

Baobab: A Review about “The Tree of Life”

Namratha V. and Sahithi P.

University College of Technology, Osmania University, Hyderabad, Telangana, India

Publication Date: 22 August 2015

Article Link: <http://medical.cloud-journals.com/index.php/IJAHST/article/view/Med-254>



Copyright © 2015 Namratha V. and Sahithi P. This is an open access article distributed under the **Creative Commons Attribution License**, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract Baobab (*Adansonia digitata* L., Malvaceae) is a native tree of Africa, Madagascar, Australia, and Arabia. It is a multipurpose tree where every part of the baobab tree can be used for either food, fodder, medicine, shelter or to produce useful utensils. The fruit of *A. digitata* is called as super fruit because of its exotic nature and rich nutrient profile. Its fruit pulp has very high content of vitamin C (6 x more vitamin C than oranges), potassium (6 x more potassium than bananas), calcium (2 x more calcium than milk), antioxidants (6 x more antioxidants than blueberries) etc. Seeds contain high quantities of crude protein, fats (oils), dietary fibre and most minerals. Baobab leaves are superior in nutritional quality to fruit pulp, as they contain all the essential amino acids and some of the non-essential amino acids and significant levels of vitamin A and C. The bark is used to produce ropes, clothes, baskets, mats and fish traps and the wood can be used as fodder or as thatching for roofs. Several plant parts of baobab tree have interesting anti-oxidant, anti-inflammatory, analgesic, antipyretic, antimicrobial, anti diarrhoea and anti-dysentery properties. Thus, since ancient times baobab has been used extensively in traditional medicine.

Keywords *Adansonia Digitata* L.; Analgesic; Anti-Inflammatory; Antioxidant; Antipyretic; Diarrhoea

1. Introduction

Baobab (*Adansonia digitata* L., Malvaceae) is a native tree of Africa, Madagascar, Australia, and Arabia [1]. It grows in southern, central western and north-eastern Africa on savannah, national tree of Madagascar, Western Australia where it is used to imprison Aborigines. *Adansonia digitata* L. belongs to family malvaceae of order malvales (subfamily: bombacoideae). The English common name is baobab, derived from the Arabic word bu hi bab, which means “fruit with several seeds”. There are many common names for *Adansonia digitata* L., Baobab, tabaldi, bottle tree, top-down tree, the chemist tree, magic tree, symbol of the earth and the monkey bread tree. The name Adansonia was given to this tree to commemorate the French surgeon Michel Adanson (1727-1806); the species name digitata meaning hand-like, is in reference to the shape of the leaves. Adansonias reach heights of 5 to 30 m (16 to 98 ft) and have trunk diameters of 7 to 11 m (23 to 36 ft) [2]. African baobab is a very long-living tree. It normally lives for about 500 years, but it is believed that some trees are up to 5000 years old. Because of its great size and diffusion, *Adansonia digitata* is an extremely impressive tree with characteristics such as unusual bottle shaped trunk up to 25m tall and 3m diameter in which spongy fibres store water for dry season hence called “bottle tree”. Its spongy wood does not burn the

tree has an extensive lateral root system, which produces tubers at the end. The crown like branches at the top of the tree regularly distributed horizontal. The leaves are digitate and divided into 5-7 finger-like leaflets. Mature leaf size may reach a diameter of 20 cm. being deciduous; the leaves are dropped during the winter months and appear again in late spring or early summer. The Baobab tree has large whitish flowers which open at night. Baobab fruits are of great importance which are bottle or cucumber shaped containing woody outer shell, 7.5-54 cm long x 7.5-20 cm wide, covered by velvety yellowish, sometimes greenish hairs. The internal fruit pulp is split into agglomerates that enclose several reniform shaped seeds (approximately 10 mm long). The baobab is a multipurpose tree where every part of the baobab tree can be used for either food, fodder, medicine, shelter or to produce useful utensils, hence termed as the “tree of life”. The fruit pulp, seeds, leaves, bark and root tubers have been studied by scientists for their useful properties and they all have interesting medicinal values hence used in pharmaceutical, nutritional, and cosmetic items.

