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# Traditional and economical use of Bambara groundnut

## Insight into the Research and Development

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**A**n orphan and under-utilized crop development program of the Agricultural Research Council (ARC) started in evaluation and identification of potential plant species for agronomic, nutritional quality, and consumer preference as well as to document knowledge. As part of the ARC research programme on orphan crops, bambara groundnut was identified as one of the crops of interest due to its wide use, adaptation and nutritional quality attributes. Although it is not always the most popular legume crop, it was always in the top due to its multiple uses in drought tolerance, nitrogen fixation, and its use in intercropping system. It is consumed in South Africa by the smallholders community as a grain and vegetable crop. Characterization and evaluation of bambara groundnut was done at the different sites in the country (Roodeplaats campus of the ARC, namely the ARC-Vegetable, Industrial and Medicinal Plants (ARC-VIMP), Gauteng Province; Loskop, Limpopo Province; Polokwane, Limpopo Province; Mafikeng, North West Province; Brits, North West Province and Ukulinga, KwaZulu Natal Province for adaptability, agronomic performance, and nutritional quality.

Bambara groundnut is one of the neglected, underutilized and orphan crop species in South Africa. It is used as a medicinal plant, as well as for income generation by rural communities in South Africa and beyond. It is popular amongst small-scale farmers in South Africa, which contributes to food, nutrition, and health security.



**Figure 1**  
**Intercropping Bambara groundnut and maize**  
Photo by Dr VGP Chimonyo and Dr T. Mabhaudhi





**Figure 2**  
**Mono cropping system.**

Photo Dr AS Gerrano



**Figure 3**  
**Diverse seed colours of Bambara groundnut**

Photo by Dr AS Gerrano

Farmers benefit from the cultivation of Bambara groundnut as it is extremely tolerant to poor quality soils and drought, as well as its ability to out yield other crops under severe conditions. It is particularly suitable for low-input agricultural production systems in drought-prone regions. It also helps to replenish soil nutrients through its nitrogen-fixing ability, which makes it suitable for intercropping with maize, millet, sorghum, cassava, and yam.

In South Africa, the crop is mostly grown by smallholder farmers in the northern and eastern parts of the country in the Limpopo, Mpumalanga, and KwaZulu Natal Provinces, either as an intercrop (Figure 1) or as a monocrop (Figure 2). The yield is estimated at 0.48 ton/ha. It is only recently that people started to generate income by selling boiled Bambara groundnuts in local and traditional markets. The wide genetic variability in Bambara groundnut, as well as its ability to grow in a wide range of agro-ecological zones in the country, aids in the selection of potential parental lines for use in a breeding program aimed at improving drought tolerance, increasing yield and nutritional quality, as well as increasing resistance to diseases and pests.

Bambara groundnut has played an important role in improving the livelihoods of rural communities as its consumption contributes to improved nutrition and health, especially because they cannot afford to go to health care facilities. The medicinal role of Bambara groundnut was based primarily on information

gathered from rural communities in various parts of South Africa, in which it is believed that it can be used for the treatment of a variety of ailments. Information gathered indicated that the seeds are often used for the treatment of venereal diseases (sexually transmitted diseases), and for the treatment and alleviation of diarrhoea. Roasted seeds were also highly recommended for treating polymenorrhea (menstrual cycle). Other tribes believe that consumption of Bambara groundnut seeds can reduce the incidence of heart failure, plays a significant role in the treatment and prevention of cancer, and can be used for the treatment of various inflammatory disorders. Rural communities further encouraged the chewing of immature fresh seeds before swallowing for preventing stomach aches and vomiting. Thus, it is believed that this assists in treating morning sickness in pregnant women.

Bambara groundnut is also cultivated as food for human consumption. The seeds and pods are consumed at various stages of growth and development, from the immature stage to the stage of physiological maturity. The seeds can be black, dark brown, red, white, cream, or variegated, and they can be speckled with or without hilum coloration (Figure 3). Immature seeds (Figure 4) can be eaten alone or mixed with immature groundnuts and other cereal crops during the 'hunger season', which is the time of year between planting and harvest when food runs out. The seeds are hard (Figure 5), and they must be boiled before preparation. Ripped seeds are dehulled and



**Figure 4**  
**During harvesting**  
 Photo by Mr Julius Siwale

grounded into flour, which can be used to make food products, such as biscuits, or it can be mixed with cereals to make porridge. The seeds can also be roasted, be crushed into pieces, be boiled, be crumbled, and can be eaten as a relish when mixed with other crops. It can also be eaten together with other leafy vegetables. The pods contain at least one or two seeds and are produced underground. The dried seeds can be boiled and eaten as a meal replacement. The leaves and stems of Bambara can also be used as animal feed, with the leaves being rich in nitrogen and potassium.



**Figure 5**  
**The seeds must be boiled before preparation.**  
 Photo by Mr Julius Siwale

Bambara groundnuts are highly nutritious due to their high protein content, which can help to improve food and nutrition security in rural communities. When compared to groundnuts, Bambara groundnut contains more amino acids and has a higher protein content than other legume crops. In the seeds, the total essential amino acids amount to 32.7% and the non-essential amino acids amounts to 66.1%. It also contains micronutrients, such as zinc, iron, calcium, and potassium. The red seeded varieties contain nearly twice as much iron and zinc as the cream seeded varieties, making them useful in rural areas of South Africa where iron and zinc deficiencies are common.



**Figure 6 (a)**  
**Planting of Bambara groundnut with the community by the assistance of the researchers at the ARC.** Photo by Dr AS Gerrano.



**Figure 6 (b)**  
**Participatory evaluation and selection of Bambara groundnut at the field.** Photo by Dr AS Gerrano.



Intercropping of Bambara groundnut with cereal (Figure 1) and root crops is widely practiced in South Africa. Intercropping, in addition to its role in the intensification of crop production, is also used for the control of weeds, diseases and insect pest infestations. Intercropping increases the spatial diversification of crops, resulting in competitive interactions with weeds. It also reduces the risk of crop losses because of climatic changes, such as drought. Intercropping also enhances the competitive ability of crops to take up nutrients and water in monoculture systems. Intercropping Bambara groundnut with cereal crops resulted in an increase in yield and yield related traits, as well as in gaining better use efficiency of nutrient and water resources in both crop species.

To understand the extent and nature of genetic diversity in Bambara groundnut over a wide range of agro-ecological zones in South Africa, field trials and nutritional

quality assessments have been conducted by the Agricultural Research Council and potential parental lines were identified for improvement of the traits of interest (agronomic and nutritional values). This enables breeders to make informed choices of the accessions to be used in pre-breeding and breeding programmes in the ARC and in the country in general. Furthermore, farmer participatory research (Figure 6a and 6b) has been conducted in the fields of the farmers as a technology transfer tool.

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