Volume : 2 | Issue : 7 | July 2013 • ISSN No 2277 - 8179

Comparison of Nutrient Potentials of Maize *(Zea mays)* Gruel Supplemented with Processed African Yambean *(Sphenostylis sternocarpa)* and Soybean *(Glycine max)*

Home Science

KEYWORDS : African Yambean, gruel, nutrient value, supplementation

Madukwe, E.U.	Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.
Nnam, M.N	Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.
Ani, P.N	Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.
Chukwuka, O.F	Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.
Chukwuzubelu, C.N	Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.

ABSTRACT

African yambean (AY) and soybean (SB) grains, and maize flour (custard) were purchased from Nsukka local market in Enugu State, Nigeria. The legumes (AY and SB) were fermented for 48 and 24h respectively, washed, dehulled, sundried and hammer-milled into fine flour (70 mesh screen). The proximate composition of AY and SB flours were determined using standard methods. The flours were separately used to supplement custard (maize flour) gruel. The gruels were organoleptically evaluated using a 9-point hedonic scale. The flour had comparable moisture (AY – 4.8% and SB – 3.36%). On the other hand, protein fat and carbohydrate values differed (P<0.05). Soybean flour had higher protein, fat, and energy levels that those of African yambean. The gruel supplemented with soybean was much more accepted than its counterparts (P<0.05). The African yambean supplemented gruel was less accepted probably due to its strong beany flavour.

INTRODUCTION

The low-income mothers in Nigeria have serious challenge in weaning their children with adequate complementary foods. This continues to precipitate high rate of malnutrition among children under five years old in Nigeria. The current nutrition education of mother is meant to reduce infant malnutrition. The selection of cheaper protein-rich plant foods such as soybean and groundnut is highly recommended to achieve food diversification. African yambean is an under-exploited legume (Duke, Okigbo, Reed and Weder, 1977) and it is rich in protein, mostly the cultivar/ variety in Southern Nigeria (Ene-obong and Carnovale, 1992).

This study evaluated the comparative supplementary value of processed African yambean and soybean in maize gruel as complementary food.

MATERIALS AND METHODS

Materials: Maize (*Zea mays*) flour, sugar, seeds of African yambean (*Spenostylis sternocarpa*) and soybean (*Glycine max*) were purchased from local retailer in Ogige market, Nsukka, Enugu State, Nigeria.

Sample treatment/ processing: African yambean (AY) grains were washed in clean tap water, parboiled for 5 minutes at 100oC and fermented for 48h. Soybean (SB) grains were washed in clean tap water, and fermented for 24h. Both AY and SB grains were separately fermented 1:3 (w/v), dehulled and oven-dried at 55oC for 10h and milled separately into fine flour (70 mesh screen).

Both flours were analyzed for moisture and protein content using Pearson (1976) procedure. Crude fat and total ash were determined by AOAC (1995) procedure. The method of Josylyn (1970) was adopted for crude fibre. Carbohydrate was determined by difference using the formula: % carbohydrate = 100 – (% Moisture + % Protein + % Fat + % Ash + % Crude fibre).

Sensory evaluation: Maize flour (140g) was mixed with water to form paste. Boiling water (750ml) was added to paste and constantly stirred to form gruel. The gruel was divided into two equal portions to which 10g and 13g of soybean and African yambean flours, respectively, were added. The variation in quantity was arrived at on protein basis. Sugar (13 and 10g) each was added to the gruel and stirred. Multiples of these blends were prepared to provide enough gruel for the sensory panel. Maize gruel supplemented with soybean was the control. Thirty (30) judges were selected based on their previous experience in organoleptic assessment of foods. The evaluation of the test samples was conducted in the Food laboratory of the Department of Home Science, Nutrition and Dietetics of the University of Nigeria, Nsukka. A 9-point hedonic scale was used to evaluate the gruels for colour, taste, flavour and general acceptability. Nine (9) represented the highest score and 1 the least score.

Statistical Analysis: The Statistical Package for Social Sciences (SPSS), version 17 was used to analyze the data obtained. Percentages, means, standard deviation, standard error of the mean and standard t-test were used to analyze the data generated. Duncan's studentized New Multiple Range Test was applied to separate and compare means (Steel & Torrie, 1960)

RESULTS AND DISCUSSION

Table 1: Percentage proximate composition and energy value of processed African yambean (*Sphenostylis stenocarpa*) and soybean (*Glycine max*) flours (per 100g)

Flour	Moisture	Protein	Fat	Crude fibre	Ash	CHO*	Energy (Kcal)
African yambean	4.48±0.00[a]	29.78±0.00[b]	5.95±0.00[b]	4.02±0.00[a]	3.60±0.00[b]	52.17±0.04[a]	381.35
Soybean	3.36±0.01[a]	41.75±0.35[a]	19.75±0.35[a]	3.73±0.01[a]	5.00±0.01[a]	26.41±0.07[b]	450.39

Mean±SD of 2 determinants

*Carbohydrate

Table 1 presents the proximate composition and energy content of processed African yambean and soybean flours. The moisture content of the two foods differed. African yambean contained moisture (4.48%) than soybean (3.36%). However, the difference in moisture between the two flours was similar (P>0.05). The low moisture content of the flours was solely attributed to drying. It is known that drying decreases moisture in any given food. The present study confirmed that of Odo (2001). She observed that drying reduced moisture and increased dry matter.