2. Common Uses

2.1. Fruit

The baobab fruits are ovoid in shape, composed of an outer shell (epicarp) (45%), fruit pulp (15%) and seeds (40%). The woody epicarp or pod with a velvety yellow green coating contains the internal fruit pulp (endocarp) which is split in small floury, dehydrated and powdery slides that enclose multiple oil rich seeds and filaments, the red fibres that subdivide the pulp in segments. Baobab is a popular food source. The powder separated from the harvested fruits is mixed with water and drunk as lemonade [3]. It has a somewhat acidic flavour, described as ‘somewhere between grapefruit, pear, and vanilla’ and is added to many sauces and drinks. 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. When burned, it is a good repellent for cattle flies.

2.2. Seed

The baobab fruit consists of large seeds embedded in a dry, acidic pulp and shell. The seeds can be eaten fresh, or they may be dried and ground into flour which can either be added to soups and stews as a thickener, or roasted and ground into a paste, or boiled for a long time, fermented and then dried for use. The fermented seeds are used as flavouring soups, whereas the roasted seeds are used as a side dish substituting peanut (snacks) or made into coffee. The seeds are pressed for baobab oil which is pale yellow oil. These seeds are considered refreshing to suck and when boiled or soaked in water they make a refreshing lemony flavoured drink.

2.3. Leaves

The leaves of baobab tree are staple food for many populations in Africa, the tender leaves are harvested and eaten fresh and also dried for domestic use. The Young leaves are widely cooked as spinach, and frequently dried, often powdered and used for sauces over porridges, thick gruels of grains, or boiled rice and to flavour drinks and sauces.

2.4. Bark

Baobab bark is mainly used for medicinal properties. The bark from the lower part of the stem can be removed to produce a valuable fibre. The bark of baobab is very unusual, that it regenerates itself. The bark is stewed to wash newborn babies to give them strength. The bark is used to produce ropes,

clothes, baskets, mats, strings and fish traps and the wood can be used as fodder or as thatching for roofs [4].

3. Phytochemistry

3.1. Fruit

The fruit of *A. digitata* is called as super fruit because of its exotic nature and rich nutrient profile. Its fruit pulp has very high content of vitamin C (6 x more vitamin C than oranges), potassium (6 x more potassium than bananas) calcium (2 x more calcium than milk), antioxidants (6 x more antioxidants than blueberries) etc [5]. The dry baobab fruit pulp has a slightly tart, refreshing taste with little moisture content (8.7%) and is very nutritious, with particularly high values for carbohydrates (74%), dietary fibre (9%), protein (3%), energy, iron (3 x more iron than spinach), thiamine, magnesium, zinc and nicotinic acid and only 0.2% fat. The baobab fruit pulp is dry and acidulous (ph 3.3) due to the presence of organic acids including citric, tartaric, malic, succinic as well as ascorbic acid. It is mealy, and rich in mucilage, pectin's (average 56.2%), tartrate and free tartaric acids [6]. The presence of the tartrate gives rise to the name 'cream of tartar tree'. Pulp sweetness is provided by fructose, saccharose and glucose contents. Baobab fruit also contains all 8 essential amino acids. The baobab fruit pulp is particularly high in valine, tryptophan, phenylalanine and tyrosine. The baobab fruit out as a rich source of linoleic acid and exceptionally high calcium content, but contains very little iron and is a relatively poor source of manganese.

3.2. Seed

The baobab Seeds contain high quantities of crude protein, fats (oils) (29.7% expressed on dry weight basis), dietary fibre and most minerals. Besides, baobab seeds have high levels of lysine, thiamine, calcium, and iron. Baobab seed can be classified as both protein and oil rich. It is also a very rich source of energy and has a relatively low fat value. In contrast to other plant seed protein profiles, baobab seed protein contains a high amount of lysine. Baobab seed protein is an adequate food ingredient as it suggests high protein solubility at alkaline and acidic pH. Naturally occurring Omega 3, 6, and 9 are present in seed endocarp [7]. The oil of baobab seed contains, 73.11% unsaturated and 26.89% saturated fatty acids. The saturated fatty acids contain 33% palmitic and stearic acid; mono unsaturated fatty acids contain 36% oleic and linoleic acid while the poly unsaturated fatty acids are around 31%. The baobab seeds are poor source for iron, zinc and copper while being a major source for calcium, potassium, magnesium and phosphorous [8]. The acceptability and optimal utilization of baobab seed as a protein source is limited due to the presence of anti nutritional factors such as amylase inhibitors, protease inhibitors, trypsin inhibitors, tannins, alkaloids, phytate, phytic acid and oxalate. It was observed that there was reduction in tannin content after cold water, hot water and hot alkali treatment. Activity of amylase inhibitor was greatly reduced by dehulling and cold water treatment. Among all alkali treatment proved to be most efficient method for reducing trypsin inhibitor and tannin contents and had additional advantage of improving digestibility of protein. However, such alkali treatments may also cause the production of harmful compounds, such as lysinoalanine which is nephrotoxic.

