Proximate and Sensory Evaluation of Kunun-zaki with Defatted Soybean and African Yam Bean

Akinsola, Akinjide O.,*[1] Idowu, Oyeyemi A., [2] Oke, Emmanuel K.,[3] Laniran, Abigail M.[1] and Sumonu, Basirat A.[2]

[1.] Department of Home Economics, Federal College of Education (Special), Oyo, Oyo State, Nigeria
[2.] Department of Food Science and Technology, Federal Polytechnic Offa, Kwara State, Nigeria
[3.] Department of Food Science and Technology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
akinsola4gold@gmail.com

Abstract: This study was carried out to investigate the proximate and sensory evaluation of Kunun-zaki samples enriched with defatted Soybean and African yam bean (AYB). Soybeans, sorghum grains and African yam bean (AYB) were sorted, wet milled and defatted respectively. 100% Sorghum was used as the control sample in production of the kunun-zaki (Sample A) while defatted Soybean was substituted with Sorghum at a ratio of 50:50 (Sample B) and African yam bean (AYB) was substituted to sorghum at the ratio of 50:50 for the production of *kununzaki* (Sample C). All the kunun-zaki samples produced were subjected to proximate analysis and sensory evaluation using nine point hedonic scale of preference. Data obtained were subjected to analysis of variance (ANOVA) and significant means were separated using Duncan multiple range test. Moisture, crude protein, crude fat, crude fibre, total ash and carbohydrate content of the kunun-zaki ranged from 81.32 to 88.53%, 4.18 to 6.08%, 0.30 to 0.35%, 1.08 to 1.77%,1.71 to 1.99% and 2.30 to 10.86%. The sensory evaluation of kunun-zaki produced from sorghum, defatted soybean and African yam bean were all acceptable by the panelist. In conclusion, the study shown that the use of defatted soybean substitution as well as African yam bean (AYB) is feasible in kunun-zaki beverage production at an acceptable ratio of 50:50.

[Akinsola, A.O., Idowu, O.A., Oke, E.K, Laniran, A.M, Sumonu, B.A. **Proximate and Sensory Evaluation of Kununzaki with Defatted Soybean and African Yam Bean.** *Researcher* 2017;9(1):37-40]. ISSN 1553-9865 (print); ISSN 2163-8950 (online). http://www.sciencepub.net/researcher. 6. doi:10.7537/marsrsj090117.06.

Keywords: Proximate, sensory, kunun-zaki

1. Introduction

Kunun-zaki is traditionally fermented non-alcoholic beverage mostly consumed in Northern Nigeria especially during fasting and dry season periods. Kunun-zaki is a Hausa word meaning sweet beverage. It is traditionally prepared from millet (*Pennisetum glaucum*), sorghum (*sorghum bicolor*) or maize (*Zea mays*) (Gaffa *et al.,* 2002). It is believed to be of immense social, economic, nutrition and medicinal importance to its numerous consumers (Efiuvwewere and Akoma, 1995) and is generally regarded as an after-meal refreshing drink during the dry season in both rural and urban centres. Although cereals are the major raw materials used in its preparation, other ingredients are also introduced such as sugar, spices-ginger, black pepper or clove to give taste to the final product (Onuorah *et al.,* 1987; Elmahmood and Doughari, 2007). Some other groups of ingredients are also added that specifically aid in starch liquefaction/saccharification and also include malted rice, malted sorghum, *Cadaba farinose* and sweet potato paste (Gaffa and Jideani, 2001). The method of production is crude involving only household utensils and varies from locality to locality (Adeyemi and Umar, 1994). Kunun-zaki was reported to have low nutritional status providing substantial carbohydrate value (Ikhajiagbe *et al.,* 2007). The beverage is deficient in protein since it is majorly from cereal crops. (NAS, 1979). Therefore, protein-energy malnutrition is prevalent in the areas where kunun-zaki serves as their major food. There is need to improve the protein contents of kunun-zaki to solve the problem of malnutrition in our society.

With the ever increasing population pressure and fast depletion of natural resources, it has become necessary to explore the possibilities of exploiting new plant resources to meet the growing needs of the human society, which incidentally has depended only on a small fraction of plant resources comprising less than 30 crops; among which is the African yam bean, a leguminous crop (Ikhajiagbe, 2007). Although the African yam bean represents a less expensive source of dietary protein among Nigerians of low economic status, very little is known about its nutritional potential and with its incorporation as an enrichment to kunun-zaki could pose a well-nourished product with protein-energy balance.