The protein values for the two flours were high and differed from each other. African yambean had 29.78% and soybean had 41.75%. The high protein content of the flours was not a surprise. They are legumes whose proteins are known to range from 16.00 to 45% depending on the variety. The higher protein values for these legumes agreed with the results of many (Ene-obong and Carnovale, 1992; Lui, 1997; Enwere 1998). The values ranged from 21 – 23% for African yambean and 40.00% for soybean. The fat content of these flours differ. Soybean as one would expect had much higher fat value (19.75%) than African yambean (5.95%). The higher fat value for soybean was not surprising. It is an oil seed that stores energy in form of carbohydrate. African yambean had more crude fibre (4.02%) than soybean (3.73%). The difference in their crude fibre values were very close and insignificant (P>0.05). The slight edge in crude fibre that African yambean had over soybean was due to higher complex carbohydrate content of African yambean. The ash value for the two flour differed. African yambean had3.60% and soybean had 5.00%. The values showed that soybean would be a better source of mineral than African yambean. This is because it is known that the higher the ash content of a food the higher is its minerals.

The carbohydrate value varied. African yambean had twice the value for soybean (52.17 vs. 26.41%). The higher value for African yambean is simple to explain. African yambean is pulse that has more carbohydrate for energy than soybean that stores more fat for energy. Their energy values differed. Soybean had more energy (450.39Kcal) than African yambean (381.35kcal). The higher energy for soybean was not a surprise. Soybean is an oil seed. Oil/ fat contains more than twice energy per gram as against carbohydrate (9Kcal vs. 4Kcal).

Table 2: Sensory evaluation of maise (*Zea mays*) gruel enriched with African yambean (*Sphenostylis sternocarpa*), and soybean (*Glycine max*) flours.

Sensory parameter	AYF	SBF
Colour	6.38^{b}	7.56^{a}
Flavour	5.88^{b}	6.75^{a}
Taste	5.53^{b}	6.50^{a}
Texture	4.93^{b}	6.50^{a}
General acceptability	4.80^{b}	6.62^{a}

Mean±SEM of 30 respondents

Key:

AYF = Gruel supplemented with African yambean flour

SBF = Gruel supplemented with soybean flour

Table 2 presents the organoleptic attributes of the supplemented maize gruels. All the organoleptic attributes of the two gruels differed. The gruel supplemented with soybean (SBF) had higher values for all the attributes selected for comparison (P<0.05). The lower attributes for the gruel supplemented with African yambean might be attributed to treatments. It is also known that when a food has low flavour it affects its taste, and acceptability. The poor acceptability of the gruel supplemented with African yambean were due to (a) unfamiliarity of the product and (b) its beany flavour.

Conclusion:

African yambean, an under-utilized legume, is nutritious and can be used to enrich cereal gruels. It lends itself to easy household and traditional processing methods just like soybean. However, it still has some shortcomings in terms of sensory acceptability.

REFERENCE

[1] AOAC (1995). Official Method of analysis. Association of Analytical Chemistry, Washington D.C. | [2] Duke, J.A., Okigbo, B.N., Reed, C.F. and Weder, J. K. (1977). Tropical grain bulletin, IITA, Ibadan. | [3] Ene-obong, H.N. and Canovale, E. (1992). Nigerian soup condiments, Traditional processing and potential as dietary fibre sources. Food Chemistry. 43; 29 | [4] Enwere, N.J. (1998). Food of plant origin. Afro-orbis Publications, Nsukka. | [5] Josylyn, M.A. (1970). Methods of Food Analysis. 2nd ed., New York Academic Press. | [6] Lui, K. (1997). Soybeans: Chemistry, Technology and Utilization. Springer Publishers | [7] Odo, P.C. (2001). Chemical and organoleptic evaluation of maize (Zea mays) pap supplemented with sesame flour (Sesamum indium). Unplished B.Sc. Thesis Dept. of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka. | [8] Pearson, D. (1976). The Chemical Analysis of Foods. The edition Churchill Livingstone Edinburgh.