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PROXIMATE AND SENSORY EVALUATION OF MEAL (FUFU-PLUS) PRODUCED FROM CASAVA AND UNRIPE PLANTAIN

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Abstract

Three samples of composite flours were produced from cassava and unripe plantain. Formulation of the samples was carried out using standard methods. The samples were labelled A, B and C. Sample A had 80% cassava and 20% unripe plantain, sample B had 90% cassava and 10% unripe plantain, while sample C had 85% cassava and 15% unripe plantain. The proximate and sensory analysis was carried out on the samples. While, the control was labelled sample D. The results showed that sample B had the highest carbohydrate (91.02%), while sample A had the least carbohydrate (90.58%) contents. However, there was no significant difference ($P<0.05$) in the carbohydrate values of the samples. There was no significant difference ($P<0.05$) in the protein and moisture contents of the food samples. Sample C containing 85% cassava and 15% unripe plantain was most acceptable by the panellists. This can be attributed to the composition of sample C. Sample C varied significantly ($P>0.05$) from other samples in terms of taste and texture. There was a significant difference ($P>0.05$) in aroma between the control and other samples. Sample A was the least accepted in taste, colour and aroma in all the samples. However, all the samples were accepted by the panellists.

Introduction

Cassava (*Manihot esculenta crantz*) is a perennial woody shrub with an edible root, which grows in tropical and subtropical areas of the world (Iita, 2005). Cassava can grow on marginal lands where cereals and other crops do not grow well, it can tolerate drought and can grow in low nutrient soils. Cassava roots can be stored in the ground for up to 24 months and some varieties for up to 36 months, the harvest may be delayed until market, processing or other conditions are favourable (Asiedu, 1989).

Traditionally, cassava roots and leaves are utilized in various ways and processed by various methods into numerous product according to local customs and preferences. Such products include garri, lafun, fufu, pupuru, etc (Halm, 2005).

The potential of cassava for the production of confectionery products and ethanol have been previously identified.

Plantains (*Musa paradisiaca*) are potential sources of micronutrients especially vitamins A, C, potassium and fibre. Over 2.3 million metric tons of plantain are produced in Nigeria annually (FAO, 2009), however, about 35% to 60% post-harvest loss was reported and attributed to lack of storage facilities and inappropriate technologies for food processing (Abioye,*et.al,* 2004). USDA (2009)

reported that plantain provides a better source of vitamin A than most other staples. Plantain contains low sodium in dietary terms hence recommended for low sodium diets.

This research therefore aimed at determining the proximate and sensory qualities of meal produced from cassava and unripe plantain.

Materials and Methods

- **Collection of Samples:** The cassava and unripe plantain were purchased in Jattu market in Etsako West Local Government Area of Edo State, Nigeria.
- **Processing of Materials:** The cassava and unripe plantain were washed, cleaned, peeled, sliced, processed and dried in powder form.Formulation and composition were carried out following standard methods. The flours were produced at different composition and labelled samples, A, B, and C.

Determination of Proximate Composition

The moisture content, crude protein, crude fibre and ash contents were determined using AOAC (2012) methods, while the carbohydrate was determined by difference (Ihekoronye and Ngoddy, 1985).

Sensory Evaluation

Sensory evaluation was carried out on the cooked samples (A, B, and C) within 20 minutes after cooking. A 9-point hedonic scale was used with a panel of twenty semi-trained panellists comprising males and females staff and students who are familiar and consumers of cassava and plantain were coded and randomly presented to the panellists in the same type of saucers. Bottled water was provided to rinse the mouth between evaluations. A 9-point hedonic scale was used for the evaluation where 1 represented "dislike extremely" and 9 "like extremely". The texture,colour, aroma, taste and overall acceptability were evaluated.

Statistical Analysis

All the data obtained from analytical determinations were subjected to analysis of variance and reported using descriptive statistics as mean ± standard deviation of the three determinations. Sample means were separated using Duncan's Multiple Range Test ($P<0.05$). Analyses were done using the statistical software package (SPSS version, 2010).