3.3. Leaves

Compared to the fruit, baobab leaves are superior in nutritional quality, as they contain significant level of vitamin A and C, all the essential amino acids and some of the non essential amino acids. The leaves when expressed on dry weight basis contain: 60-70% carbohydrate, 13-15% protein, 11% fibre, 4-10% fat and 16% ash. The amino acid profile of the baobab leaves are potential source for analyzing protein quality in local diet. The amino acid profile of baobab leaf is similar to that of an ideal protein: tyrosine + phenylalanine (9.6%), arginine (8.0%), valine (5.9%), lysine (5.7%),

methionine + cysteine (4.8%), threonine (3.9%) and tryptophan (1.5%). The leaves also contain an important amount of mucilage which is an acidic polysaccharide with associated proteins and minerals. It was reported that total lipid content in baobab leaves is 55 mg/g on dry weight analysis, though the fatty acid composition revealed that the leaves did not provide significant sources of linoleic acid. Baobab leaves are significant source of several minerals such as calcium, iron, potassium, magnesium, molybdenum, phosphorous, zinc and manganese among which calcium and iron are found to be predominant. Baobab leaves contain interesting level of vitamin A (provitamin A) which is usually estimated by the amount of carotenoids, which in turn depends on the method of leaf drying and tree type. The recommended storage condition for baobab leaves to maintain the highest vitamin content is by whole leaf storage rather than ground leaf powder.

3.4. Bark

Baobab bark is mainly used for medicinal properties. The alkaloid 'adansonin' in the bark is thought to be the active principle for treatment of malaria and other fevers. Baobab bark which is often given to infants to promote weight gain was found to be high in fat, calcium, copper, iron, and friedelin, lupeol and baurenol (all three terpenoids) were identified in the bark of baobab.

4. Biological Properties

The baobab tree is a multipurpose tree due to its high nutritional value. The tree parts are Potent Source of Antioxidants (capacity by fighting against the formation of free radicals) due to high Vitamin C, bioflavonoids, Provitamin A. The fruit pulp helps in slow the aging process and protect against major illnesses like heart disease and cancer. It is excellent ingredient in diets for diabetics (notably type II Diabetes) because it is extremely rich source of polyphenols, known to be beneficial in reducing the glycaemia response (the rate at which sugar is released into the bloodstream). The soluble fibre in fruit pulp is ideal in pre-biotic formulations, and stimulates the intestinal micro flora and High potassium is important for brain, nerve and muscle function and phosphorous, which helps bones. The baobab fruit pulp produced a marked anti-inflammation, analgesic and antipyretic activities, this effect could be due to the presence of sterols, saponins and triterpenes in the fruit pulp. The flower of the baobab tree is the most evolved part of the plant and therefore contains many medicinal properties. The essence of the flower has been very useful for reliving back pain or pain caused by arthritis. It also helps to heal flesh wounds. The esculent oil of baobab can be used for beauty purposes such as enrichment of skin, hair and nails as it posses Vitamin A, D, E and essential fatty acids [9]. It is actively involved in the rejuvenation and renewal of cells, hence improves the skin's elasticity and reduces the appearance of stretch marks. The residual remains after oil processing is mixed with coconut oil for soap making which helps to fight skin diseases such as eczema, sunburn, acne and rashes.

