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Proximate and Sensory Qualities of Fortified Food From Flour Blends of Malted Sorghum, Yellow Maize and Tiger Nut

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Abstract

This research was carried out to produce fortified food from flour blends of malted sorghum, yellow maize and tiger nut and to determine the proximate and sensory qualities of the samples. Three samples of the fortified foods were produced at different ratio of formulation and labeled as samples A, B and C. Sample A had 50% yellow maize, 30% malted sorghum and 20% tigernut. Sample B had 60% yellow maize, 25% malted sorghum and 15% tigernut while Sample C had 70% yellow maize, 20% malted sorghum and 10%tigernut. The result of the proximate composition showed significantdifference ($P < 0.05$) in the parameters considered, however, sample A had the highest protein, crude fibre and fat contents and the least moisture, ash and carbohydrate contents. Sample B had the highest moisture and ash contents, while sample C had the highest carbohydrate and least crude fibre, fat and protein contents. In the sensory qualities, sample A was most preferred while sample C was least preferred. There was significant difference ($P<0.05$) in the sensory parameters considered,however, all samples were accepted by the panel.

Keywords: malted, tigernut, fortified, yellow maize

Introduction

Nutritional demand of Nigerians is changing in response to the trend in other parts of the world in order to check emerging diseases and to avoid or manage some other health conditions. This change has a shift from synthetic products to natural, fresh and plant-based products. This situation had led to sourcing for alternative in plant to produce the needed nutrients, minerals and vitamins.

Sorghum is an ancient cereal grain belonging to the grass family, Poaceae.There are many species of sorghum, the most popular being sorghum bicolor, which is native to Africa. Although Sorghum is less known in the Western world, it's the fifth most produced cereal crop in the world, with an annual production of around 57.6 million tons. Farmers favor this crop due to its tolerance to drought, heat and various soil conditions. The increased use of sorghum as a food inSub-saharan Africa could alleviate the problem of chronic under-nourishment, as Sorghum is much better suited to cultivation in Semi-Arid tropics (SAT) of Africa, than non-indigenous cereals such as wheat or maize (Okolo and Ezeogu, 1996). Sorghum is rich in a variety of nutrients, including B vitamins, which play an essential role in metabolism, neural development, skin and hair antioxidants like flavonoids, phenolic acids and tannins. Also, it is rich in protein.

Malting has been identified as a traditional processing technology that could possibly be used to improve the nutritional quality of the protein The process of malting comprises three-unit operations, viz steeping, germination and drying. A number factors are known to have an effect on the development of enzymes synthesized during germination and thus on the quality of the malt produced (Mertz, *et. al,* 1984).

Maize (*zeamays*) is one of the world's most popular cereal grains. It's the seed of a plant in the grass family, native to central America but grown in countless varieties worldwide. Maize contains a number of important B vitamins, vitamin C, E and vitamin A. Maize is also a good source of dietary fibre and protein but low in fat (Enyisi, et. al; 2014). Maize grain is rich in starch (60 – 75%) and is an excellent source of minerals. The protein content (9 - 12%) of maize is relatively low and it does not provide the essential amino acids since it is relatively low in lysine (Olaonipekun, *et. al,* 2015).

Tigernut (*Cyperus esculentus*) is commonly known as earth almond, tigernut, chirta, yellow nutsedge and zulunuts. It is known in Nigeria as "aya" in Hausa "Ofio" in Yoruba ad "Akihausa" in Ibo. There are three varieties (black, brown and yellow), but only two varieties (yellow and brown) are readily available in te market. Tigernut is a tuber rich in energy, mineral (mainly phosphorus and potassium) and vitamin E and C thus suitable for the diabetics. (Dianne, 2004).

The objective of this research was to determine the proximate and sensory qualities of fortified food produced from malted sorghum, yellow maize and tigernut flours.

Materials and Methods

Sample Collection:

200kg each of Sorghum, yellow maize and tigernuts were purchased in Jattu market in Etsako West Local Government Area of Edo State, Nigeria. The samples were transported to processing workshop in the Department of Food Technology, Auchi Polytechnic, Auchi for processing.

Production and Formulation of Samples:

The raw materials were sorted, clean, washed and dried. The Sorghum was processed by malting for 72 hours at room temperature and made into powder form after sundrying.

The yellow maize and tiger nuts were made into powder form after sundrying and grinding.

Three different formulations were made at different ratios and labeled as samples A, B and C.

Sample A had 50% yellow maize, 30% malted sorghum and 20% tigernut flours.
Sample B had 60% yellow maize, 25% malted sorghum and 15% tigernut flours.
SampleChad 70% yellow maize, 20% malted sorghum and 10% tigernut flours.

The samples were formulated and fortified into finished product and packaged.

Proximate Analysis

Nutritional analysis was carried out on the three samples to determine the moisture, ash, crude fibre, protein and carbohydrate content according to AOAC, 2019.

Sensory Evaluation

Sensory evaluation of the samples was carried out using a twenty member panel drawn from the staff and students of Food Technology Department, Auchi Polytechnic, Auchi. The samples were rated on the following parameters: Taste, Aroma, Colour, Texture and General acceptability using 9-point hedonic scale where liked extremely was scored 9 and dislike extremely scored 1 (Iwe, 2002).

Statistical Analysis

All data obtained were subjected to analysis of variance (ANOVA) and separation of means using a pre-packaged computer software (MINITAB 15).

