



Proximate Composition, Energy and Nutritional Value of Local Malt (*Asaana*) Prepared from Maize in Ghana

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Abstract— *Background and objectives:* “Asaana” is a local malt consumed by majority of Ghanaians of all ages in all the cultures due to its refreshing and nutritional benefits. Since traditional women and methods prepare it, no nutritional information is available during sale. In addition, research data about it is very scanty. This study therefore aims at determining its nutritional and potential energy value to enrich the existing data. *Method:* The study focused on two types of Asaana preparations. A sample from a local producer prepared by the traditional recipe; and another prepared in the laboratory from two varieties of maize (yellow and white) according to the traditional recipe. Proximate analysis and energy evaluation done to determine nutritional value and energy potential. *Results:* The white variety had higher moisture ($94.20 \pm 0.01\%$), P ($6324.16 \pm 36.31 \mu\text{g/g}$), K ($6162.76 \pm 128.07 \mu\text{g/g}$), Na ($718.08 \pm 4.51 \mu\text{g/g}$), Zn ($865.65 \pm 9.09 \mu\text{g/g}$) contents and fat energy (0.44 kJ/g). The yellow variety recorded higher dry matter ($7.39 \pm 0.00\%$), and carbohydrate ($88.33 \pm 0.20\%$) contents and carbohydrate energy (15.0 kJ/g). The traditional preparation had higher protein ($8.95 \pm 0.11\%$), fat ($1.40 \pm 0.03\%$), fibre ($4.04 \pm 0.08\%$), Ca ($11600 \pm 76.68 \mu\text{g/g}$), Mg ($2000.48 \pm 28.20 \mu\text{g/g}$), Fe ($300.45 \pm 9.86 \mu\text{g/g}$) contents and Protein energy (1.52 kJ/g). *Conclusion:* “Asaana” is potentially nutritious and provides basic energy needed for physiological activities.



Keywords— maize, malt, proximate composition, mineral constituents, energy.

I. INTRODUCTION

Cereal-based beverages account for as much as 77% of total caloric consumption and contribute significantly to the dietary protein intake in Africa. They are processed traditionally through natural fermentation with maize or sorghum as the predominant raw material (Ojokoh & Bello 2014)¹. “Asaana” is a traditional non - alcoholic beverage prepared and consumed mostly in the Southern part of Ghana. The Gas knows it as “Asaana” (meaning “we taste” or ‘it is tasty’). “Liha” or “Aliha” (corn drink) in the Volta region, and as “Elewonyo” by the Ashantis. It is believed to have originated from the Volta region of Ghana.. “Asaana” is a refreshing drink best consumed fresh with ice cubes and milk (optional). It is a source of essential nutrients, and has medicinal and functional properties (Perez-Armentariz & Cardoso-Ugarte 2020)².

Corn (*Zea mays*) is the main ingredient in “Asaana” and it is grown extensively around the world. *Zea mays* is a great source of minerals such as potassium, which helps regulate the circulatory system. It contains lutein, a vitamin known to reduce the risk of macular degeneration, cataracts and other eye diseases. It is rich in dietary fiber beneficial in regulating bowel movements. It contains the anti-oxidant quercetin, which plays an important role in treating prostatitis protects neuronal cells and reduces neuro inflammation (International Grains Council Market Report, 2013)³. Therefore, consuming “Asaana” could provide all these health benefits. The aim of this study is to determine the respective nutritional and energy potential of the samples. The results shall enrich the database on this local beverage.

II. MATERIALS AND METHODS

2.1. Collection of Samples:

A traditionally prepared sample of Asaana from a local producer, and two varieties of maize (yellow and white) from Abura market in Cape Coast, in the Central Region of Ghana were collected.

2.1.1 Laboratory Preparation of Asaana

The maize samples were rid of all foreign materials. They were labelled separately, and the grains soaked in water overnight, strained and allowed to germinate for seven days. They were then sun-dried for four days, ground to coarse flour, mixed with cold water and the mixture boiled with constant stirring for four hours. It, was strained after cooling and allowed to ferment for three days. They were strained, and caramel sugar added to produce the Asaana (Madilo et

al., 2022)⁴. The preparation took place in the Agriculture Research Laboratory of University of Cape Coast, Ghana. Some modifications introduced into the procedure proposed by Madilo et al., 2020 include sorting of foreign materials and insect infected grains; milling by stainless steel industrial blender, and adopting the optimum conditions.