Several reports are available in the literature on kununzaki with respect to its production, microbiological, sensory and nutritional quality characteristics during production and storage. At present, there is no adequate information available on the comparative quality characteristics of kunun-zaki enriched with soybean and kunun-zaki enriched with African yam beans. Consequently the objective of this work is to produce an enriched kunun-zaki with

defatted soybean and African yam bean and to determine the proximate and sensory evaluation of kunun-zaki enriched with defatted Soybean and African yam bean (AYB).

2. Materials and Methods

2.1 Materials

Soybeans, sorghum grains, millet grains, African yam bean (AYB), ginger were purchased from Owode market Offa Kwara state.

2.2 Preparation of African Yam Bean Flour

The method of Eke (1996) was used for the production of African yam bean flour with slight modifications. The AYB seeds were handpicked, carefully sorted and winnowed to remove unwholesome seeds and other foreign particles. The clean seeds were steeped in warm water overnight. In the morning, the seeds were manually dehulled and washed to remove the seed coat after which they were dried in a cabinet dryer at 70^0C for 72hrs. After drying, they were winnowed and the dried samples were milled into flour using a laboratory hammer mill (Fritsch, D-55743, Idar-oberstein-Germany) to a particle size that could pass through a 250µm sieve. The milled samples were stored for further use.

2.3 Preparation of Defatted Soybean Flour

Soybean flour was prepared by the method described by Ihekoronye and Ngoddy (1985). Soybean was sorted to remove particles defective seeds and stones before cleaning thoroughly washed in water. The seeds were boiled for 30minutes and drained to inactivate trypsin inhibitors followed by dehulling by hand rubbing within two palms after which the soybean cotyledons were dried in a hot air oven at 70□C for 10hrs. After drying the soybeans hulls were removed by winnowing and the dried samples were defatted using soxhlet extractor. It was then milled using laboratory hammer mill (Fritsch, D-55743, Idar-oberstein-Germany) to fine powder and sieved through a standard sieve (250µm) and was stored for further use.

2.4 Production of Non-Alcoholic Kunun-zaki

The modified method of Olufunke and Oluremi (2015) was adopted. The sorghum grains were sorted out, rinsed in tap water it was then soaked for about 24hours, after that the spices were added. The soaked sorghum and spices were cleaned thoroughly with water. The cleaned sorghum and spices was then milled using an attrition mill into slurry and was sieved with a muslin cloth. The filtrate was allowed to ferment and settled for 4hours which the slurry was allowed to settle and sediment. The supernant liquid was decanted and the residue was mixed with water and was divided into two. Half of the residue was boiled and allow to cool to normal room temperature, and then the unboiled residue was mixed thoroughly until a homogenized mixture was obtained using muslin cloth and sugar was added. Two kunnu-zaki beverage samples were prepared in the Department of Food Science and Technology Laboratory, Federal Polytechnic Offa, using traditional methods. One of the samples was without addition of soybean and African yam bean while the other was enriched with defatted soybean and African yam bean at the ratio of 50:50 (w/w) – sorghum /defatted soybean/ African yam bean to improve its nutritional quality and to enhance the taste.

2.5 Formulation of Non-Alcoholic Kunun-zaki

Kunun-zaki samples were prepared by combining 100%, 50% sorghum grains with 50% defatted soybean and African yam bean flour respectively.

Table 1: Formulation of non-alcoholic *Kunun-zaki* (%)

Samples	Sorghum	African yam bean flour	Defatted soybean flour
A	100	-	-
B	50	-	50
C	50	50	-

2.6 Determination of Proximate Composition of Non-Alcoholic Kunun-zaki

Moisture content and crude fibre content of non-alcoholic kunun-zaki were determined by AOAC method. Crude protein was determined by the standard khjeldahl method, AOAC method. Fat content of the samples were measured using Soxhlet extraction method according to AOAC method. Ash content was determined by igniting 5g of sample in a furnace for 4hours at 550ºC until light grey ash colour and constant weight was achieved (AOAC,2000). Carbohydrate content were determined by difference method. The analyses were carried out in triplicates.

2.7 Sensory Evaluation of Non-Alcoholic Kunun-zaki

The method described by Iwe, (2000) was used. The sensory panel consisted of fifty consumers of Kunun-zaki who were asked to score the kunun-zaki using a 9-point hedonic scale based on their degree of likeness where 9= like extremely; 5= neither like nor dislike; 1= dislike extremely. Kunun-zaki attributes evaluated were: Taste, aroma, colour, appearance and overall acceptability.

2.8 Statistical Analysis

Data obtained were subjected to statistical analysis. Means, Analysis of variance (ANOVA) were determined using SPSS Version 21.0 and the differences between the mean values were evaluated at $p \leq 0.05$ using Duncan's multiple range test.

