Research Paper

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Nutrient and organoleptic profile of vegetable drink from African yambean *(Sphenostylis sternocarpa)*

Home Science

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ABSTRACT

African yambean (Sphenostylis sternocarpa) was assessed as a potential for production of vegetable drink. Its grains and that of sorghum (Sorghum bicolor) were purchased from local retailers from Nsukka market, Nigeria. The grains were separately fermented for 48 and 12h, respectively. They were wet-milled, sieved (70 mesh screen) and formulated into drinks. Approved standard methods of chemical analysis were employed to assess their proximate values, mineral content and anti-nutrient values. A 9-point hedonic scale was used to evaluate their sensory profile. Statistical analysis of mean, standard error of the mean, and student t-test were employed. African yambean drink had a significantly higher protein value (2.16%) than sorghum drink (1.76%)(P<0.05). African yambean drink had a higher calcium value (4.36mg/100ml) than the sorghum drink (3.55mg/100ml). The Phytate: Zinc Molar Ratios (PZMR) of the two samples were very low (less than 0.50). There was no significant differences for all the organoleptic attributes tested (P>0.05).

INTRODUCTION

There has been a rising interest in the development of vegetable drinks from legumes. In Nigeria, sorghum, millet and maize (all cereals) have been regularly used as refreshing local vegetable drinks for both adults and children (Enwere, 1998). Bambara groundnut, lima beans, African yambean, and so many other types of legumes are usually boiled for family meals (Elegbede, 1998). Most Nigerian indigenous plant foods are under-exploited and rarely diversified in their use as food.

Production of vegetable drinks involve some easy traditional processing methods like dehulling, drying, soaking, roasting, and milling and does not necessarily require expensive equipment. Hence, it can easily be adopted by people on restricted budget. Vegetables drinks, especially from legumes (like soybean) are cheap sources of protein when compared with animal milk. If production of vegetable milk from local crops is adopted, they can provide cheap alternative and nutritionally adequate foods.

This work, therefore, explored the possibility of producing not only refreshing but nourishing vegetable drink from African yambean (Sphenostylis stenocarpa); evaluate its nutrient content and organoleptic profile when compared with local sorghum-based drink.

MATERIALS AND METHODS

Materials: African yambean (Sphenostylis stenocarpa), sorghum (Sorghum bicolor), sweet potato, ginger roots, and sugar were bought from local retailers in Ogige Market, Nsukka, Nigeria.

Method: One-half kilogram of African yambean was washed in clean cold water, parboiled for 5mins at 100oC, soaked in water in the ratio of 1:3 (w/v) for 48h. The seeds were dehulled, wet-milled with peeled and sliced ginger (180g). The paste was blended with sweet potato flour (125g); mixed with cold water in the ration of 1:3 (w/v) and sieved (70mm mesh). The filtrate was sweetened with 150g granulated refined sugar and boiled for 40minutes. The resultant drink was cooled, poured into sterilized plastic bottles and refrigerated until needed.

One-half kilogram of sorghum seed was washed with clean cold water and soaked in cold water in the ratio of 1:3 (w/v) for 12h, then wet-milled with peeled and washed ginger roots (180g). It was then mixed with water in the ratio of 1:3 (w/v), brought to boil, and cooled, sweet potato flour (125g) was blended into it and was allowed to stand for 12h, and sieved using muslin cloth. The drink was sweetened with 150g refined granulated sugar, bottled and refrigerated.

Portions of the two vegetable drinks were sent for nutrient analysis and the remaining portions for sensory test. In the proximate analysis, moisture and protein were determined using Pearson (1976) method. AOAC (1995) was used for crude fat, ash and crude fibre. Carbohydrate was determined, after wet digestion, using atomic absorption spectrophotometer, phytate was determined using procedure from Harland and Oberleas (1977) while the method described by Price and Butler (1977) was employed for tannins determination.

A 9-point hedonic scoring form was used for sensory evaluation and general acceptability of the vegetable drinks. The highest level of acceptability on the scale was 9 while 1 was the least. Thirty (30) judges were selected, based on their previous involvement in similar works, for organoleptic evaluation. The sensory test was done in the Food laboratory of the Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka. The standard rules guiding such test were observed.

Statistical analysis

The Statistical Package for Social Sciences (SPSS), version 17 was used to analyze the data. Statistical tools employed include mean, standard deviation, standard error of the mean, and students't-test.

