# OUR ANCIENT GRAINS

## Millet and sorghum

People have collected, eaten and domesticated the seed from wild grasses over millennia to develop the cereals we know today. This cultivation of cereal grains is the basis of agriculture, enabling and feeding civilisations around the world. Records dating back many thousands of years show that the African continent is home to a vast diversity of both wild harvested and cultivated cereals.

These include finger millet, pearl millet, sorghum, fonio, tef, guinea millet, and African rice varieties. In the last few hundred years, through colonisation and trade, cereals such as maize, wheat, oats as well as several varieties of Asian rice, have been introduced from other continents. These grains, which are promoted by powerful trade interests through advertising, agricultural support and breeding programmes, are processed into convenience foods and have become global and local food staples. In the process, our locally adapted and nutritious ancient grains have been side-lined and stigmatised.

In Southern Africa finger millet, pearl millet and sorghum have a significant role in a variety of cultural rituals. These traditional grains are adapted to African conditions and are resilient in variable rainfall, temperature and soils. The harvested grain also stores well and crops provide good foods for people and livestock. Generally, the whole grain is consumed, providing antioxidants, minerals, proteins and fibre. Ancient grains, especially millets, are packed with nutrients.

**Finger millet, pearl millet and sorghum were once a foundation of Africa's food security. They are our right, and our future!**

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# Finger millet

Finger millet is one of the most important small grains in Africa. It is a quick-growing summer annual that has fairly few insect pests or diseases. It is thought that finger millet was domesticated during the Iron Age in the east African highlands. The oldest archaeological remains were found in Axum in Ethiopia dating back 5 000 years. This food, that has been a staple for thousands of years, is becoming scarce. The crop has received little attention from the scientific community, and with a global trend to fast food, the production of finger millet has declined worldwide. In South Africa, finger millet deserves urgent conservation and promotion as a crop that can provide quality food in an ever more variable and dry climate.

Of all major cereals, this crop is one of the most nutritious and tasty. The plant is hardy, and has adapted to a variety of conditions: rainfall as low as 275mm and up to 1 000mm and more, and cool to hot temperatures of up to 35°C. The grain can be stored for up to 10 years without insect damage, carrying communities through seasons of drought when other crops don't produce.

Finger millet is recognisable by the finger-like spikes of its seed head that curl into a fist as they mature and dry. It grows up to 1.5m in height, reaching maturity within 3–6 months. It prefers fertile, well-drained sandy to loam soils, but tolerates heavier soils as well as some water-logging, salinity and alkalinity. Birds and the invasion of closely-related weed grasses are key challenges for farmers. There are two subspecies of African finger millet: a wild form and a cultivated form that is typical in KwaZulu-Natal. It is difficult to tell the plants apart when young, and they easily cross-pollinate resulting in poor hybrids the next season.

## Delicious, nutritious, ancient grain

Finger millet is prepared in many ways: cooked like rice; ground to make porridge or flour for breads and cakes; and popped. Sprouted grains are readily digestible and recommended for infants and the elderly. It is especially suited to malting – the sprouting and then heating of the grain – because of the high conversion of starch to sugar that results in sweet and tasty beer. The time-consuming process of de-hulling and grinding the tiny grains is probably the biggest reason for the decline in popularity of the crop, and appropriate technology to assist smallholders with this should be a priority.

It is well worth the effort to revive finger millet. It contains 5–8% protein, 65–75% carbohydrates, and 15–20% dietary fibre. The starch is in a form that digests slowly making it an endurance food. It has high levels of the amino acids methionine and lysine that are lacking in most starchy diets of maize, rice and cassava. As with other millets, the seed coat is a rich source of vitamins and nutrients, as well as phenolic acids and tannins in darker seeds. Finger millet is high in manganese, phosphorus and iron, has useful amounts of copper and comparatively higher chromium, magnesium, molybdenum, zinc and selenium. It has the highest calcium content of all cereals, at a whopping 350mg/100g per portion.

# Pearl millet

Pearl millet is the most widely grown type of millet worldwide. Archaeological evidence suggests that it was first domesticated in the Sahel region in Mali 4 500 years ago, and this remains the centre of diversity. From here it spread to India by 2 000 BC, and to south and east Africa. India is the largest producer in area and production, growing half of the world's pearl millet.