3. Results and Discussion

3.1 Proximate composition of non-alcoholic kunun-zaki

Table 1 shows the proximate composition of non-alcoholic kunun-zaki. All the kununzaki samples varied from 81.32 to 88.53% confirming their use as thirst quenching foods. Kunun-zaki enriched with soybean had the highest moisture content while Kunun-zaki produced from sorghum had the lowest moisture content. The moisture content of the Kunun-zaki sample were very close to the findings of Gaffa *et al.,* 2002 on soybean seed in Kunun-zaki beverage production. Water is the most important constituent of every living cell. It takes part in various chemical and biochemical processes including hydrolytic breakdown of nutrients during digestion, is continually lost from the body through urine, stools, sweat, and is expelled through respiration. Water imbalance leads to serious conditions such as dehydration which may be fatal (Shelton, 1998). The crude protein varied from 4.18 to 6.08% with Kunun-zaki enriched with soybean having the highest crude protein while kunun-zaki produced from sorghum had the lowest protein content. The higher value obtained in the soybean enriched sample might be due to high content of protein in soybean. The result obtained for the protein content of all the kunun-zaki samples were in agreement with the findings of Olufunke and Oluremi (2015). Proteins are increasingly being utilized to perform functional roles in food formulation. Therefore, the protein content of the kunun-zaki in this study suggests that it possess better nourishing property. The crude fat varies from 0.30 to 0.35%. There were significant differences ($p<0.05$) in the crude fat content of the kunun-zaki samples. The crude fat value obtained in this study was very low and this might be due to the anti-oxidant action of the spices used. The low fat content would enhance the storage life of the kunun-zaki samples due to the lowered chance of rancid flavour development. The result was in lined with the findings of Gaffa *et al.,* 2002. Crude fibre varied from1.08 to 1.77% with kunun-zaki enriched with African yam bean having the highest while kunun-zaki with sorghum had the lowest. Significant difference ($p<0.05$) was observed in the crude fibre content of the kunun-zaki samples. Fibre has been reported to play a vital role in the prevention of several diseases such as irritable colon, cancer and diabetes (Slavin, 2005; Elleuch *et al.,* 2011). Fibre consumption also soften stools and lowers plasma cholesterol level in the body (Norman and Joseph, 1995). Ash content is the total mineral content varied between 1.71 and 1.99% with kunun-zaki enriched with African yam bean having the highest while kunun-zaki with sorghum had the lowest. The result obtained in this study is an indication of the presence of inorganic nutrients in the kunun-zaki samples; therefore the sample could be a source of mineral element having nutritional importance. The carbohydrate varied from 2.30 to 10.86%. The value of carbohydrate obtained in this study is in line with the report of Gaffa *et al.,* 2002. The low carbohydrate content obtained in this study might be due to the enriched kunun-zaki, since soybean has been reported to be low in carbohydrate (Lee *et al.,* 1990). Carbohydrate has been reported to supplies energy to cells such as brains, muscles and blood. It also contributes to fat mechanism, acts as mild natural laxative, and spares proteins as an energy source (Gaman and Sherrington, 1996; Gordon, 2000).

Table 1: Proximate composition of non- alcoholic kunun-zaki

Parameters	A	B	C
Moisture Content	81.32^{b}	88.53^{a}	84.91^{c}
Crude Protein	4.18^{b}	6.08^{c}	5.20^{a}
Crude Fat	0.35^{a}	0.30^{a}	0.33^{b}
Crude Fibre	1.37^{b}	1.08^{a}	1.77^{bc}
Total Ash	1.92^{a}	1.71^{b}	1.99^{ab}
Carbohydrate Content	10.86^{c}	2.30^{a}	5.80^{b}

Mean values with different superscripts within the same column are significantly different ($p<0.05$)
A: 100% sorghum kunun-zaki
B: 50% sorghum+50% defatted soybean kunun-zaki
C: 50% sorghum+50% African yam bean kunun-zaki

3.2 Sensory evaluation of non-alcoholic kunun-zaki

Table 2 shows the sensory evaluation of non-alcoholic kunun-zaki. There was a total decrease in all the attributes measured. The taste, aroma, colour, appearance, and overall acceptability ranged from 6.9-8.5, 7.3-8.6, 7.6-8.8, 7.9-8.6 and 8.2-8.8 respectively. However, kunun-zaki produced from sorghum has the highest likeness while kunun-zaki enriched with African yam bean has the lowest likeness in all the attributes measured. It was observed that the highest likeness of kunun-zaki produced from sorghum could be due to the known popularity of the panelists with kunun-zaki produced from either sorghum or millet. However, all the kunun-zaki samples were all accepted by the panelist.