The baobab fruit is rich in iron, potassium and essential blood clotting ingredients support the circulatory system whilst the high fibre content benefits digestive system. The dry baobab fruit powder contained high vitamin C and calcium, so it is used as rehydrating agent and to fight diarrhea, valuable aid in prevention and treatment of gastric disorders, varicose veins, osteoporosis and haemorrhoids. It is Beneficial to anaemics, anorexics, smokers and athletes for celiac diseases. Vitamin C has been shown to be related to low blood pressure, enhanced immunity against many tropical maladies, lower incidence of cataract development and lower incidence of coronary disease. *Adansonia digitata* stem, root-bark and leaf methanol extracts have shown high antiviral activity and antimicrobial activity.

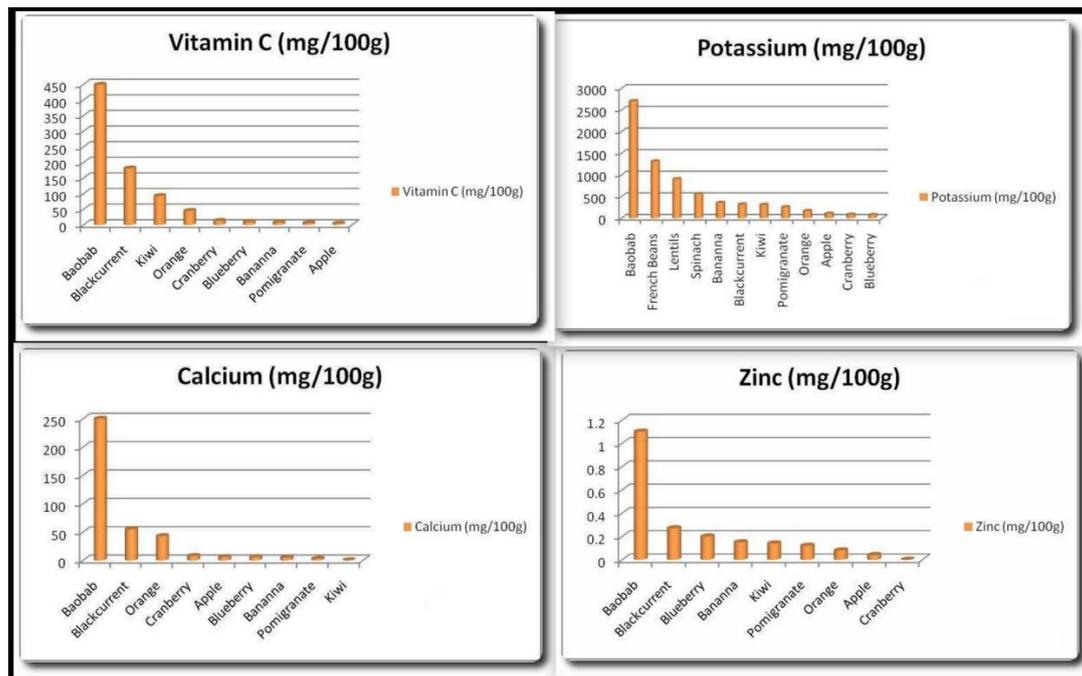
5. Traditional Medicine

In traditional African medicine, baobab fruit was often used to curb inflammation caused by insect bites, guinea worm sores and it was also used to treat number of illnesses such as asthma. The fruit pulp was used as anti-inflammatory, antipyretic, immune-stimulant, analgesic, febrigue and astringent in treatment of dysentery and diarrhea and hence it has been evaluated as a substitute for improved western drugs. The aqueous extract of baobab fruit pulp exhibited significant hepatoprotective activity and, as a result, consumption of the pulp plays an important part in human resistance to liver damage in areas where baobab was consumed. The baobab leaves are boiled and the leftover water is taken in small dosages to cure fever, diarrhea, malaria, small pox, kidney, bladder related diseases and chest related ailments such as asthma. Powdered leaves are used as an anti-asthmatic and known to have antihistamine and anti-tension properties. Oil extracted from baobab seeds is used for inflamed gums and to ease diseased teeth. The widest use in tradition medicine comes from the baobab bark as a substitute for quinine in case of fever or as a prophylactic. The alkaloid 'adansonin' in the bark is thought to be the active principle for treatment of malaria and other fevers. Moreover, the bark contains white, semi-fluid gum that can be obtained from bark wounds and is used for cleansing sores. The bark which has high content of fat, calcium, copper, iron and zinc is often given to infants to promote weight gain [10].

