

USES AND PROXIMATE COMPOSITION OF BAOBAB FRUIT (*Adonsonia digitata* L.) PULP AND SEEDS FROM WUDIL KANO STATE

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ABSTRACT

Twenty structured questionnaires were distributed in different parts of Wudil town to gather information about food uses of Baobab pulp and seeds. Results showed that there are various food uses of both fruit pulp and seeds among the people of Wudil. There was no record of use of Baobab fruit pulp, seeds or leaves for medicinal purpose among the people of Wudil. Results of proximate composition of the fruit pulp reveal 17.30 ± 0.10 , 6.30 ± 0.02 , 5.30 ± 0.02 , 2.30 ± 0.20 , 68.2 ± 0.00 per cent and 275.60 ± 0.00 (mg/100g) for moisture content, Ash, crude lipid, crude protein, total carbohydrates and ascorbic acid respectively. On the other hand, the proximate composition of the seeds of Baobab reveals 6.90 ± 0.20 , 7.90 ± 0.01 , 12.60 ± 0.16 , 10.50 ± 0.01 and 62.10 ± 0.00 per cent for moisture content, ash, crude lipid, crude protein and total carbohydrate respectively. Therefore the findings of the study showed that Baobab fruit pulp and seeds are important sources of nutrients and despite the availability and cheapness of the baobab fruits it is grossly underutilized. Recommendations are made to create awareness on the nutritional value and importance of the fruit and also to find simple ways of processing it into various products.

KEYWORDS: Baobab fruit, vitamin C, seeds, proximate composition and pulp.

INTRODUCTION

Africa has abundant wild plants and cultivated native species with great agronomic and commercial potential as food crops. However, many of these species particularly fruits and nuts have not been promoted or researched and therefore remain under utilized. Moreover, many of these species face the danger of loss due to increasing human impact on ecosystems (Gebaur et al., 2002).

Baobab (*Adonsonia digitata* L.) is a deciduous tree, massive and majestic which grows up to a height of 25 m and may live for hundreds of years (Gebaur et al., 2002). The tree belongs to the *Bombacaceae* family found in the Savannah of Africa and India, mostly around Equator. The fruit of the tree differ in shape among the varieties from baloney and cylinder to ovoid, measuring 12 – 40 cm in length, 7 – 17 cm in diameter filled with white floury acidic pulp (Abdallah et al., 2010).

Baobab plays an important role in human nutrition because of the high content of ascorbic acid in the pulp which many researchers have reported (Nour et al., 1980 ; Ighadalo et al., 1991; Saka et al., 1994; Dos-Santos and Damon, 1996 and Manfredini et al. 2002. It was reported that consumption of about 23 g of Baobab pulp provide the daily recommended allowance of vitamin C for an adult (Odetokun, 1996). This report was later confirmed by Abdallah et al. (2010). The Baobab Fruit Company (2002) reported high amount of Ca, Mg, and P contents in Baobab fruit pulp.

Sidibe and Williams (2002) and Owen (1970) reported that every part of the Baobab tree is useful. Among its many food uses are fruit pulp used to produce a refreshing drink, sweets, milk additive or filler etc. The leaves either fresh or dried are pulverized and used in preparation of soup (Asimugha, 2000).

The seeds are reported to be used in preparation of *Maari* a fermented condiment in Burkina Faso (Parkouda et al., 2011). Nkafamiya et al., (2007) have also reported the use of Baobab seeds in production of a fermented condiment called *Issai* or *Daddawar Higgi* among the Higgi tribe of Adamawa North Eastern Nigeria. They are also pounded whole and added to soups in Sudan; and also roasted and used as coffee substitute (Gebauer et al., 2002).

