method for the enumeration of bacteria in food was adopted as described by Jasson et al. (2010). Samples (1.00 mL/g) were taken from the soups. Decimal dilutions were performed for all the samples and 0.1 mL of 10-1 dilutions were inoculated on nutrient agar plates and incubated at 37 ƒC for 24h. After incubation, the colonies were counted by using colony counter (Subra Scientific Co., India). The final counts of colonies in petri dishes took into the dilution factors depending on the seeded volume and dilution, thus providing the initial number of the cells. Analysis was replicated three times and the arithmetic mean was reported as the final result. Inactivation was expressed as Log N_0/N, where N_0 is the number of microorganisms initially contained in the fresh samples and N is the corresponding number of microorganisms after freezing and thawing.

Isolation procedure

Various colonies observed on the plates were examined for colonial differences using the method described by Fawole and Oso (1998). Representatives of different colonies were streaked on sterile nutrient and mac-conkey agars. Pure cultures resulting from the isolations were subcultured and preserved on agar slants.

Fungi counts

The fungi count was determined using the method of Raper and Fennel (1973) as reported by Atanda, et al. (2009). 1 mL of each sample was aseptically transferred into 9 mL distilled water and properly homogenized. The samples were subsequently decimally diluted. All samples were analysed in triplicate on potato dextrose agar containing 0.001% of chloraphenicol and allowed to incubate at ambient temperature (30^{0}C±2) for 48hrs.

Discussion

Table 1 shows the result of proximate analysis of poundo breadfruit flour. The values of the moisture content are 10.41%, 10.73%, 10.52%, and 10.42%, sample 453 has the highest moisture content while sample 128 has the lowest moisture content. The variation in the moisture content may be due to the atmospheric condition during the production of the flour, flour specification usually limits its moisture content to 14% or less. The low moisture content was desirable, there is no danger of bacteria action and mold growth and such flours will develop hydrolytic rancidity. The protein content ranged from 13.84, 11.97%, 12.42% and 13.84%. The protein is in moderate levels, for example, 100 g seed of breadfruit will provide 7.4g of protein. The value of the fat are 6.74, 5.84%, 5.84%, and 6.62% which were coded 524, 453, 325, and 128 respectively. Sample 453 has the highest ether extract while the sample 128 has the lowest ether extract these might be due to higher temperature (100^0C) used when pre-cooking it. The ash content ranged from 3.91%, 3.62%, 3.63% and 3.72% with sample 453 having the lowest ash content and sample 128 having the highest ash content. The ash content indicates the total mineral content present in the samples. The result obtained is an indication of the presence of organic nutrient in the flour samples. The crude fiber ranged from 4.21%, 3.93%, 4.03% and 4.14, sample 453 has the lowest fiber content, while the sample 128 has the highest fiber content. The carbohydrates ranged from 60.89%-64% with the sample 524 having the highest carbohydrate content while the sample 128 has the lowest carbohydrate content which is in accordance with Udensi et al, 2008; Adeola et al, 2012; Olaoye, J.O and Oyewole, S.N., 2012. The high content of carbohydrate in the flour makes it to be a source of energy.

Table 2 shows the microbiological analysis of instant breadfruit flour. The values of the total plate count (NA) are 19×10^4, 19×10^4, 17×10^4, and 19×10^4 which were coded 524, 453,325, and 128. The sample that has highest plate count is 453 while the one with the lowest plate count is 128. The mould count ranged from 19×10^4 , 24×10^4, 20×10^4 and $18\times 10^4$with sample 128 having highest mould count and sample 453 having lowest mould count respectively.

Table 1: Proximate analysis of breadfruit flour samples

Samples	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Fibre (%)	Carbohydrate (%)
524	10.41±0.02^a	13.84±0.03^c	6.74±0.02^b	3.91±0.02^a	4.21±0.02^a	60.89±0.02^a
453	10.73±0.03^c	11.97±0.02^a	5.84±0.01^a	3.62 ±0.02^a	3.93±0.03^c	64.00 ±0.01^a
325	10.52 ±0.02^b	12.42±0.02^b	5.84±0.01^a	3.63±0 .03^a	4.03±0.02^b	63.18±0 .02^a
128	10.42±0 .02^a	13.84±0.04^c	6.60±0.04^c	3.72±0.03^{ab}	4.14±0.02^a	61.25 ±0.03^{ab}

Mean values having different superscripts within a column are significantly different ($p<0.05$).

KEYS:
524= Control (Poundo Yam Flour)
453=60^0C
325= 80^0C
128 = 100^0C

Table 2: Microbiological analyses of breadfruit flour sample.

Samples	Total Bacteria Count (CFU/g)	Mold Count (CFU/g)
524	$19\times 10^4 \pm 1.53^{ab}$	$19\times 10^4 \pm 3.00^{a}$
453	$17\times 10^4 \pm 1.53^{a}$	$24 \times 10^4 \pm 1.53^{ab}$
325	$19 \times 10^4 1.53^{ab}$	$20\times 10^4 \pm 3.00^{a}$
128	$21 \times 10^4 \pm 1.00^{b}$	$18\times 10^4 \pm 2.08^{b}$

Mean values having different superscripts within a column are significantly different ($p<0.05$).

KEYS:
524= Control (Poundo Yam Flour)
453=60^{0}C
325= 80^{0}C
128 = 100^{0}C

CONCLUSION

The protein, fat, ash and fibre content of breadfruit flour is higher than that of *Dioscocera alata* with these new discoveries I can say it is a very good source of nutrition quality requirement which poses as an advantage and also proven that there can be diversification of fruit into flour. The pre-cooking temperature doesn’t affect its nutrition qualities as there is little or no significant different in value obtained when compare with the control.

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