



Proximate and Mineral Composition of a Local Drink Made from Baobab Fruit (*Adansonia digitata*) Pulp

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ABSTRACT

The study was carried out to determine the proximate and mineral composition of a local non alcoholic drink made from the fruit pulp of baobab (*Adansonia digitata*). The fruit pulp was obtained by manually removing the pulp from the seed. Hundred grammes (100g) of the fruit pulp was dissolved in one litre of sterile distill water for 10 min to make the local drink. The baobab drink thus produced was analyzed for their proximate and mineral composition to ascertain their quality as a fruit drink. It was observed that the drink has various minerals with the highest percentage in potassium (130ppm), followed by magnesium (29.8ppm), copper (17ppm), manganese (13ppm) and calcium (12.2ppm) while protein was found to be 2.2mgg⁻¹, ash 4.4%, p H 3.1. The Vitamin C content was 26mgg⁻¹ and the sensory evaluation also showed that the fruit drink was well accepted by the consumer.

INTRODUCTION

Baobab is the fruit of the *Adansonia digitata*, (or 'upside-down') tree, which grows primarily in Africa, majorly in South Africa, Botswana, Namibia, Mozambique and Zimbabwe [1]. The fruit, which has a long history of use in Africa, has high levels of antioxidants as well as vitamins C, B1, B2 and minerals calcium, potassium, phosphorus, iron and magnesium [2]. The fruit pulp is probably the most important foodstuff. It is dry and mealy and it is used in cool and hot drinks. Pulp can be dissolved in water or milk and the liquid is used as a drink, as a sauce for food, as a fermenting agent in local brewing or as a substitute for cream of tartar in baking. [3]. Analysis of ripe fruit points to an average of 8.7% moisture with 2.7% protein, 0.2% fat, 73.7% carbohydrate, 8.9% fibers and 5.8% ash [4]. The baobab fruit looks like a coconut, but has six times the vitamin C of an orange, ten times the antioxidant level of oranges, six times more antioxidants than Cranberries, Blueberries, and Blackberries, six times more Potassium than a banana, more Iron than red meat, more Magnesium than Spinach, twice the calcium level of milk, valuable aid in the prevention and treatment of gastric disorder [5]. Another report from [1] said the fruit pulp is commonly sucked, chewed or made into a drink when mixed with water or milk, either with or without sugar, or as a supplement to mix with staple food such as corn meal and cassava, other uses for baobab pulp include sauces for food, hair rinse milk curdling agent and a substitute for cream of tartar, among other things and when burned, it is a good repellent for cattle flies. Baobab pulp extract also contains anti-inflammatory, antibacterial, antifungal, antipyretic and analgesic properties ([6]: [7]). Baobab extract can be used in various active cosmetic uses, including antioxidants for anti-aging, skin tightening, moisturizers, and hair and nail strengthening products [2]. Baobab extract is also used in the food industry for Soft drinks, Natural fruit smoothies, Fruit fillings and Health supplements [8]. The baobab fruit pulp contains a high level of pectin, and has been found to contain up to 56% water soluble pectin by weight [9]. Recent analysis by [10] revealed the pectin content to range from 23.4 to 33.8 g/100g of baobab fruit pulp. Although not as high as other reported values, these indigestible but soluble fibers are an important component of our diet. In the northern part of Nigeria and some other places in West Africa, a refreshing drink is made from the fruit pulp and cold water to preserve the vitamins [11]. Amongst the Hausa farmers, the baobab fruit juice mixture is a popular drink and is available during the hot times of the year [12].

Most non-alcoholic beverages consumed in Nigeria have their roots in foreign countries from where they are shipped in to Nigeria as concentrates. Our major markets are flooded with various brands of soft drinks that are not indigenous to our country. Nigeria is endowed with local beverages not only to cater for her citizen, but surplus enough for export. The rush for these supposed superior imported drinks to the neglect of the more nutritious local beverages, in most cases emanates from lack of knowledge of the nutritional value of these local beverages and misconception created through false advertisement of these imported drinks. One of the Nigerian local refreshing and nutritious drink is the baobab fruit drink. The baobab fruit drink, being a direct replica of the fruit pulp in water is a natural fruit juice with all the necessary vitamins, minerals and other essential nutrients required by the body in the right proportion that meets the daily body requirements of those nutrients [13]. Usually the drink is made by dissolving the fruit pulp in either hot or cold water and or mixed with milk hence this study is carried out to ascertain the nutritional values of the baobab fruit drinks made by dissolving the fruit pulp in cold water (at ambient temperature).