Among the numerous uses of Baobab are medicinal uses which include treatment of fever, dysentery, pulp extract used as eye drop in cases of measles, gum from bark used in treatment of sores (Gabeaur et al., 2002). Al Qarawi et al., (2003) also reported the use of Baobab bark as anti inflammatory, analgesic, februge and immuno stimulant. The aqueous extract of Baobab fruit also exhibited significant hepatoprotective activity and may play an important part in human resistance to liver damage (Al-Qarawi et al., 2003). The aim of this work is therefore to find out the various uses of Baobab fruit pulp and seeds through a survey and also to determine the proximate composition of both Baobab fruit pulp and seeds from Wudil (11° 49' N, 8° 51' E) Local Government area of Kano state.

MATERIALS AND METHODS

A total of 20 structured questionnaires were administered in different locations within Wudil town (11° 49' N, 8° 51' E) to obtain information on types, food and non-food uses of Baobab fruit pulp and seeds, and any other information on the use of Baobab fruit pulp and seeds. Information collected was subjected to statistical analysis.

Samples of unbroken Baobab fruits were obtained from Wudil weekly market during the 2008 – 2009 rainy season. The samples were taken to the Food Analysis Laboratory of Department of Food Science and Technology, Kano University of Science and Technology Wudil. The fruit samples were hand broken and separated. The pulp powder and seeds were separated by pounding in laboratory mortar and sieved manually using laboratory mesh (size 40). The pulp powder and seeds were separately stored in previously cleaned and sterilized jars until needed for analysis. All the reagents were from BDH and Sigma Aldrich while the various equipments were from different manufacturers. Determinations of moisture content, ash, crude lipid and crude protein of both fruit pulp and seeds were done in triplicate according to the methods reported by Kirk and Sawyer (1991) while the carbohydrate content of the pulp and seeds was calculated by difference. The ascorbic acid content of the pulp was determined by indophenol method as reported by Onwuka (2005). Standard deviations of the values obtained were calculated and tabulated.

RESULTS AND DISCUSSION

The results of the survey are summarized in Table 1. Of the twenty respondents, 85% of them knew only one type/variety with large fruits and high amount of the pulp while 15% of the respondents knew the smaller type. This is in line with report of Von Maydell (1990) that the shape

and size of the fruits varies among varieties and so also the pulp content. Most respondents (95%) indicated that the fruit pulp of Baobab is used in preparing a refreshing drink called *Kwalaba da nono* (which sometimes a little fermented milk/yoghurt is added to it) while 5% use the fruit pulp in preparing a local candy called *Tsami gaye* (a sweetened and coloured candy). The use of fruit pulp in preparing of drink and sweets are documented by Gebauer *et al.* (2002). From observations and previous knowledge, the pulp is also manually separated from the seeds by pounding in a mortar and pestle, and powder sweetened with sugar and consumed.

The leaves of Baobab according to 80% of respondents are dried and ground for preparation of local soup called *miyar kuka*. This is also reported by Asimugha (2000) and Delisle *et al.* (1997). The fresh leaves according to Sidibe and Williams (2002) are important sources of vitamin C and pro vitamin A, they also contain 4% protein.

Ijomah *et al.* (1997) have reported the various medicinal uses of Baobab in the North Eastern Nigeria, but all the respondents in this study (100%) indicated that they do not have any knowledge of medicinal use of any part of Baobab plant.

The results of proximate composition of fruit pulp and seeds of Baobab as well as ascorbic acid content are shown in Table 2. Baobab pulp was reported to be highly nutritious food material used by communities across the African continent (Gebauer *et al.*, 2002; De Calawe *et al.* 2010). The values for proximate composition of the pulp are 17.30± 0.10, 6.30± 0.02, 5.30± 0.02, 2.30± 0.20, 68.20± 0.00 per cent and 275.60 mg/100g ± 0.00 for moisture, ash, crude lipid, crude protein, total carbohydrate and ascorbic acid respectively.