2.2. Proximate Analysis of Traditionally and Laboratory Prepared Asaana

The proximate composition and micronutrient analyses were carried out using acceptable protocols (AOAC 2008; Stewart et al., 1974; FAO 2003; IITA 1985; FAO 2008)^{5,6,7,8,9}.

2.3 Data Analysis

The data analysed by SPSS version 20 at $p \leq 0.05$.

III. RESULTS

Table 1: Mean Proximate Composition (%) of the Asaana.

Test	Traditional method	White variety	Yellow variety
Dry Matter	5.30±0.02	5.80± 0.01	7.39± 0.00
Moisture	93.8±0.01	94.20 ± 0.01	92.61± 0.00
Ash	1.89±0.05	2.06 ± 0.02	1.28± 0.13
Protein	8.95±0.11	7.37± 0.23	6.19± 0.07
Oil / Fat	1.40±0.03	1.20± 0.07	1.11± 0.01
Carbohydrates	76.86±0.10	86.64 ±0.15	88.33 ±0.20
Fibre	4.04±0.08	2.73 ±0.17	3.09 ±0.10

Source: Bartels /Atakora/ Gadzekpo Statistical analysis 2023

Table 2: Mineral Constituents (µg/g) of Samples

Mineral	Traditional	White Variety	Yellow Variety	Codex values (mg)
P	5220± 26.40	6324.16± 36.31	4667.40± 34.88	600-1000mg
Ca	11600.00± 76.68	11581.00± 61.58	11364.67±314.04	800-1000
Mg	2000.48 ± 28.20	1770.33 ± 26.50	1950.33± 53.98	315-365
K	4998.34± 87.79	6162.76± 128.07	5888.42± 45.33	2000
Na	609.98 ± 64.56	718.08 ± 4.51	637.33± 0.72	2000
Zn	800.49 ± 10.12	865.65 ± 9.09	837.05± 6.52	3.6-15
Fe	300.45± 9.86	295.24± 4.57	266.68± 1.43	9.0-43

Source: Bartels/ Atakora/ Gadzekpo Statistical analysis 2023

Table3: Energy Contents for Asaana

Type of Sample	Protein		Fat		Carbohydrate	
	kcal/g	kJ/g	kcal/g	kJ/g	kcal/g	kJ/g
White variety	0.29	1.23	0.11	0.44	3.46	14.71
Yellow variety	0.25	1.06	0.04	0.17	3.53	15.0
Traditional method	0.36	1.52	0.06	0.23	3.07	13.07
Atwater standard (cereals)	3.87	16.2	4.12	17.2	8.37	35.0

Source: Bartels/Atakora/Gadzekpo Statistical results 2023

IV. DISCUSSION

4.1 Proximate composition

As shown in Table 1, for all the preparations, the mean moisture content in the range of 92.61-94.20 %; while ash, protein and fat contents respectively are 1.28-2.06, 6.19-8.95 and 1.1-1.40 %.

The moisture content falls within 93.71– 94.93 %; whereas ash, protein and fat contents respectively are higher than the 0.09 -0.19, 0.33-1.01 and 0.22 - 0.77 % reported in a similar study (Madilo et al., 2022)⁴. Carbohydrate is in the range of 76.86-88.33% and fibre is 2.73-4.04%. Protein is an essential nutrient for the human body (Hermann, 2021)¹⁰. Fibre lowers cholesterol, which may reduce the risk of cardiovascular diseases (British Nutrition Foundation, 2018)¹¹, It also regulates blood sugar and alleviates constipation (Food and Nutrition Board, 2005)¹². Carbohydrates plays key roles in the immune system as it serves as energy storage.