Table 2: Sensory evaluation of non-alcoholic kunun-zaki

Parameters	A	B	C
Taste	8.5[a]	8.3[a]	6.9[b]
Aroma	8.6[a]	8.5[a]	7.3[b]
Colour	8.8[a]	8.5[a]	7.6[b]
Appearance	8.6[a]	8.5[a]	7.9[c]
Overall acceptability	8.8[a]	8.9[b]	8.2[c]

Mean values with different superscripts within the same column are significantly different ($p < 0.05$)
A: 100% sorghum kunun-zaki
B: 50% sorghum+50% defatted soybean kunun-zaki
C: 50% sorghum+50% African yam bean kunun-zaki

4. Conclusion

This study shown an acceptable kunun-zaki can be produced from defatted soybean and African yam bean. The kunun-zaki is rich in protein content which is desirable for good health and wellbeing.

Correspondence to:
Akinsola, Akinjide Oluwabunmi.
Department of Home Economics,
Federal College of Education (Special),
Oyo, Oyo State, Nigeria
Telephone: +2348052209288
Email: akinsola4gold@gmail.com

References

1. Adeyemi, I.A. and Umar, S. (1994). Effect of Method of Manufacture on Quality Characteristics of Kunun-zaki, a Millet Based Beverage. Nigeria Food Journal 12: 34-41.
2. AOAC, (2005) Official Methods of Analysis.18th edn, AOAC International, Gaithersburg, Maryland, USA.
3. Efiuvwevwere, B.J.O and Akoma, O. (1995). The Microbiology of Kunun-zaki: A Cereal Beverage from Northern Nigeria During the Fermentation (production) Process. World J. Microbiology and Biotechnology 11: 491-493.
4. Eke, S.O. (1996) Functional properties of African yam bean (Stenostylis stenocarpa) seed flour as affected by processing. Food Chemistry 48:337-340.
5. Elleuch, M., Bedigian, D., Roiseux, O., Besbes, S., Blecker, C. and Attia, H., (2011). Dietary Fibre and Fibre- Rich by-products of Food Processing: Characterization, Technological Functionality and Commercial Applications: A review. Food Chemistry 124: 411-421.
6. Elmahmood, A.M. and Doughari, J.H. (2007). Microbial Quality Assessment of Kunun-zaki Beverage Sold in Gieri Town of Adamawa state, Nigeria. African Journal of Food Science 1:11-15.
7. Gaffa, T. and Jideani, I.A. (2001). Sensory Evaluation of Different Levels of Cadaba farinose (Dangarafa) in Kunun-zaki and Determination of its Position among Other Saccharifying Agents. Journal of Food Science Technology 38:405-406.
8. Gaffa, T., Jideani, I.A. and Nkama, I. (2002). Soybean Seed in Kununzaki Beverage Production. Pakistan Journal of Biological Science 5(9):970-973.
9. Gaman, P.M. and Sherrington, K.B. (1996). The Science of Food. 4th ed. Reel educational and Professional Publisher Ltd., Oxford, pp: 125-136.
10. Gordon, M.N. (2000). Contemporary Nutrition; Issues and Insights, 4th ed, Mc-Graw Hill companies, New York, pp:102-256.
11. Ikhajiagbe, B., Mgbeze, G.C., Folu M. and Dania Ogbe (2007). Responses of *Sphenostylis stenocarpa* (Hochst Ex A. Rich) Harms (African yam bean) to Salinity Stress I: Germi-nation and Vegetative Growth. Nigeria Journal of Botany 20(1): 69-82.
12. Iwe, M.O. (2002). Hand Book of Sensory Methods and Analysis. Rojoint Communication Publishers Ltd. Enugu.
13. Lee, S.Y., Morr, C.V. and Seo, A. (1990). Comparison of Milk-Based and Soymilk-based yoghurt. Journal of Food Science 15:532-536.
14. NAS, (1979). Tropical legumes: Resources for the Future. National Academy of Sciences, Washington D.C. pp. 331.
15. Norman, N. and Joseph, A. (1995). Food Science, CBC processing, 3rd ed. pp 432-4.
16. Olufunke, A.P and Oluremi, K.O. (2015). Assessment of Nutritional and Sensory Quality of Zaki - A Home-made Traditional Nigerian Beverage. Journal of Nutrition and Food Science 5: 358.
17. Onuorah, S.I., Adesiyun, A.A. and Adeyeye, J.O. (1987). Survival and Multiplication of *Staphylococcus aureus* and Escherichia coli in a Nigeria Cereal Drink (*kunun zaki*), Effect of Spices and Temperature. Journal of Food Agric., 1: 169-173.
18. Shelton, D.R. (1998). Dictionary of Food Science and Nutrition. Golden Books Centre SDN, BHD, Pp40.
19. Slavin, J.L. (2005). Dietary Fibre and Body Weight. Journal of Nutrition 21: 411-418.

1/25/2017