

Untapped potential of baobab

Indigenous fruit trees could improve nutrition and livelihoods, especially in rural areas

BY STEPHA MCMULLIN AND KATJA KEHLENBECK

Rates of hunger, that is, insufficient access to calories, have been falling in many parts of the world. However, there has been little change in the high rates of micronutrient deficiencies, which currently affect about two billion people worldwide.

Under-nutrition and stunting which occur early in life, and the resulting deficiencies in iron, vitamin A, iodine and zinc lead to poor mental and physical development in children, and high mortality and illness.

Vitamin and mineral deficiencies are often referred to as “hidden hunger”, as they can occur even when there is adequate calorie intake, and could be overlooked under traditional measures of food security. While much of the attention on food security has focused on increasing production of staple foods, little attention has been given to the need for the production of nutrient-rich foods that can improve the quality of diets for achieving better food and nutrition.

Trees are important for environmental benefits and for providing more resilient landscapes and also as a source of nutrient-rich foods. Agroforestry systems provide a wide variety of foods and can contribute substantially to food and nutrition security. Tree foods are traditionally used to complement and diversify the typical staple diets, thus preventing nutrient deficiencies and contributing to human health.

Edible tree crops provide fruits, leafy vegetables, nuts, seeds and edible oils. They increase the nutritional quality of local diets, mostly due to their micronutrients (mineral and vitamins), but also macronutrients (protein, carbohydrates) and phytochemicals (e.g. antioxidants). (Leakey 1999; Stadlmayr et al., 2013).

If a variety of tree crops with different harvest seasons are cultivated on a farm, it is possible to have nutrient-rich foods all year. In addition, since trees are hardier than annual crops, they provide food in times of drought, or when staple crops fail or before crops are ready for harvest.



Women sell baobab fruits in the Kibwezi area of Kenya. Trees left standing after land is cleared for cultivation can provide an income for owners. (Photo: Jan Vandenabeele)

The African baobab tree

The potential of indigenous fruit trees remains largely untapped as little attention has been given to their nutritional or economic value. Yet, many underutilised wild fruits can contribute to food security, health and to livelihood diversification. One such example is the iconic African baobab (*Adansonia digitata* L.), a wild fruit tree of the savannahs, scrublands and semi-deserts of sub-Saharan Africa.

Baobab products have great potential to support local communities in vulnerable dryland ecosystems and in the face of climate change. The baobab is a majestic tree that produces highly nutritious fruits. The most important food from baobab is the fruit pulp, which is rich in vitamins and minerals. It can provide far higher amounts of vitamin C, calcium and iron than more common tropical fruits such as mango and orange (Kehlenbeck et al., 2013b).

However, there is a large variability in levels of vitamin C in fruits of individual baobab trees – from 126 – 509mg per 100g edible portion (Stadlmayr et al., 2013). Still, even the lowest figure identified is far higher than that for many other fruits.

In addition to the fruit pulp, baobab also produces leaves that are eaten as vegetables in western Africa. The tree also produces edible seeds from which oil is extracted for cooking and cosmetics.

Baobab products offer a great opportunity for income generation, particularly for women, the main group involved in collection, processing and marketing of these products. In Kenya, the most important marketed baobab product is *mabuyu*, a sweet made from the pulp-covered seeds. Producing and selling *mabuyu* is a profitable business whose main actors are women.

In addition to domestic markets, baobab products as a type of new, healthy “super food”



Grafting experiment of baobab at ICRAF's research nursery. From left to right: ICRAF nursery expert Valentine Gitonga grafting baobab; cleft grafting ready for wrapping; grafted baobab trees; successfully grafted baobab trees (five months after grafting).

are in high demand in Europe and the USA after baobab was officially accepted as a novel food by the European Union (EU) in 2008. Due to its high nutrition potential and increasing demand, research is going on in East Africa to identify populations of baobab, its distribution across landscapes and variation in genetic characteristics as well as nutritional content.

First results from studies by the World Agroforestry Centre (ICRAF) in Kenya showed a high variation of fruit shapes and sizes between the surveyed individual trees, with fruit lengths ranging from 9 to 30cm and fruit weights ranging from 60 to 630g.

Fruits collected from the coast - Malindi, Kilifi and Diani - were significantly larger than those from the inland collection locations of Voi, Mtito Andei and Kibwezi. Nutritional characterisation of baobab fruit pulp is going on and grafting experiments of baobab has just started at ICRAF, showing positive first results.

Information on the mentioned characteristics

may facilitate the selection of superior mother trees for baobab domestication programmes. This would provide farmers with improved, grafted baobab planting material for increasing food and nutrition security and income generation.

The way forward

While baobab is only one example, there are hundreds of other wild fruit trees in Africa with similar potential for food and nutrition security. However, the number of indigenous fruit trees is said to be decreasing in many parts of sub-Saharan Africa due to changes in environmental factors and land use, intensified agriculture, unsustainable harvest and increasing urbanisation, among others.

This may result in shifts of species distribution, altered pest and disease occurrences, lack of rejuvenation of fruit tree populations and finally, loss of valuable tree species. To enhance the place of indigenous fruits in the improvement of nutrition and livelihoods in the region, there is

need to focus on the following:

- Occurrence of priority indigenous fruit tree species should be established to identify the most valuable populations for conservation and future use as seed sources.
- More rigorous nutrient content analysis should be undertaken for indigenous fruits, and databases of information developed and disseminated.
- Nutrient-sensitive fruit processing techniques need to be developed and disseminated to maintain valuable nutrients and to extend the shelf-life and availability of nutrient-rich fruit products for consumption during off-seasons.
- Markets need to be developed for new fruit products and processors linked to domestic and international markets to further improve livelihoods by farmer engagement in value chains and for meeting consumer needs.
- Domestication and increased cultivation of the most important indigenous fruit tree species should be promoted. This will contribute to diversification of farming systems and may help to both conserve natural tree stands and to provide rural communities with better livelihood options.
- Farmers and consumers should be sensitised and made aware of the important nutritional contribution indigenous fruits can make to sustainable and healthier diets.

(References for this article can be obtained from the Miti Editor.)

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Shapes of baobab fruits collected from different trees in eastern and southern Kenya. The size of the ruler is 15 cm (Photo: Katja Kehlenbeck)