Pearl millet grows up to 4m in height. Extensive roots and quick growth contribute to it being the crop that is most tolerant to extreme heat and drought. It thrives in hot, dry climates and can manage on just 200mm of rain a year. It grows best in light, well drained loam soils but can tolerate many adverse soil conditions including acidity, and high aluminium and salt content. It does poorly in clay soils and cannot withstand water-logging. Pearl millet has distinctive long seed heads that could be mistaken for Bull rushes. The tightly packed, small, round seeds range in colour from cream, through the greys to purple – like tiny pearls. It is used as a high quality "emergency" animal fodder because of its quick growth, and can be grazed fresh or fed as hay or silage fodder.

## Delicious, nutritious, ancient grain

Although growing conditions affect the availability of nutrients, pearl millet is a high energy crop with more nutrients than popular grains like wheat, rice and maize. Pearl millet is on average 70% carbohydrates, 9–21% protein, and 5% fats with comparatively high levels of iron, phosphorus, calcium and B-complex vitamins. The way millet is prepared affects the nutrient value, especially if nutrient-rich outer layers are removed – milling the grain into flour reduces the calcium and magnesium by nearly 70%, but malting the grain increases the availability of the iron and zinc.

Pearl millet is a versatile grain. It can be cooked whole like rice; roasted or steamed as a couscous; ground into meals that can be used as porridge or baked as cakes; and fermented for breads and drinks. In Niger millet flour is mixed with dried goats cheese and dates to make a nutritious food for long journeys through the Sahara Desert.

**In Southern Africa, millet and sorghum have significant roles in a variety of cultural rituals. These traditional ancient grains are adapted to African conditions and are resilient in variable rainfall, temperature and soils.**

# Sorghum

Sorghum is now the 5th most important cereal crop worldwide, providing the staple food for millions of people. Sorghum is also an important animal feed. Early evidence of the use of sorghum includes an 8 000-year-old site on the current border between Egypt and Sudan, where sorghum seeds were found together with pottery fragments and cattle bones.

Thousands of years of growing sorghum in different parts of the world has resulted in varieties that are so different that they used to be classified as separate species! Now scientists have realised that they are all the same amazing crop. Some varieties are shunned by birds, some cook fast, and some have the fragrance of Basmati rice. In Ethiopia there are two scarce varieties named "milk in my mouth" and "honey squirts out of it" that farmers hide between their other crops because they are so delicious! Zulu farmers have traditionally grown sweet sorghum, which has a stem that can be eaten like sugarcane.

Sorghum is an annual or short-term perennial crop in the grass family. Sorghum grows best in temperatures above 20 °C, in light to medium-textured soils with good aeration and drainage. It can tolerate some water logging and produces well with 450mm to 650mm of rain a year. The main advantage of sorghum is that it can still produce with as little as 350mm of rain and can even grow in temperatures above 38 °C – conditions that maize can't grow in. Sorghum is adapted to tolerate drought: leaves and stalks have a waxy coating that prevents drying; it has a low transpiration ratio (the leaves curl up when wilting to reduce surface area); it has a large fibrous root mass to absorb moisture; and the plant can become dormant during a drought period and then carry on growing.

## Delicious, nutritious, ancient grain

Sorghum is completely gluten-free, providing a safe alternative for people suffering from digestive and other auto-immune reactions to gluten. Sorghum contains around 69% starch and 3% fat. The protein in sorghum varies depending on the variety and growing conditions, but in general the protein content is low especially in the amino acid lysine. It is a reliable source of the vitamins thiamine (B1) and niacin (B3), as well as phosphorus and magnesium.

The dark and red-grained sorghums contain high levels of tannins in their hull, which contribute to their bird and insect resistance. These tannins lock onto the proteins and starch in the grain. This prevents the tannins from being digested, but also provides vital anti-oxidants and enables better malting and flavour when brewing fermented beverages. Traditionally, these sorghums are processed to make them more edible: fermenting them for beer; treating them with wood ash; and pounding the grain to remove the hull. Interestingly, brewing sorghum into traditional beer appears to improve its protein and starch content, as well as concentrating thiamine (B1), niacin (B3) and the minerals copper, manganese, iron, magnesium, potassium and phosphorus.



*This Biowatch Crop Information Sheet was updated in October 2023.*
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