Results

Table 1: Proximate composition (%) of fortified Food from flour blends of maltedsorghum, yellow maize and tigernut.

Sample	Moisture	Ash	Fibre	Fat	Protein	CHO
A	$4.13^{a}\pm0.02$	$1.21^{ab}\pm0.04$	$2.98^{ba}\pm0.01$	$10.^{cd}71\pm0.02$	$15.32^{af}\pm0.01$	$65^{ta.}.65\pm0.05$
B	$4.26^{b}\pm0.01$	$1.72^{ac}\pm0.03$	$2.61^{ca}\pm0.028.^{cb}36\pm0.02$	$13.43^{af}\pm0.01$	$69^{fb.}.62\pm0.01$	
C	$4.17^{c}\pm0.02$	$1.48^{ad}\pm0.02$	$2.53^{bc}\pm0.01$	$7.^{ac}95\pm0.02$	$11.61^{fc}\pm0.05$	$72^{fd.}.26\pm0.02$

Values are means ± standard deviation of triplicatesdetermination

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

A - 50% yellow maize, 30% malted sorghum and 20%tigernut
B - 60% yellow maize, 25% malted sorghum and 15% tigernut
C - 70% yellow maize, 20% malted sorghum ad 10% tigernut.

Table 2: Sensory properties of fortified food from flour blends of malted sorghum, yellow maize and tigernut.

Sample	Taste	Aroma	Colour	Texture	General Acceptability
A	$7.50^{a}\pm0.01$	$6.85^{ac}\pm0.15$	$7.70^{bd}\pm0.055.^{af}65\pm0.02$		$7.40^{fd}\pm0.01$
B	$7.40^{ab}\pm0.025$	$.80^{ac}\pm0.25$	$.60^{cd}\pm0.025.^{ad}70\pm0.036$	$.80^{df}\pm0.01$	
C	$6.60^{ba}\pm0.015$	$.70^{cb}\pm.015$	$.40^{dc}\pm0.035.^{fc}85\pm0.016$	$.70^{cf}\pm0.01$	

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

A - 505 yellow maize, 30% malted sorghum ad 20% tigernut.
B - 60% yellow maize, 25%malte sorghum and 15% tigernut.
C - 70% yellow maize, 20% malted sorghum and 10% tigernut.

Discussions

The result of the proximate composition of the three samples as shown in table 1, revealed significant difference (P<0.05) in the parameters considered in all the samples. However, all the samples were rich in nutrients. Sample A had the highest crudefibre, fat and protein contents and least in moisture, ash and carbohydrate contents. Sample C had the least in crude fiber, fat and protein contents and highest in carbohydrate content. Sample B had the highest in moisture and ash contents. Low moisture contents in food help to increase the shelf life of food by reducing the replication of microorganisms thereby leading to food spoilage. Malting of sorghum also increased the protein content of sorghum.

The result of the sensory qualities as shown in table 2, revealed significant difference (P<0.05)in all the parameters considered in all the samples.
Sample A was most preferred while sample C was least preferred in general acceptability. However, the samples were accepted by the 20 man member panel. Sample A was most preferred in taste, aroma and colour while sample C was least preferred in taste, aroma, colour but most preferred in texture. The difference in the level of acceptance can be attributed to individual preference, sample combination and level of awareness of panelists.

Conclusion

The fortified food flour blends of malted sorghum, yellow maize and tigernut were rich in nutrients and were accepted by the panelist. The food was rich in protein which is very essential for building of cells, growth and development. The low moisture content is one of the qualities needed for long shelf life of food.Malting of sorghum increased the protein content of sorghum and the aroma of the food. This however reflected in the sensory qualities as sample A with the highest malted sorgum was most preferred in taste and aroma. Sample A also had the highest protein content.

Recommendation

This fortified food from flour blends of malted sorghum, yellow maize and tigernut can provide the required nutrients for infants, young and old. This can also help to reduce malnutrition particularly in developing countries. This fortified food can be produced locally at home and in food industries thereby creating jobs and providing revenue.

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References

AOAC, (2019) Association of Official Analytical Chemistry. Official Method of Analysis. 21st Edition, Washington, D.C

Dianne (2004): Nutritive value of potential complimentary foods based on Tigernut and maize. Nutritional food Sci. 3:187.

Enyisi, I. S, Umoh V. J., Whong C.M.Z., Abdulahi, I. O. Alabi, O. (2014) Chemical and Nutritional Value of Maize and Maize products obtained from selected markets in Kaduna State, Nigeria. *African Journal of Food Science and Technology,* 5(4):100-104.

Iwe, M. O. (2001). Organoleptic assessment of extruded blend of soy and sweet Potato flour by response surface analysis. Plants Foods for Human Nutrition 60: 1-14.

Mertz, E. T., Hassan, M. M. Caims–Wittern, C. Kirleis, A. W. TU, I and Axtell, I (1984). Pepsin digestibility of proteins in Sorghum and other major cereals. Proceedings of the National Academy of Sciences of the United State of America 81. 1-2.

Okolo, B. N. and Ezeogy, I. I. (1996) Enhancement of amylolytic potential of Sorghum malts by alkaline step treatment. *Journal of the Institute of Brewing* 102, 277 – 284.

Olaonipekun, O T. Olapade, O. A., Suleiman, P. Ojo, S. O. (2015) Nutrient and Sensory analysis of abari made from composite mixture of kidney beans flour. *Sky Journal of Food Science,* 4(2): 019-023.

