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EFFECT OF SPROUTED PIGEON PEA *(CAJANUS CAJAN)* ON PROXIMATE COMPOSITION AND SENSORY VALUE OF TUWO

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Abstract: This study was aimed at investigating the possibility of producing acceptable "tuwo" from maize flour and sprouted pigeon pea flour blends. Blends of the two were produced and subjected to sensory evaluation to determine consumer acceptance with respect to quality attributes such as: appearance, texture, aroma, taste and mouth feel. Proximate analysis of the flour blends shows that all samples except the control sample which was the 100% maize flour recorded significant (P>0.05) higher amount of protein, fat, ash and crude fiber as the pigeon pea substitution level increases. There was no significant difference (P>0.05) recorded in the moisture content of all the samples and the carbohydrate content decreases with increase in pigeon pea level. The result of the sensory analysis shows that the tuwo produced from 80% maize and 20% sprouted pigeon pea flour blend was the most acceptable among others. The overall result has shown that it is possible to produce acceptable tuwo from the combination of maize and sprouted pigeon pea flour blends.

Keywords: Sprouted, Pigeon Pea, Sensory, Nutritional, Tuwo.

INTRODUCTION

Maize flour is by far the most widely eaten flour after wheat and rice flour (Purseglove, 1992; Osagie and Eka, 1998). It has carbohydrate as its major component and also contains sizeable amount of protein, minerals and vitamins. It is cheaper compared to wheat flour (Osagie and Eka, 1998). Maize flour is the major ingredient used in the preparation of "tuwo". Tuwo is a very important and stable food among various ethnic groups in Nigeria. It is referred to as "Tuwo Massara" in Hausa, "Oka" in Egun, "Ini oka" in Ibo and "Uka apaapa" in Ibira. Its preparation seems to be similar among all groups with minor differences (Abdulrahaman and Kolawole, 2006).

Pigeon pea is a legume grain of good production capacity and consists of a high nutritive value. It is a locally available affordable and underutilized grain legume of the tropics and subtropics. Pigeon pea contains high level of protein and important amino acids methionine, Lysine and Tryptophan (Aletor and Aladetimi, 1989). (Cereals e.g. maize) are known to have limiting amino acids (Ihekoronye and Ngoddy, 1985). In combination with cereals, pigeon pea makes a well balanced human food. Its varieties have protein content in the range of 23-26% (Oshodi *et al,* 1985). It is rich in mineral and fibre content. Pigeon pea grows well in Nigeria but the hard-to-cook phenomenon and the presence of anti-nutrients have limited its utilization (Nene *et al,* 1990; El Tabey, 1992). Efforts are being made to increase the utilization of underutilized indigenous crops cultivated in Nigeria (Ayo and Gaffa, 2002). The need to find inexpensive source of protein cannot be over emphasized thus, dependency on plant protein is very high (Ihekoronye and Ngoddy, 1985). There is need to enhance the utilization of pigeon pea in the production of relevant products hence, the need to eliminate difficulties associated with the usage of the seed.

Jood *et al,* (1985) has reported that most of the identified constraints in the utilization of pigeon pea can be reduced or eliminated through sprouting. Sprouting is a process that involves soaking, draining and rinsing of seeds at regular intervals until they germinate or sprout. Improvement in protein value of sprouted seed has been observed earlier (Onimawo and Asugo, 2004). Sprouting also enhances the digestibility of legumes (e.g. pigeon pea) via the reduction of indigestible sugars (Auret and Behar syndrome, 1953).

The objective of this study is to enhance the utilization of pigeon pea through the production of "tuwo" from pigeon pea and maize flour blends and to determine the nutritional properties of the flour blends and the acceptability of the tuwo sample in comparison with tuwo from maize flour which is already in consumption.

MATERIALS AND METHODS

Pigeon pea (*Cajanus cajan*) used was purchased from Aiyeda market, Igbo-ora town, Oyo State, Nigeria. Maize *(Zea mays)* was purchased from Panseke market, Abeokuta, Ogun State, Nigeria.

Processing of Sprouted Pigeon Pea Flour

Processing of sprouted pigeon pea flour was done as described by Odia *et al,* (2010) with a little modification in which pigeon pea was sorted, cleaned and steeped in distilled water for one hour, drained and spread on jute sack to sprout for 5 days. After sprouting, the sample was de-sprouted and dried at 60^0C for 8hours in a cabinet drier. The sample was then manually dehulled by soaking in cold water for 12hours followed by vigorous hand rubbing. Water was added to the dehulled seed and the water was decanted continuously until the seed coat was almost completely removed. The seed was dried at 60^0C for 12hours followed by milling and sieving. The flour was packed in an air-tight polythene bag.

Processing of Maize Flour

The preparation of the flour was in accordance with traditional procedure. Grains were cleaned, seed, coats removed with a locally available hand mill, and winnowed.

Formulation of Flour Blends

Five composite blends of Maize: Pigeon pea flour were formulated at different ratios of 100:0, 80:20, 70:30, 60:40, 50;50. The blends were thoroughly mixed to obtain homogenous blends and stored in a polythene bag prior to analysis.

Tuwo Preparation

Tuwo was prepared as described by Omoge (2007). A small amount of water was poured inside a clean pot and placed on fire. Some Tuwo powder was poured into a plastic bowl and small amount of water was added to it and stirred until smooth. The mixture was poured into the boiling water and stirred continuously with a wooden spatula. More powder was added and turned until dough was formed.