Table 1: Summary of results of survey in percentages

Question	% of Respondents
* Knowledge of type of Baobab	
Big fruit type/variety	85
Small fruit type/variety	15
* Major uses of Baobab pulp	
<i>Tsami gaye</i>	5
<i>Kwalaba da nono</i>	95
* Other uses of Baobab	
Medicinal	0
Non medicinal	100
*Uses of leaves	
For soup	80
Non soup uses (e.g. <i>danwake</i> a local food also)	20
*Uses of Baobab seeds	
<i>Mando</i>	20
Other uses	80

Table 2: Result of proximate composition and ascorbic acid content of Baobab fruit pulp and seeds

Nutrient content	Baobab pulp (in %)	Baobab seeds (in %)
Moisture	17.±0.10	6.9± 0.20
Ash	6.30 ± 0.02	7.9± 0.10
Crude lipid	5.3± 0.02	12.6± 0.16
Crude protein	2.3± 0.20	10.5± 0.10
Total carbohydrate	68.2± 0.00	62.1± 0.00
Ascorbic acid (mg/100g)	275.6± 0.00	ND

The results are means of triplicate determinations ± standard deviation.
 ND = Not determined

The values of ash, lipid and crude protein are higher than values reported by Sadiq *et al.*, (2009) and this may probably be due to geographical and environmental differences. Ascorbic acid content of Baobab pulp is one of the important nutrients that made Baobab pulp an important product from nutritional point of view. The ascorbic acid content was found to be 275.6±0.00 mg/100g which is slightly lower than 300mg/100g reported by Nour *et al.* (1980). According to Odetokun (1996) consumption of 23 g of Baobab pulp powder is enough to meet the recommended daily allowance of vitamin C for an adult.

The values of proximate composition of the seeds of Baobab seeds are also reported in Table 2. The values are 6.90±0.20, 7.9±0.10, 12.60±0.16, 10.50±0.10, and 62.10±0.00 for moisture, ash, crude lipid, crude protein and total carbohydrate respectively. The values for moisture, ash and total carbohydrate are higher while lipid and crude protein contents are lower than reported values Nkafamiya *et al.*, (2007). Ascorbic acid content of Baobab seeds was however not determined. Nkafamiya *et al.*, (2007) reported a value of 6.71±0.04 mg/100 g in the seeds.

REFERENCES

Abdalla, M. A. Mohammed, M. A. and Mudawi, H. A. (2010): Production and Quality Assesment of Instant Baobab (*Adonsonia digitata* L.). *Advanced Journal of Food Science and Technology* 2(2): 125 - 133

Asimugha, V. U. (2000): Effect of Drying Techniques on the Vitamin A Content of Baobab (*Adonsonia digitata* L.) Leaves. *Proceedings of 24th Annual Conference of Nigerian Institute of Food Science and Technology held in Bauchi 20 - 24th November 2000.*

Al-Qarawi, A. A.; Al-Damegh, M. A. and El-Moughy, S. A. (2003): Hepatoprotective Influence of *Adonsonia digitata* pulp. *Journal of Herbs, Spices and Medicinal Plants* 10(3):1 - 6

Baobab Fruit Company (2002): *Nella Tradizione Africana Baobab.* From www.baobabfruitco.com on 10.02.12

It should be noted here that many researchers principally from Africa, Asia and elsewhere have reported the proximate composition values for Baobab fruit pulp and seeds but with variations. The variation may be due to the types/variety, soil and environmental differences and also the different procedures used in the determinations.

CONCLUSION AND RECOMMENDATIONS

From the foregoing it can be seen that both Baobab seeds and fruit pulp are very rich sources of important nutrients particularly for children and pregnant women as pointed out by NRC(1996). Even though Baobab pulp and seeds are being used as food in Wudil, one can say that this 'Nature's gift to Mankind' is highly underutilized despite its cheapness and availability.

It is therefore recommended that awareness should be created to sensitize the public on the nutritional and medicinal importance of Baobab. Efforts should also be made to process the pulp and seeds into various processed products such as instant drinks, pulp powders, imitation coffee, ascorbic acid rich drinks etc.