MATERIALS AND METHODS

Baobab fruit pod was purchased from Yankaba market in Kano metropolis. It was immediately transfer to the laboratory for processing. The fruit was manually prepared by removing the seed and fiber from the fruit pulp to obtain the fruit (pulp) powder separately. Hundred grammes (100g) of the powder was dissolved in one litre of cold sterile distill water in a conical flask, stir together and left to dissolve for ten minutes at room temperature. The sample was labeled and kept for laboratory analysis.

Chemical and nutritional analysis:

The drinks thus produced were subjected to chemical and nutritional analysis. The protein was determined using kjeldahl procedure and the minerals calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), iron (Fe), copper (Cu), manganese (Mn), lead (Pb) and zinc (Zn) were determined by the method of AOAC [14]. The ash content was evaluated by the method of Pearson [15]. The vitamin C content was determined also following AOAC, [14].

Sensory Evaluation

Semi-trained panelist carried out subjective evaluation of quality on the drink sample. This composed of staff of the Department of microbiology, Nigerian Stored Products Research Institute, Kano, Nigeria. Panel member scored for color, taste and general acceptability using the 9-point hedonic scale [16].

RESULTS

NUTRITIONAL ANALYSIS:

Table 1: Mineral analysis of baobab fruit drink

Samples (ppm)	Ca	Mg	K	Na	Cu	Mn	Pb	Zn	Fe
BFD	12.2	29.8	130	5.6	17	13	2.5		3.0 2.0

Table 2: Proximate composition of baobab fruit drink

Tests	Result
Protein	2.2%
Ash	4.4%
Vitamin C	26Mgg ⁻¹

Table 3: Sensory evaluation of baobab fruit drink

S/N	Parameters	Scores
1	color	7.5
2	taste	7.3
3	general acceptability	7.6

BFD = baobab fruit drink

DISCUSSION

The analysis of the drink reveals that it has a high vitamin C content recorded. The baobab fruit pulp has been reported by various authors to have a particularly high antioxidant capability mainly because of its high natural vitamin C content, which is equivalent to 6 oranges per 100 g. Anti-oxidants protect the cells of organisms from damage by free radicals. A deficiency of vitamin C weakens the immune system and promotes the susceptibility to disease. Deficiency of vitamin C also results in scurvy. Additionally, vitamin C aids the bodily uptake of iron and calcium, of which the fruit pulp contains more than double than the same amount of milk [17] [18] [19] and [20]. The ash content of the sample was relatively high which further confirms its high mineral content as shown on Tables 1 and 2. This is in agreement with the work of early workers. [21], recorded that high amount of ash contained in plants, is an indication that the plant provides appreciable quantity of minerals essentially required by the body. The drink was found to contain appreciable quantity of Potassium, Calcium, Magnesium, Iron, Sodium and others (Table 1). Early workers have shown that baobab fruit pulp is very rich in these minerals of which the drink is a direct replica [22] [23] [24] and [20]. Potassium is the principal cation of most body tissues, it participates in a number of essential physiological processes in the body, Calcium is a major requirement in bone formation and strength, Magnesium is a co-factor in a number of enzyme system and is involved in neuro-chemical transmission and muscular excitability along with calcium, Manganese is a co factor in several enzymes such as hydrolase and decarboxylase, Iron is very important in formation of red blood cells and Sodium is the backbone of body fluid [25]. The nutritional values obtained in the course of this work were similar early records on baobab fruit pulp. The nutrients assayed for were found to be available in good quality and quantity and they were found to meet the daily requirement of these essential nutrients in children, adult, pregnant and lactating mothers [26]; [13]: [2] and [27]. The macro nutrients are found to be more abundant than the micro nutrients which are only needed in trace amount in the body (Potassium, calcium, magnesium, and iron are more abundant than lead and zinc) (Table 3). The sensory evaluation as shown in Table 3 which was conducted by semi trained panelist on a 9 point hedonic scale of color, taste and general acceptance showed that, the drink was of a good quality and can be widely accepted.

CONCLUSION AND RECOMMENDATION

The drink is easily prepared and highly refreshing essentially during hot period of the long dry season of the savannah where the baobab plant commonly grows. Conclusively baobab fruit drink was found to be rich in the essential minerals and vitamin C which is highly required in the body for proper functioning and can replaced most of the commercially produced non alcoholic beverages found in our stores and supermarkets today. Meanwhile in preparing the drink caution should be exercised to be sure that the principles of hygiene is well observed and clean portable water is used to prevent microbial contamination through unhygienic preparation.