Proximate Composition

Proximate composition (protein, fat, crude fiber, ash and moisture) were determined by the method of AOAC (2005). Carbohydrate was calculated by difference (Egan *et al.,* 1981).

Sensory Evaluation

The flours were processed into Tuwo. These were compared with tuwo made from 100% maize flour. Samples were coded and presented at random numbers to twenty panel of judges to test for the following attributes: appearances, taste, aroma and texture. The panelists were provided with mouth rinse in-between each tasting. The attributes were scored using a 9point hedonic scale. 9 equals like extremely and 1 equals dislike extremely.

Statistical Analysis of Data

Data generated from the chemical and sensory analysis were subjected to analysis of variance (ANOVA) and means were separated by Duncan multiple range test (SAS, 1995).

RESULTS AND DISCUSSIONS

Result of proximate analysis of sprouted pigeon pea and maize flour blends together with the control was shown in table 1. The result has shown increase in protein, fat, ash and crude fibre contents with increased substitution of pigeon pea flour. There was no significance difference ($P>0.05$) in the moisture level of all the blends. The increase in protein, fat, ash and crude fiber contents of the blends was in agreement with the reports of Akinjayeju and Adekanye, (2006) but contrasted to the results of Nwabugwu and Onweluzo (2005). The increase in protein can be attributed to increase enzyme activities resulting in a net synthesis of enzymatic proteins (Onimawo and Asugo, 2004). The increase in ash content of the blends is most likely as a result of losses during sprouting (germination losses) leading to reduction in dry matter and increase in ash content. However, it has been observed that the level of carbohydrate in the blends was decreasing with increase in the level of sprouted pigeon pea flour. This may be due to the fact that energy stored in the carbohydrate content was used for metabolism during germination (Odia *et al,* 2010).

Table 2 shows the results of the sensory analysis of tuwo from composite flour and the control. The result showed significant difference ($P<0.05$) between the control sample and the composite samples in all the sensory parameters evaluated. However, the panelist's scores in some attributes were a bit comparable to the control sample. Tuwo produced from 80% maize flour and 20% pigeon pea flour has the highest panelist ratings in appearance, texture, aroma, taste and mouth feel with mean scores of 7.45, 6.10, 6.95, 6.70 and 6.95 respectively. It was also observed that there were no significant difference ($P>0.05$) in the rating of the tuwo samples. This suggests that this blend was more acceptable to the panelist in these parameters most especially in terms of appearance. Appearance of food is usually the first sign of edibility (Ihekoronye and Ngoddy, 1985). It has also shown that the two samples; 60:40 and 50:50 blends were the ones rated least among all the formulated blends.

CONCLUSION

The result of the proximate analysis has shown that the combination of sprouted pigeon pea with maize flour enhances the nutritional composition of the end product. Result of the sensory analysis of the tuwo samples from the blends has shown that maize flour and sprouted pigeon pea flour can be combined/blend in the ratio of 80:20 respectively to obtain an acceptable product.

Table 1: Proximate Analysis of Flour from Sprouted Pigeon Pea and Maize Flour Blends

	(Mf : Pf) 100:0	(Mf : Pf) 80:20	(Mf : Pf) 70:30	(Mf : Pf) 60:40	(Mf : Pf) 50:50
Moisture	10.27±0.12	10.03±0.06	10.53±0.0	10.27±0.06	10.60±0.00
Protein	9.47±0.06	10.57±0.06	11.77±0.15	13.33±0.15	13.33±0.06
Fat	1.10±0.10	1.53±0.06	1.83±0.1	2.20±0.00	2.23±0.15
Ash	0.60±0.00	1.13±0.15	1.90±0.10	2.73±0.15	2.77±0.15
Crude Fibre	0.37±0.06	0.83±0.06	1.30±0.10	1.67±0.12	1.70±0.17
Carbohydrate	78.20±0.17	75.93±0.21	72.33±0.67	69.83±0.12	69.37±0.25

± Standard deviation of three replicate which is mean

Data are mean together with standard deviation (±) of three replicates.

Mf = Maize flour

Pf = Sprouted Pigeon pea flour

Table 2: Sensory Analysis of Tuwo from Sprouted Pigeon Pea and Maize Flour Blends

	(Mf : Pf) 100:0	(Mf : Pf) 80:20	(Mf : Pf) 70:30	(Mf : Pf) 60:40	(Mf : Pf) 50:50
Appearance	8.80±4.10^{a}	7.45±0.60^{b}	6.00±1.52^{c}	4.40±1.64^{d}	3.90±1.68^{d}
Texture	8.15±0.75^{a}	6.10±2.38^{b}	5.25±1.89b^{c}	4.40±2.16^{c}	4.85±2.03b^{c}
Aroma	8.35±0.96	6.95±1.05^{b}	5.50±1.67^{c}	4.35±1.94	55±1.93c^{d}
Taste	8.00±1.08^{a}	6.70±1.66^{b}	4.60±1.82^{c}	4.50±1.73^{c}	4.45±2.16^{c}
Mount feel	8.15±0.93^{a}	6.95±1.47^{b}	5.35±2.18^{c}	3.95±1.57^{d}	4.60±1.73c^{d}

Means in the same row with different superscript are significantly different (P<0.05).

Mf = Maize flour

Pf = Sprouted Pigeon pea flour

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