Delisle, H; Bakari, S.; Gerry, G.; Picard, C. and Ferland, G. (1997): Pro-Vitamin A Content of Traditional Green Leaves from Niger. *Cahiers Agricultures.* 6(1): 533-560

De Caluwe, E.; Halamoud, K. and Van Damme, P. (2010). *Adonsonia digitata* L.- A review of Traditional uses, phytochemistry and pharmacology. *Afrika Focus* 23(1):11-51.

Dos-Santos, H. A. and Damon, M. (1996): *Manual de Nutrition Africaine.* Karthala Publishing Co. Dakar Pp 2-10

Gebauer, J.; El-Siddig, K. and Ebert, G. (2002): Baobab (*Adonsonia digitata* L.): A Review on a Multipurpose Tree with Promising Future in the Sudan. *Gartenbauwissenschaft* 64(4): 155 - 160

Ighadalo, C. E.; Calherine, O. E. and Daniel, M. K.(1991): Evaluation of Mineral Elements and Ascorbic Acid Contents in Fruits of Some Wild Plants. *Plant Foods Hum. Nutr.* 41: 151 - 154

- Ijomah, J. U.; Idu, M. and Umar, A. H. (1997): Medicinal Plants in Used by the Fulani Traditional Herbalist in Yola North and Yola South Local Government Areas of Adamawa State. *Journal of Applied Science and Management* 1(1): 59 - 63.
- Kirk, R. S. and Sawyer, R. (1991). *Pearson's Composition and Analysis of Foods*. 9th Ed. Longman Group U.K. Pp 609 - 628
- Manfredini, S. (2002): *The Health Properties of Baobab (Adonsonia digitata L.)*. University of Ferra. Retrieved from www.mightybaobab.comen/left/baobab on 16/02/12
- Nkafamiya, I. I.; Osemeahon, S. A.; Dahiru, D. and Umaru, H. A. (2007): Studies on the Chemical Composition and Physico-Chemical Properties of the Seeds of Baobab (*Adonsonia digitata*). *African Journal of Biotechnology*. 6(6): 756 - 759
- Nour, A. A.; Maghboul, B. I. and Kheiri, N. H. (1980): Chemical Composition of Baobab Fruit (*Adonsonia digitata*). *Trop. Sci.* 22:383 - 388.
- Odetokun, S. M. (1996). Nutritive value of Baobab Fruit (*Adonsonia digitata*). *Ravista Italiana delle Sostanze Grasse* 73(8): 371 - 173.
- Onwuka, G. I. (2005). *Food Analysis and Instrumentation Theory and Practice*. Naphthali Prints Lagos Nigeria Pp 1 - 131.
- Owen, J. (1970). The Medico-Social and Cultural Significance of *Adonsonia digitata* in African Continent. *African Notes*. 6(1): 24 - 36.
- Parkouda, C.; Diawara, B.; Lowor, S.; Diako, C. and Jacobsen, M. (2011). Volatile Compounds of Maari: A Fermented Product from Baobab (*Adonsonia digitata* L.) Seeds. *African Journal of Biotechnology* 10(20): 4197 - 4206
- Saka, J. D. K.; Nisonthi, J. O. and Maghembe, J. A. (1994): Nutritional Value of Edible Fruits of Indigenous Wild Trees in Malawi. *Forest Eco. Mgt* 64(2-3): 245 - 248
- Sidibe, M. and Williams, J. T. (2002): *Baobab, Adonsonia digitata*. International Centre for Under Utilised Crops UK.
- Sadiq, I.; Hassan, L.; Dangoggo, S. M.; Dogonyaro, A. I. and Itodo, A. U. (2009): Proximate Analysis and Mineral Composition of the Pulp and Seeds of *Adonsonia digitata*. *International Journal of Tropical Agriculture and Food Systems*. 3(2):1 - 5
- Von Maydell, H.J. (1990). Trees and Shrubs of the Sahel: Their characteristics and uses. *Duestch GTZ GmbH, Germany, ISSN* 3823611984