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PROXIMATE, FUNCTIONAL AND SENSORY PROPERTIES OF ''OFULOJU'' PRODUCED FROM COWPEA, PIGEON AND SOYABEANS

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ABSTRACT

A study was conducted to find out the possibility of replacing cowpea with pigeon pea and soybeans in the production of an acceptable pudding (''Ofuloju'').Flour was produced from cowpea, pigeon pea and soybeans and evaluated for proximate and functional properties. Pastes were also produced from cowpea, pigeon pea, and soybean and processed into Ofuloju and were evaluated for sensory parameter. The moisture contents of soybean, cowpea and pigeon pea were 9.01±0.01%, 10.28±0.01, 11.99±0.01 respectively, ash content of the samples ranged from 3.15±0.00% to 3.99%±0.00 for cowpea and soybean, Fat content of the samples are1.65±0.00% (pigeon pea), 2.49±0.01 (cowpea) and 19.45 ±0.10% soybeans. The result of the crude fibre showed that pigeon pea had the highest content (4.18±0.00%) while cowpea had the lowest (2.20±0.00%). The protein content of soybean had the highest (44.99±0.00%) while pigeon pea had the lowest protein content (19.93%). The result of the functional properties showed that bulk density ranged from 0.5416±0.00g/ml (soybean) to o.6900±0.01% (pigeon pea). Foaming capacity were 2±0.001% (pigeon pea), 6 ±0.01% (soybean), 8±0.02% (cowpea). Foaming stability showed that cowpea had the highest (72.22± 0.01%) while pigeon pea had the lowest.The cooking time of the pudding (Ofuloju) differs; cowpea had the fastest cooking time (45 minutes), pigeon pea (1 hour) while soybean has the longest cooking (1 hour, 30 minutes).T he result of the sensory assessment shows that Ofuloju produced from pigeon pea was better accepted interms of colour, taste, texture, aromal and overall acceptability than Ofuloju produced from soybean and cowpea. This study showed that the characteristics of Ofuloju produced from pigeon pea was similar to Ofuloju produced from cowpea; therefore, pigeon pea may be used as an alternative in the production of Ofuloju

INTRODUCTION

In most developing countries including Nigeria, the economic situation is such that the low income families cannot afford protein rich foods from animal source to meet recommended dietary allowance. The diet of most people consists predominantly of cereals and root which do not provide good quality protein in diet. Studies by the Food and Agricultural Organization have shown that over one billion people are undernourished in the world (Fasoyi 2005).Some foods have been neglected and underutilized in combating the protein energy malnutrition ((Fasoyi 2009). Food legumes like African yam beans, pigeon pea contain more protein than meat, they can be used to prepare local dishes such as akara, moinmoin and ofuloju (Onochie, 1965).Traditionally, cowpea paste is prepared by the combined processes of soaking, dehulling and wet milling of cowpea seeds. Akara is made by deep frying of whipped

cowpea paste flavoured with onions, salt and pepper.Moinmoin is made by steaming whipped cowpea paste flavored with onion, salt, pepper, fish, egg and vegetable oil or palm oil Soya bean, Glycine max, a grain legume is one of the richest and cheapest source of plant protein (Ihekoronye and Ngoddy, 1985). Soya bean contains higher and essential fatty acids, and is a good source of calcium, magnesium, lecithin, riboflavin, thiamin, fiber, folic acid and iron which if eaten along with cassava based foods could go a long way in improving its nutritional value status. Pigeon pea is a legume that is rich in protein, pigeon pea is locally available and affordable and underutilized grain legume of tropics and subtropics. Pigeon pea can be processed into paste and flour (Fasoyiro S.B 2009) Ofuloju is a local dish, mainly prepared from cowpea paste. The cowpea is prepared traditionally by the combined process of soaking, dehulling and wet milling of cowpea seeds. It is made by steaming the cowpea paste. The paste is first stirred hard to incorporate into local leaves with no salt. The research work attempted to incorporate blends of legumes in the production of Ofuloju and assessed the nutritional and sensory acceptability of the products

MATERIALS AND METHODS

Source of Materials

The cowpea, pigeon pea and soybean used were purchased from a local market in Abeokuta.

PREPARATION OF OFULOJU

Ofuloju was prepared using local method with slight modification. 600g of whole cowpea seeds were weighed and sorted to remove the cracked beans, dirts and other foreign materials. During sorting 20g of foreign materials were removed from the cowpea, the remaining 580g cowpea were soaked in 750ml of water for 10 minutes in which the weight increased to 660g.This was then dehulled and steeped into water for 1 hr before wet milling into paste. The cowpea was mixed vigorously with stirrer to ensure consistency.The paste was packaged in Local leaves known as eweran and steamed for 45 minutes. The pudding was removed from the pot and allowed to cool before taking for sensory analysis. The same protocol was used for soy beans

PROXIMATE ANALYSIS OF FLOURS

Determination of Moisture Content

The method described by AOAC 1984 was used

Determination of Ash Content

The method described by AOAC 1984 was used

Determination of Fat Content

The method described by AOAC 1984 was used

Determination of Crude Fibre

The method described by AOAC, 1984 was used

Determination of Functional Properties of Flours

Bulk density

The procedure described by AOAC, 1984 *was used*

Foaming Capacity

The procedure described by AOAC, 1984was used
Swelling Index
The procedure described by AOAC, 1984 was used

