BAMBARA GROUNDNUT: A CROP FOR THE FUTURE

Compiled

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1. Introduction

Bambara groundnut could be a potential crop of the future well adapted to various agro-ecological conditions and climate change in particular. It is known in South Africa as jugoboon in Afrikaans; jugo in Xhosa; indlubu in Ndebele; nduhu Venda / phonda in Venda; and ditloo in Sotho. Bambara groundnut is produced in the South African provinces of Mpumalanga, Limpopo and KwaZulu-Natal. This crop is indigenous to African and has been cultivated in Africa for years. It is highly nutritious crop that plays a crucial role in people's diets. It is an underutilized African legume which provides security for many farmers as it shows considerable drought tolerance.

Bambara groundnut is highly nutritious, and has been termed a complete food. Its seed consist of 49 % - 63.5 % carbohydrate, 15 % -25 % protein, 4.5 % - 7.4 % fat, 5.2 % - 6.4 % fibre, 3.2 % - 4.4% ash and 2 % mineral compared to whole fresh cow milk 88 % water, 4.8 % carbohydrate, 3.2 % proteins, 3.4 % fat, 0.7% ashes, and 0.01 % cholesterol. Its chemical composition is comparable to that of soy bean.

Bambara groundnut has been reported to be a potential crop, owing to its nutritional composition, functional properties, antioxidant potential, and a drought resistant crop. It has advantages over more favoured leguminous species in terms of nutritional value and tolerance to adverse environmental conditions including poor soil fertility and little rainfall hence its nutritional superiority to other legumes. The seed can be stored very well and preserved for long time without prone to attack by pests or disease.

Traditionally, this crop was cultivated in some extreme, tropical environment by small scale farmers without access to irrigation and / or fertilizer with little guidance on improved practices. It is mainly grown for the subsistence of households. It is biologically well adapted to marginal areas of the semiarid and arid than locally competing grain legumes. It is also capable of increasing the level of soil nitrogen because it fixes own nitrogen, thus giving acceptable grain yields where other crops usually fail.

2. Origin, Distribution and Botanical description of Bambara Groundnut

Bambara groundnut is indigenous to sub-Saharan Africa where it is widely cultivated. The known distribution of Bambara groundnut extends from West to southern Africa via Central Africa. The species is also grown to a lesser extent in some Asian countries such as India, Malaysia, Philippines and Thailand. Bambara or round beans are widespread in Africa and have various names each language and dialect has its own variation. In the literature the name Bambara groundnut is commonly used. Figure 1 below shows Bambara groundnut crop in the field.

Figure 1. Bambara groundnut plant

The current scientific name of Bambara groundnut is *Vigna subterranean*. It has also been called *Glycine subterranea L., Voandzeia subterranea* (L.) In English, it is called Bambara groundnut, Bambara pea, Bambara nut. It is a leafy, annual, creeping legume with glabrous (hairless) leaves supported by a petiole 5-30 cm long. Each leaf is composed of three leaflets (trifoliate) and can be up to 11 cm long. The beans are related to cowpeas. There are two botanical varieties namely *V. subterranea* var. spontanea which includes the wild varieties and *V. subterranea* var. which includes the cultivated varieties.

This crop is cultivated for its subterranean pods. The pods are approximately 1.5 cm long, and may be wrinkled and slightly oval or round, containing one to two seeds. Figure 2 and Figure 3 below show immature and mature pods, respectively, of Bambara groundnut pulled out of the ground. The colour of the seeds varies from black, dark-brown, red,

white, cream or a combination of these colours. At harvest, i.e. when the pods ripen, the plant is extracted from the soil, exposing the subterranean nuts.

Figure 2. Immature Bambara groundnut pods

Figure 3. Mature Bambara groundnut pods

3. Cultivation

Bambara groundnut is very resistant to drought. The required minimum annual rainfall for optimal performance is about 300 mm and optimum annual rainfall is between 750 and 1,400 mm and should not exceed 3,000 mm. It can tolerate heavy rainfall, but too much rainfall at harvest may result in yield losses.

Production is most suitable in tropical humid and dry and subtropical dry tropical climates; between 20°C and 30°C latitude. The optimum temperature is between 19°C and 30°C. Temperatures below 16 °C and above 38°C are not suitable for Bambara groundnut

production. Depending on temperature, the rate of leaf formation ranges from 0.19 to 0.63 leaves/day. In 2015, Nordin and Singh found that highest seedling emergence was recorded at 30°C.

Sandy soils are the best for the production of Bambara groundnut. However, it can grow on sandy to sandy loam and well-drained soil, which make it easier to harvest. These soils prevent clogging. Light textured soils are recommended. The optimal depth of the soil is between 50 and 100 cm. Soil pH is better adapted between 5 and 6.5 and should not be less than 4.3 or greater than 7. Bambara groundnut generally performs better on poor soils than groundnuts (*Arachis hypogaea* L.). It is the least demanding for mineral elements and its yields on low–fertility soils are generally higher than those of groundnut grown on similar soil.

Although soil fertility should be low for its production; the richness of the soil in mineral elements (P especially) influences its growth, development and yield. It is recommended to apply 250 kg/ha of single super phosphate before Bambara groundnut planting. Nitrogen requirement for Bambara groundnut is provided by natural N2 fixation with nitrogen–fixing bacteria belonging to the genus Rhizobium. Bambara groundnut fixes 32-81 kg N/ha. High nitrogen level mostly leads to few pods production and seeds.

Bambara groundnut is used in crop rotations to improve soil productivity through its ability to fix atmospheric nitrogen and provide it to the soil. It is mainly grown by farmers because it has several agronomic benefits including high nutritional value, drought tolerance and the ability to produce in poor soils compared with preferred species such as common bean, peanut, and groundnuts. Bambara groundnut tolerates acidic and poor soils. It has good resistance to water stress and is characterized by a strong link between good symbiotic nitrogen fixation capacity and high seed yield. The potential of this plant could explain its presence in the arid regions of the African continent.

4. Consumption and Utilization

In general, both the immature and mature Bambara groundnut seeds are consumed. Figure 4 shows dry and uncooked Bambara groundnut seeds. Boiling is the preferred processing method for consumption, thus easy cooking time has become a major trait sought after by farmers and end user. It is essentially grown for human consumption, and can be used as an ingredient in cooking, making flour, or eaten as a snack.

Figure 4. Bambara groundnut seeds

The leaves are rich in nitrogen and potassium and therefore an excellent source of animal feed. In African countries such as Nigeria and Ghana, the seeds are pound and made into flour. The flour is usually and added to maize to enrich traditional preparations and used to make a variety of cakes, or are mixed with cereals and used to prepare several types of porridge. Figure 5 shows a dish of cooked Bambara ground nut grains in soup.

Figure 5. Cooked Bambara groundnut grains

5. Conclusion

Due to its ecology, distribution, nutritional and medicinal properties, Bambara groundnut could be a potential future crop to be exploited for food security, climate change mitigation and poverty alleviation in the North West Province, given that it is well adapted to various agro-ecological conditions and climate change.

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