Baobab Fruit Powder as a wholesome Food Ingredient

By Gabriele Fernsebner and Martin A. Spaeth, Biomega e.U.

The baobab tree (*Adansonia digitata* L.) is a member of the Bombacaceae family and a genus of nine species of tree. The baobab is widely distributed through the savannas and drier regions of Africa but it is also common in Asia, Central America and in the Caribbean region.

The generic name honours Michel Adanson, the French naturalist who described Adansonia for the first time. Digitata refers to the fingers of a hand, which the leaflets bring to mind. The tree is also commonly called the upside-down tree, bottle tree and monkey-bread tree. The trees reach heights of 20 m with a trunk 10 m in diameter and branches 50 m in diameter.

The baobab has long been an important source of human nutrition. Indigenous peoples traditionally use the leaves, bark, roots, fruit and seeds as foodstuffs, as well as in medicines for humans and animals.

Fruit harvesting and production process:

Upon pollination by fruit bats, the tree produces large green or brownish fruits which are capsules and characteristically indehiscent. The capsules contain a soft, whitish, powdery pulp and kidney-shaped seeds (Sidibe and Williams 2002). After the fruit is collected, the hard outer shell of the fruit is cracked open and the contents are removed. The seeds are then separated from the fibrous material and the fruit pulp. This is screened to remove further unwanted fibrous and flaky material. Finally the food-grade powder is sieved and packaged.

Nutritional properties:

100 g of baobab fruit pulp is comprises of about 80 % total carbohydrates (including dietary fibres), 2-3 % proteins and a very low content of lipids (< 1 %). Furthermore, the fruit pulp is rich in vitamin C and minerals like calcium and potassium.

Dietary fibres

Baobab fruit pulp provides soluble and insoluble fibres, specifically around 50 g of fibres per 100 g of pulp. Recently, dietary fibres have gained increased importance as a component of the diet, thanks to its ability to influence multiple aspects of the digestive physiology. In combination with a diet rich in vegetables, cereals, and fruits, frequent consumption of dietary fibre has been associated with a reduced risk of cancer involving the digestive tract, and in particular, the rectal colon tract (Okazaki et al. 2002, World Cancer Research Fund 2007). Dietary fibres are fundamental in the composition of a healthy and balanced diet. Regular consumption of fibre-rich foods can also help in preventing

constipation and maintaining a healthy body-weight (Murray et al. 2001).
The insoluble fibres are not adsorbed by the intestine and are useful against constipation and to induce satiety, due to their ability to increase the faecal mass and to stimulate peristalsis. This latter aspect may be useful in case of hypo-caloric diet (Garcia Peris and Camblor Alvarez 1999).
The recommendation for the daily intake (RDA) of dietary fibres is 30 g per day. A mere 70 g baobab fruit pulp already contains the guided value (DGE 2008).

Vitamins and minerals

Baobab fruit is known for its high content of vitamin C (ascorbic acid); in specific, 100 g of pulp contains up to 300 mg of vitamin C. This vitamin is extremely important as a nutritional element and as a supplement. Vitamin C protects the body against free radicals, and is the most effective antioxidant in hydrophilic compartments; moreover, it participates in several metabolic processes, such as collagen biosynthesis in connective tissue, neurotransmission, and steroidal hormone synthesis. It also increases calcium absorption and iron bioavailability (Arrigoni 2002) and is related to the prevention of many degenerative diseases like cataract formation, cardiovascular risks and arteriosclerosis (Sauerlich 1994, Weber et. al. 1996).
The RDA for vitamin C is 80 mg (Commission Directive 2008). Considering that baobab's vitamin C content is 300 mg per 100 g of pulp, the oral intake of 26 g provides the daily recommendation of vitamin C for humans.
The fruit also contains other essential vitamins, such as vitamin B2 (riboflavin), necessary for growth and maintaining the integrity of nervous fibres, skin and eyes, and vitamin B (niacin or PP), important for the regulation of several metabolic processes.
In addition the fruit contributes to the supply of other important dietary nutrients, such as minerals. 100 g of pulp contains about 300 mg of calcium, 3000 mg of potassium and 30 mg of phosphorus.

Suggested dosage:

The suggested intake of 5 to 15 g of fruit pulp will help ensure a highly nutritional level of fibres, vitamins, minerals, proteins and carbohydrates. The powder can be diluted directly with milk or fruit juices.
Furthermore, the powder fortifies yoghurt with prebiotic fibres and can be used as additional ingredient in beverages, dairy products, ice-creams, bread, cakes, bars, biscuits and confectionery.

Traditional use and medicinal benefits:

In some areas the use of baobab milk is very common. The dried pulp is made into a solution with water or fresh milk. In the traditional use, the baobab drink is used by women during pregnancy and in some cases as nourishment for babies (Prentice et al. 1993).

In addition the Baobab fruit pulp is used for multiple medicinal purposes in many parts of Africa.

Antioxidant activity

Dietary antioxidants are believed to be effective nutrients in the prevention of oxidative stress-related diseases. The use of the oxygen radical absorbance capacity (ORAC) assay as a tool for antioxidant assessment is described and proposed as a method for comparing botanical sources and for standardizing antioxidant supplements. The range of ORAC for common fruits is around 1,40 µmol/g (watermelon) to 95 µmol/g (cranberry). Recent studies have shown that baobab fruit with ORAC of 250 µmol/g has a remarkable antioxidant capacity. It may prevent against free radical damage (Besco et. al. 2007).

Anti-inflammatory, analgesic and anti-pyretic activity

Aqueous extract of the baobab fruit pulp produces marked anti-inflammation and anti-pyretic activity. The extract also produces marked analgesic activity. The anti-pyretic activity resembles that normally induced by a standard dose of administered acetylsalicylic acid (Ramadan et al. 1993).

Anti-microbial activity

An acid medium, as created by the addition of baobab fruit pulp to tempe fermentation could prevent the growth of pathogenic bacteria such as *Salmonella sp., Bacillus sp. and Streptococcus sp.* and increasing concentrations of baobab powder led to an increase in the population of lactic acid bacteria (Afolabi et al. 2005).

Anti-dysentery and anti-diarrhoea, immunostiumulant

Traditionally the baobab fruit pulp is used internally in cases of dysentery and diarrhoea and as an immunostimulant. The fruit pulp has been evaluated as a substitute for western drugs (Al-Qarawi et al. 2003).

Hepatoprotective activity

The aqueous extract of the baobab fruit pulp exhibited significant hepatoprotective activity and its consumption may play an important part in human resistance to liver damage in areas where the plant is consumed (Al-Qarawi et al. 2003).

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