6. Conclusion

Adansonia digitata L. is a multipurpose tree where every part of the baobab tree can be used for food, fodder, medicine, shelter or to produce useful utensils. The baobab fruits are ovoid in shape and popular food source. The baobab fruit pulp is probably the most important food stuff with very high vitamin C content and is a rich source of calcium. The acidic pulp is rich in pectin, contains a high amount of carbohydrate, is low in protein, and extremely low in fat. The baobab fruit is a rich source of linoleic acid and exceptionally high calcium content, but contains very little iron and is a relatively poor source of manganese. The baobab fruit pulp produced a marked anti-inflammation, analgesic and antipyretic activities, this effect could be due to the presence of sterols, saponins and triterpenes in the fruit pulp. Baobab seed can be classified as both protein and oil rich. They also contain high levels of lysine, thiamine, Ca, Mg and Fe. Baobab seeds can be eaten fresh, or may be dried and ground into flour which is added as thickener to soups and stews. Anti nutritional factors from seed can be eliminated by processing. The leaves of baobab tree are staple food for many populations in Africa, the tender leaves are harvested and eaten fresh and also dried for domestic use. The Young leaves are widely cooked as spinach, and frequently dried, often powdered and used for sauces over porridges, thick gruels of grains, or boiled rice and to flavour drinks and sauces. Baobab leaves are superior in nutritional quality, as they contain significant level of vitamin A and C, all the essential amino acids and some of the non essential amino acids. They are a significant source of Ca, Fe, K, Mg, Mn, P and Zn. Baobab bark is mainly used for its medicinal properties and for its fibres. The alkaloid 'adansonin' in the bark is thought to be the active principle for treatment of malaria and other fevers. Several plant parts of baobab tree have interesting anti-oxidant, anti-inflammatory, analgesic, antipyretic, antimicrobial, anti diarrhoea and anti-dysentery properties. Thus, since ancient times baobab has been used extensively in traditional medicine and as substitute in western drugs.

7. Figures



Figures: Baobab Fruit Nutrients Compared to other commonly used Fruits [11]

References

- [1] WebMD, LLC. *Baobab Overview Information*, www.webmd.com/vitamins-supplements/ingredientmono-1260-BAOBAB.aspx?activeIngredientId=1260&activeIngredientName=BAOBAB
- [2] Blogorama, Blogspace. What's the Baobab, www.plant-extract.blogspot.fr/5731515/WHAT-S-THE-BAOBAB/
- [3] *First Taste of a Magical Fruit*. http://news.bbc.co.uk/2/hi/uk_news/magazine/7509077.stm
- [4] Siyabona Africa (Pty) Ltd. Baobab Siyabona Africa. www.krugerpark.co.za/africa_baobab.html
- [5] The Baobab Story. www.abaobab.com/baobab/category/baobab-health-benefits/
- [6] Abdalla, A.A., Mohammed, M.A. and Mudawi, H.A. Production and Quality Assessment of Instant Baobab (*Adansonia digitata* L.) *Advance Journal of Food Science and Technology*. 2010. 2 (2) 125-133.
- [7] Liliana Usvat, 2014: *Baobab Tree - Protector of the African Continent Fight Diabetes*. www.lilianausvat.blogspot.in/2014/03/baobab-tree-protector-of-african.html#.VX6LEM4j-dx
- [8] Dr. Joerg Gruenwald and Dipl. Ing.-agr. Mathias Galizia, United Nations Conference on Trade and Development, Market Brief in the European Union for Selected Natural Ingredients Derived from Native Species.
- [9] Thebestofcreation.com. 100% Pure Baobab Oil. www.thebestofcreation.com/baobab-oil-skin-hair/#sthash.cZOP1trp.dpuf

- [10] Emmy De Caluwé, Kateřina Halamová, and Patrick Van Damme. *Adansonia digitata* L.: *A Review of Traditional Uses*. *Phytochemistry and Pharmacology, afrika focus*. 2010. 23 (1) 11-51.
- [11] Baobab Fruit: A Superfruit Packed with Vitamin C. www.botanicals.com/baobab.php