RESULTS AND DISCUSSION

The results obtained were hereby presented in the tables below.

Table 1 - Percentage proximate composition and energy value of processed African yambean (Sphenostylis sternocarpa) and sorghum (Sorghum bicolor) drinks (per 100ml)

as consumed

Test Sample	Moisture	Protein	Fat	Crude fibre	Ash	CHO*	Energy (Kcal)
African Yambean	87.38±0.04a	2.16±0.01a	0.71±0.01a	Trace	0.45±0.01	9.30	52.23
Sorghum	85.25±0.00a	1.75±0.01b	0.36±0.01b	Trace	0.35±0.00	12.30	59.53

Mean±SD of 2 detemination

* Carbohydrate

Table 1 shows that African yambean and sorghum drinks had comparable values (P>0.05) in moisture. They showed significant difference in protein value (P<0.05). The high moisture values of the drinks account for lower levels of their other food nutrients due to dilution effect. However, the fat content of African yambean drink (0.71%) differed from that of Ene-Obong and Carnovala (1992) which was 1.9%. The difference could be due to specie variety and processing methods employed. The same goes for sorghum drink (0.35%) as against 3.7% recorded by Enwere (1998).

Table2: Calcium, iron and zinc content of African yambean (Sphenostylis sternocarpa) and Sorghum (sorghum bicolor) drinks (mg/100ml) as consumed.

Test samples	Calcium	Iron	Zinc
African yambean	4.39±0.00	0.70±0.01	0.36±0.00
Sorghum	3.55±0.00	0.79±0.01	0.55±0.01

Mean±SD of two determinations

Table 2 reveals the mineral content of the samples. African yambean drink showed superior value to sorghum drink in terms of calcium content (4.39 vs 3.55mg/100ml) (P<0.05).

Even though raw samples of African yambean and sorghum are rich sources of iron, low levels of calcium and iron observed in the test samples could be due to soaking. Soaking decreases calcium and iron in food due to leaching (Ene-obong, 1992). Food processing, according to Levenstein (2003) can lower the nutritional value of foods. Effect of dilution should also not be ignored since the samples were drinks and so had high moisture values.

Table 3: Antinutrient and Phytate: Zinc Molar Ratio (PZMR) of African yambean (Sphenostylis sternocarpa) and sorghum (Sorghum bicolor) drnks (mg/100ml) as consumed.

Test samples	Tannins	Phytate	PZMR
African yambean	0.95±0.00	Trace	0.00
Sorghum	0.87±0.01	Trace	0.13

Mean±SD of 2 determinants

Table 3 shows that the Phytate: Zinc Molar Ratio (PZMR) of the samples were very low (0.00 and 0.13 for African yambean and Sorghum drinks, respectively).

Low levels of phytate recorded by the test samples were in agreement with the findings of Enwere (1998) and Gibson and Ferguson (1998). They stated that dehulling and soaking remove significant amount of phytate and these processing techniques were employed in the production of these drinks. The low PZMR (less than 5) of the drinks implies that Zinc can easily be absorbed from the drinks.

Table 4: Sensory evaluation of African yambean (Sphenostylis sternocarpa) and sorghum (Sorghum bicolor) drinks

Sensory parameters	AYD	SGD
Colour	5.77a±0.03	6.25a±0.30
Flavour	5.58a±0.23	6.15a±0.32
Taste	5.60a±0.03	6.07a±0.28
Texture	6.00a±0.31	6.33a±0.30
General acceptability	5.58±0.27	6.00±0.34

Mean±SEM of 30 respondents

Key:

AYD – African yambean drink

SGD – Sorghum drink

Table 4 shows the sensory profile of the samples. In the attributes so tested, the values of the test samples were comparable (P>0.05), even though SGD which served as the control showed slightly higher values.

The comparable values of African yambean drink with local sorghum drinks shows that the former has a promise of acceptability as a vegetable drink. Food processing can be used to improve palatability of foods, according to Latham (1997). The processing of African yambean to drink keeps at par with sorghum drink since there taste and flavour attributes showed no significant difference (P>0.05).

Conclusion

African yambean, an under-utilized legume, can be used in diverse ways as food. Household processing techniques like soaking, dehulling, fermentation can be employed to decrease antinutrients in African yambean thereby improving its nutritional value. Sensory profile of African yambean drink was promising and can be an alternative or addition to the already existing sorghum drink. However, more research works need to be carried out on how to maximally improve the acceptability.

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