REFERENCES

1. Kurebgaseka N. (2005): notice in writing. www.phytotradafrica.com
2. Sidibe, M. and Williams, J. T. (2002) Baobab. *Adansonia digitata*. Book published by the International Centre for Underutilized Crops, Southampton, UK
3. Becker, B. (1983). The contribution of wild plants to human nutrition in the Ferlo (Northern Senegal). *Agro forestry Systems*, **1**: 257-267.).
4. Arnold, T. H., Well, M. J. and Wehmeyer, A. S. (1985) Koisan food plants: taxa with potential for economic exploitation. In, G.E. Wickens, J. R. Goodin and D. V. Field (eds.), *Plants for Arid Lands*, Allen and nwin, London: 69-86.
5. <http://www.baobabfruit.co.uk>
6. Ramadan A, Harraz FM, El-Mougry SA (1994), Anti-inflammatory, analgesic, and anti pyretic effects of the fruit pulp of *Adansonia digitata*, *Fitoterapia* 65(5) pp418-421;
7. Manfredini S, Vertuani S, Braccioli E, Buzzoni V, (2002), Antioxidant capacity of *Adansonia Digitata* fruit pulp and leaves, *Acta Phytotherapeutica* 2 pp2-7;
8. Gruenwald J. and Galizia M. (2005). *Adansonia digitata* L. Baobab. United Nations Conference on Trade and Development. Market Brief in the European Union for selected natural ingredients derived from native species.
9. Nour, A. A., Magboul, B. I. and Kheiri, N. H. (1980). Chemical composition of baobab fruit (*Adansonia digitata*). *Tropical Science*, **22**: 383-388.
10. Wilkinson, J.A. (2006) Baobab Dried Fruit Pulp Novel Food Application,
11. Bosch C., Sie, K. and Asafa, B. (2004). *Adansonia digitata* L. [Internet] *Fiche de Protabase*

12. Nicol, B. M. (1957) Ascorbic Acid Content of Baobab Fruit. *Nature*, 180 (4580):287;<http://www.acnfp.gov.uk/assess/>.
13. John Wilkinson and Matt Hall, (2007) in *Soft Drinks International*.www.softdrinksinternational.com
14. A.O.A.C. (1990). Official methods of analysis. 13th edition. *Association of Agricultural Chemist. Washington D.C.* Pearson, D. (1976). *The chemical analysis of foods*. 6th edition. Chemical Publishing Company. New York. pp 169-172.
15. Pearson, D. (1976). *The chemical analysis of foods*. 6th edition. Chemical Publishing Company. New York. pp 169-172.
16. Ihekoronye A.I. and Ngoddy P.O. (1985). *Integrated Food Science and Technology for the Tropics*. Macmillan pub. Co. Ltd., London. Pp170-190
17. Sidibé, M., Scheuring, J. F., Tembely, D., Sidibé, M. M., Hofman, P. and Frigg, M. (1996) Baobab – homegrown vitamin C for Africa. *Agroforestry Today*, **8**(2): 13-15.
18. Ighodalo, C. E., Catherine, O. E. and Daniel, M. K. (1991) Evaluation of mineral elements and ascorbic acid contents in fruits of some wild plants. *Plant Foods for Human Nutrition*, **41**: 151-154
19. Palmer, E. and Pitman, N. (1972) *Trees of Southern Africa*. A. A. Balkema, Cape Town, South Africa
20. Baobab Fruit Company (2002) *Nella tradizione africana il Baobab* [in Italian]. www.baobabfruitco.com
21. Rao-pu, (1996). Nutrient Composition and Biological Evaluation of Mesta (*Hibiscus sabdariffa*) seeds. *Plant Food for Human Nutr.* **49**: 34-37.
22. Glew, R. H., Vanderjagt, D. J., Lockett, C., Grivetti, L. E., Smith, G. C., Pastuszyn, A. and Millson, M. (1997) Amino acid, fatty acid and mineral composition of 24 indigenous plants of Burkina Faso. *Journal of Food Composition and Analysis*, **10**: 205-217.
23. Odetokun, S. M. (1996) The nutritive value of baobab fruit (*Adansonia digitata*). *Rivista Italiana delle Sostanze Grasse*, **73**(8): 371-373.
24. Saka, J. D. K., Msonthi, J. D. and Maghembe, J. A. (1994) Nutritional value of edible fruits of indigenous wild trees in Malawi. Proceedings of a regional conference on agro forestry research in the African miombo ecozone held in Lilongwe, Malawi, 16-22 June 1991. *Forest Ecology and Management*, **64**(2-3): 245-248.
25. Okeniyi, SO and Kolawole JA (2007) Quantitative Mineral Ion Content of a Nigerian Local Refreshing Drink- Zobo- (Water Extract of Hibiscus Sadriffa Calyx). *Research Journal of Pharmacology* **1** (1): 23-26
26. The Tree Of Life Company (2009) <http://www.baobabfruit.co.uk>
27. National Research Council- National Academy of Science, (1989). *Recommended Dietary allowances*, (10th Edn.), Food and Nutrition Board. USA