SENSORY EVALUATION OF OFULOJU SAMPLES

Nine point Hedonic Scale as described by Ihekoronye and Ngoddy, 1985

RESULT AND DISCUSSION

In Table 1 the moisture content of pigeon pea flour rated higher (11.99± 0.01%) compared to cowpea flour (10.28 ± 0.01%) and soybean flour (9.01±0.01%). The ash content of soybean was highest (3.99±0.00%) followed by pigeon pea (3.88±0.03%) compared to cowpea (3.15±0.00%). The protein content of pigeon pea was 19.93±0.00% followed by cowpea (25.65±0.01%) and soybean flour (44.99±0.00). The protein content result of pigeon pea was similar to the value reported by Salunke et al;1986, who reported that the protein content of commonly grown pigeon pea cultivars ranges between 17.90% and 24.30% for whole grains samples. The result obtained for crude fibre for pigeon pea was 4.18±0.00%, cowpea 2.20±0.00% and soybeans 3.99±0.00%. Increase in the crude fibre for pigeon pea was compared to other samples was similar with those that were reported by Oshodi et al;1993 and Osagie et al;1996 which stated that crude fibre should be between 1.20% to 8.10%.There was significant difference in the fat content of the samples with cowpea having 2.49, soybeans 19.45 and pigeon pea 1.65, reduction in pigeon pea fat content was expected and it followed the result of Oshodi et al; 1993 and Osagie et al; 1996 which expressed that the fat content of pigeon pea ranges between 0.60 – 3.80.

The functional properties of the different flours are presented in Table 2. Bulk density of pigeon pea flour (0.6900) rated highest followed by cowpea flour (0.6250) followed by soybeans flour (0.5416). Cowpea flour has the highest foaming capacity (8%) followed by soybeans flour (6%) while pigeon pea has the lowest (2%). The foaming capacity of cowpea rated highest (72.22%) compared with soybeans (59.30%) and pigeon pea (16.67%) which has the lowest value. The swelling index of soybean flour (0.1205) rated higher compared to pigeon pea (0.1041) followed by cowpea (0.0592) which has the lowest swelling power. The Ofuloju produced from cowpea has space in between due to the high foaming capacity and foaming stability. It thus means that the product can withstand the heat treatment during steaming. Table 3 shows the sensory evaluation of the samples. The sensory scores indicated that all the parameters of Ofuloju are siqnificantly different from each other at 5% level. The sensory evaluation result also shows that the panelist preffered Ofuloju from pigeon pea to soybean because Ofuloju produced from pigeon pea is similar to Ofuloju produced from cowpea. The panelists stated that the high content of fat and protein of soybean was responsible for the unaccepted Ofuloju produced.

TABLE 1: PROXIMATE COMPOSITION OF COWPEA, SOYBEANS AND PIGEON PEA FLOUR

SAMPLES	MOISTURE CONTENT%	ASH (%)	FAT (%)	CRUDE FIBRE	PROTEIN (%)
COWPEA	10.28±0.01	3.15±0.00	2.49±0.01	2.20±0.01	25.56±0.01
SOYBEANS	9.01±0.01	3.99±0.01	19.45±0.10	3.99 ±0.01	44.99±0.00
PIGEON PEA	11.99±0.01	3.88±0.03	1.65±0.00	4.18±0.00	19.93±0.00

TABLE: 2 FUNCTIONAL PROPERTIES OF COWPEA, SOYBEANS AND PIGEON PEA FLOUR

FUNCTIONAL PROPERTIES	COWPEA	SOYBEANS	PIGEON PEA
Bulk Density (g/ml)	0.6250±0.00	0.5416±0.00	0.9600±0.01
Foaming capacity (%)	8±0.02	6±0.01	2±0.01
Foaming Stability (%)	72.22±0.01	59.30±0.01	16.67±0.01
Swelling Index	0.0592±0.00	0.1205±0.01	0.1041±0.01

TABLE: 3 MEAN SENSORY SCORES OF OFULOJU SAMPLE

PARAMETERS	COWPEA	SOYBEAN	PIGEON PEA
COLOUR	5.0^{a}	3.2^{b}	7.5^{a}
TEXTURE	5.0^{a}	3.3^{b}	7.9^{a}
AROMA	5.0^{a}	3.2^{b}	7.2^{a}
TASTE	5.0^{a}	3.2^{b}	8.0^{a}
OVERALL ACCEPTABILITY	5.0^{a}	3.8^{b}	7.7^{a}

Mean with different superscript within the same rows are significantly different from each other ($p < 0.05$)

CONCLUSION

The use of pigeon pea in the production of Ofuloju gave a positive result. A wide range of physical textures to meet consumer's expectations could be obtained in Ofuloju by using pigeon pea. Ofuloju produced from soybean is not acceptable by panelists. Therefore, pigeon pea flour and paste can be used as an alternative in the production of Ofuloju instead of cowpea.

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