

CHEMICAL PROPERTIES AND ACCEPTABILITY OF SORGHUM-OGI ENRICHED WITH WATERMELON SEEDS

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Introduction

Ogi is a fermented food made from millet, maize and sorghum. It is consumed in many parts of Africa including Nigeria. Ogi is rich in carbohydrate and contains relatively low amounts of protein. Attempts by previous researchers to improve the nutritional value of ogi have been well documented. For instance, the protein content of ogi was found to increase with the addition of soy bean flour¹, blends of roasted soybean and peanut meals². Other promising source of low-cost protein that may be potentially used to improve the nutritional value of ogi is watermelon seed. Watermelon (*Citrullus lanatus*) seeds are rich sources of protein (31.9%), and fat (57.1%)³. They are also excellent sources of mineral such as calcium and potassium. Despite the nutritional value and potential health benefits of watermelon seeds which are comparable to those of cashew nut, sesame seed and pumpkin seeds, the seeds are usually discarded after the fruit is consumed. This may be due to limited research to unlock their potential. One way to improve the utilization of the seeds is to explore it in value added products such as in enriching foods. Hence, in this study, the chemical and sensory properties of ogi enriched with watermelon seeds were investigated.

Materials and Methods

Sorghum seed (5kg) and raw watermelon seed (2kg) were purchased from ipata market, Ilorin Kwara State. The sorghum seeds were carefully selected and washed thoroughly then soaked in cold water for 3 days. The sorghum grains were soaked differently. The grains were washed and the water was changed twice for the sorghum grain. The watermelon seeds were roasted at 160 °C for about 10 minutes to deactivate some of its anti nutrients before washing and adding to the sorghum grains. Five (5) samples of ratio 100:0%, 95:5%, 90:10%, 85:15%, 80:20% of sorghum and watermelon seed respectively were wet milled using a disc attrition mill. The resulting slurry was sieved using a sieve (aperture size: 0.2 mm). The filtrate was allowed to settle for 12 hours then the water was decanted. The settled slurry was then dried using the hot air oven at 50 °C for 6 hours⁴.

Results and Discussion

Carbohydrate (68.93-77.23%) is the major component of sorghum ogi enriched with water melon seed (Table 1). Other components such as protein, fat, ash and fibre contents were generally low. The protein, fat, ash and fibre contents of sorghum ogi significantly ($p < 0.05$) increased with increasing levels of watermelon seed. At 20% level of addition of watermelon seed, the protein content of sorghum ogi increased by approximately 19%. The increase in protein content shows that the product could be a very good source of non-expensive protein. All the ogi samples had low levels of moisture (8.45-4.67%), which is within the normal range of dried food sample. Hence, the dried ogi samples may have a better storability of up to 6 months⁵. The mineral contents of the sorghum ogi significantly increased with increasing levels of watermelon seed (Table 1). Potassium (58.0-292.0 mg/100g) was the major mineral in the sorghum ogi, followed by calcium (17.31-160.96 mg/100g) and sodium (25.5-110.98 mg/100g). High levels of potassium in human diet is important for the protection against life-threatening diseases such as hypertension, cardiac dysfunctions and osteoporosis⁶. Mean sensory scores showed that all the samples were accepted by the panelists, but sample with 80:20% was most preferred in terms of taste, appearance and general acceptability.

Table 1: Proximate, mineral and sensory evaluation of sorghum-watermelon seed flour

	M ₁ T ₅	M ₂ T ₄	M ₃ T ₃	M ₄ T ₂	M ₅ T ₁
PROXIMATE COMPOSITION (%)					
Moisture	8.45 ^a ±0.08	7.32 ^b ±0.28	6.45 ^c ±0.08	5.52 ^d ±0.06	4.67 ^e ±0.34
Protein	8.62 ^d ±0.02	8.64 ^d ±0.02	9.02 ^c ±0.05	9.48 ^b ±0.05	10.27 ^a ±0.19
Fat	3.33 ^c ±0.46	4.41 ^d ±0.22	6.31 ^c ±0.05	7.87 ^b ±0.11	8.56 ^a ±0.23
Ash	0.74 ^d ±0.25	1.14 ^d ±0.03	1.66 ^c ±0.13	2.36 ^b ±0.18	3.08 ^a ±0.13
Carbohydrate	77.23 ^a ±0.38	76.45 ^a ±0.62	73.72 ^b ±0.19	71.04 ^c ±0.20	68.93 ^d ±0.17
MINERAL COMPOSITION (mg/ 100 g)					
Calcium	17.31±1.43	38.97±1.43	60.72±0.00	146.74±0.00	160.96±1.43
Sodium	25.5±0.01	66.11±0.01	94.14±0.01	103.5±0.01	110.98±0.01
Potassium	58.0±0.01	97.2±0.03	136.5±0.01	254.1±0.01	292.0±0.08
SENSORY EVALUATION					
Taste	6.35 ^c ±1.31	6.55 ^{bc} ±1.88	6.75 ^{ab} ±1.48	6.55 ^{bc} ±1.40	6.85 ^a ±1.73
Appearance	7.25 ^{ab} ±1.02	7.15 ^b ±0.99	6.70 ^c ±1.26	6.95 ^{bc} ±1.40	7.30 ^a ±1.30
General acceptability	6.50 ^c ±1.32	6.45 ^{cd} ±1.23	6.45 ^{cd} ±1.23	6.90 ^b ±1.25	7.15 ^a ±1.46

M₁T₅-Control (100% sorghum); M₂T₄-95% of sorghum + 5% of watermelon seed; M₃T₃-90% of sorghum + 10% of watermelon seed; M₄T₂-85% of sorghum + 15% of watermelon seed; M₅T₁-80% of sorghum + 20% of watermelon seed

Conclusion

Watermelon seed improved the nutritional value of sorghum *ogi*, which may be consumed in areas where the watermelon fruit is grown. Protein, fat, ash and fibre contents of *ogi* significantly increase with the addition of watermelon seed. The study shows the potential of watermelon seed in the reduction of protein energy malnutrition and has further revealed the possibility of reducing wastages resulting from underutilization of the watermelon seed.

References

1. Anuonye J.C. (2011): Soybean utilization and fortification of indigenous foods in times of climate change. *Food Science and Nutrition, Federal University of Technology Mina Niger State Nigeria*
2. Aminigo, E.R. and Ossai, G.E.A. (1999). Production and evaluation of high-protein roasted maize meal. *J. Appl. Sci. Environ. Mgt.* 3, 17-22
3. Braide, W., Odiong, I.J. and Oranusi, S.U. (2012). Phytochemical and antibacterial properties of the seed of watermelon (*Citrullus lanatus*). *Prime Journal of Microbiology Research*, 2(3), 99-104
4. Olosunde, O.O, Adegoke, G.O and Abiodun, O.A. (2015). Composition of sorghum-millet flour, *Aframomum denielli* essential oil and their effect on mycotoxins in kunu zaki. *African Journal of Food Science*, 9(7), 411-416.
5. Kolawole O., Ajanaku, Kehinde O., Ogunniran, Olayinka O, Ajani, Oladele O., James, Obinna C and Nwinyi (2010): Improvement of Nutritive Value of Sorghum Ogi Fortified with Pawpaw (*Carica papaya* L.). *Fruit, Vegetable and Cereal Science and Biotechnology* 5(1): 98-101.
6. Lewu M., Adebola P., Afolayan A. (2010). Effect of cooking on the mineral contents and anti-nutritional factors in seven accessions of *Colocasia esculenta* (L.) Schott growing in South Africa. *Journal of Food Composition and Analysis*, 23, 389-393.