Results

Table 1: Proximate Composition of Samples (Fufu Plus)

Sample	Moisture (%)	Crude fibre (%)	Ash (%)	Fat (%)	Protein (%)	CH_O
A	$6.81^{a}\pm0.00$	$0.14^{ab}\pm0.00$	$0.33^{bd}\pm0.00$	$0.32^{bd}\pm0.001$	$1.83^{cd}\pm0.01$	$90.58^{c}\pm0.01$
B	$6.29^{b}\pm0.00$	$0.13^{ab}\pm0.00$	$0.31^{bd}\pm0.00$	$0.34^{bd}\pm0.00$	$1.91^{bc}\pm0.00$	$91.02^{ac}\pm0.07$
C	$6.40^{c}\pm0.10$	$0.41^{ac}\pm0.00$	$0.35^{bd}\pm0.00$	$0.31^{bd}\pm0.00$	$1.93^{bc}\pm0.01$	$90.71^{c}\pm0.07$

Means with different superscript letters in the same column are significantly different ($P<0.05$).

Samples:

A = 80% cassava and 20% unripe plantain

B = 90% cassava and 10% unripe plantain

C = 85% cassava and 15% unripe plantain

Table 2: Mean Sensory Quality Attributes of Samples (Fufu-Plus)

Sample	Taste	Colour	Aroma	Texture	Overall Acceptability
A	$5.61^{a}\pm0.01$	$5.27^{b}\pm0.01$	$6.00^{ad}\pm0.02$	$6.18^{ab}\pm0.005$	$6.10^{ad}\pm0.01$
B	$6.16^{ab}\pm0.05$	$6.31^{bc}\pm0.01$	$7.00^{c}\pm0.02$	$5.26^{b}\pm0.01$	$6.80^{bd}\pm0.02$
C	$7.00^{c}\pm0.05$	$6.17^{ab}\pm0.02$	$7.31^{cd}\pm0.02$	$6.67^{d}\pm0.03$	$7.00^{c}\pm0.01$
D	$6.20^{bd}\pm0.01$	$6.21^{bd}\pm0.05$	$7.50^{e}\pm0.01$	$5.81^{ac}\pm0.01$	$6.98^{ac}\pm0.01$

Means with different superscript letters in the same column are significantly different ($P<0.05$).

Samples:

A = 80% cassava and 20% unripe plantain

B = 90% cassava and 10% unripe plantain

C = 85% cassava and 15% unripe plantain

D = Control (commercial cassava meal)

Discussion

The results of the proximate composition showed that the samples were rich in carbohydrate. The samples were rich in sugar and energy.

The produced meal (*fufu-plus*) had low moisture contents. The low moisture content of the food as shown in the result will not encourage microbial

proliferation and food spoilage (Ajayi andOyetayo, 2009). Dry and low moisture increases the shelf life of food (Ihekoronyeand Ngoddy,1985). The high fibre content in food helps to empty bowel and reduces the risk of constipation. The produced meal samples had low protein, fat, crude fibre, and ash contents. This composite flour can provide the necessary energy and nutrients needed by the body. This will help to solve the problem of food shortage, malnutrition and making food available for the internally displaced population.

The results of the sensory analysis are shown in Table 2. Among the samples, sample C was the most acceptable, while sample A was the least acceptable. Sample C varied significantly (P>0.05) from other samples in terms of taste and texture, this can be attributed to the composition of the Sample C. there was a significant difference (P>0.05) in aroma between the control and other samples. Sample A was the least accepted in taste, colour and aroma in all the samples. However, all the samples were accepted by the panellists.

Conclusion

The composite flour produced had a high percentage of carbohydrate content. The meal can provide the necessary energy needed in the body. The composite flour can provide the necessary energy and nutrients needed by the body. This will help to solve the problem of food shortage, malnutrition and

making food available for the internally displaced population. This food can also be fortified to increase protein contents. The shelf life of the produced samples was high because of the low moisture contents. Sample C containing 85% cassava and 15% unripe plantain was most acceptable by the panellists. This can be attributed to the composition of sample C, which had significant and highest values in the taste and aroma of the sensory attributes considered. However, all the samples were accepted by the panellists.

Recommendation

The composite flour can be produced in large quantities to meet the food need of the world growing population, particularly in Africa. This will help to solve the problem of malnutrition, food shortage and the problem of the internally displaced population. The produced samples can also be fortified with protein and minerals to increase the nutrient value.

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