4.2 Energy Contents

Protein, fat and carbohydrates in the body yield energy, which the body needs. As Table 1 indicates, the energy content of the white variety ranges between 0.11-3.46 kcal/g (0.44-14.71 kJ/g); yellow variety ranges between 0.04-3.53 kcal/g (0.17-15.0 kJ/g), while traditional method is in the range of 0.06-3.07 kcal/g (0.23-13.07 kJ/g). These values are within the Atwater standards (www.fao.org)¹³ of 4.12-8.37 kcal/g (17.2-35.0 kJ/g).

Basal metabolism requires 1.2-2.4 kcal/24 hours, equivalent to 5.0-10.0 kJ/24 hours for human beings (www.fsps.muni.cz)¹⁴, this implies that the *Asaana* has the potential to provide the basic energy required for physiological activities by human. In addition, the energy evaluation of the *Asaana* is as follows: fat < protein < carbohydrate.

The energy content from protein in the traditional method (0.36 kcal/g) is relatively higher, the white variety has highest fat energy (0.11 kcal/g), whereas the carbohydrate energy (3.53 kcal/g) is highest in the yellow variety. These

values are within their respective Atwater values for cereals as depicted in Table 1.

4.3 Mineral constituents

Table 2, shows phosphorus (P) content for *Asaana* prepared from white variety as 6324.16µg/g, yellow variety as 4667.40µg/g and traditional method as 5220 ± 26.40 µg/g. These concentrations are below the Codex value (FAO/WHO 2019)¹⁵ (600-1000 mg) for Phosphorous. Though very insignificant, the Phosphorus in *Asaana* could be beneficial to the consumer for the formation of bones and teeth and plays an important role in how the body uses carbohydrates and fat.

Calcium content in white corn was 11581.00µg/g and that of yellow corn was 11364.67µg/g, traditional method 11600.00± 76.68. These concentrations are also less than the Codex value of 800-1000 mg, and also less than that reported by Madilo et al., (2022)⁴. Calcium is essential for the development, growth and maintenance of bone, regulate muscle contraction, blood clotting

and lowers the risk of developing high blood pressure (<https://www.medicalnewstoday.com/articles/248958#why-we-need-calcium>)¹⁶. Magnesium content for *Asaana* prepared from white corn was 1770.33µg/g and that of yellow corn *Asaana* was 1950.33µg/g, traditional method 2000.48 ± 28.20. Consuming *Asaana*, Magnesium promotes healthy blood sugar regulation and nerve function [Kubala J. 2023]¹⁷.

Potassium and Sodium contents for *Asaana* prepared from white corn were 6162.76 and 718.08µg/g respectively and that of yellow corn were 5888.42 and 637.33µg/g respectively, while traditional method had 4998.34± 87.79 and 609.98 ± 64.56µg/g. Potassium and Sodium help maintain normal level of fluid inside our body. Increasing Potassium intake can help reduce blood pressure, heart disease and stroke. In contrast, high intake of Sodium increases blood pressure, heart disease and stroke (C.D.C 2022)¹⁸. Therefore, it is best to consume *Asaana* in moderation for people with heart conditions and high blood pressure since there is no provision for appropriate dosage.

Zinc and Iron content for Asaana prepared from white corn was 865.65µg/g and 295.24µg/g respectively and that of yellow corn was 837.05µg/g and 266.68 µg/g respectively, traditional method 800.49± 10.12 and 300.45± 9.86 µg/g. Zinc boost the immune system, accelerates wound healing, treat acne and decreases inflammation

(<http://www.healthline.com/nutrition/zinc#what-it-is>)¹⁹.

Iron helps in normal oxygen transportation in the body, reduces fatigue increases red cells production and supports the immune system (<http://betteryour.com/blogs/products-guides/iron-benefits>)²⁰.

The nutrients in the Asaana as found in the study, are very insignificant to make any meaningful impact on the health of the consumer, but continual intake might provide adequate nutrient for the consumer.

V. CONCLUSION

1. Asaana, non - alcoholic local malt was found to be nutritious.

2. Asaana has the potential to provide the basic energy required for physiological activities by human, the energy profile is fat < protein < carbohydrate.

RECOMMENDATION

Stakeholders must provide a framework for its nutritional labelling, and in addition to monitor its preparation and consumption.

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