

# Indigenous crops

## Sowing the seeds of knowledge on underutilised crops



*As South Africa's agricultural sector continues to battle the aftermath of current drought conditions, researchers at the University of KwaZulu-Natal's School of Agriculture, Earth and Environmental Sciences are growing valuable knowledge on the water use and production of drought tolerant traditional crops as a viable alternative to currently grown, more popular variants.*

Article by Tafadzwa Mabhaudhi and Albert T Modi.

South Africa, like much of sub-Saharan Africa, is currently going through a severe drought due to El Niño. The phenomenon causes changes to seasonal weather conditions. For South Africa, this often translates to below average rainfall and drought.

The United Nations reports that about 30 million people in sub-Saharan Africa face hunger due to the ongoing drought. In South Africa, the government has declared five provinces disaster areas. South Africa will have to import between four and six millions tons of maize to meet the gap caused by low yields due to the prevailing drought. This will have a negative effect on food prices and access to food in poor households.

Subsistence farmers in rural areas are most vulnerable as they lack resilience. There is a need to reconsider the potential of currently cultivated

major crops to continue to provide food security, especially in marginal agricultural production areas.

In pursuit of such an alternative, the Water Research Commission of South Africa (WRC) has been systematically funding research aimed at identifying drought tolerant underutilised indigenous and traditional crops. Underutilised indigenous and traditional crops are those crops that are either indigenous to or have been "indigenised" in South Africa.

Indigenous crops are those that have their centre of diversity in South Africa while indigenised crops are those who, although their centres of diversity lie outside of South Africa, have been domesticated in South Africa over hundreds of years, thus making them traditional crops. Plant breeders generally refer to the crops as landraces

and they play an important role as sources of genetic material for crop improvement and biodiversity.

Previously, these crops played a major role in contributing to food security for the majority of rural people. However, the promotion of exotic major crops has caused the decline in cultivation of indigenous crops. These crops are well-adapted to local growing conditions, which are often marginal and harsh, thus offering sustainable food production.

Given the challenges of climate change and that South Africa is largely an arid land with only about 3% of it being fertile, it is imperative that the our research efforts should include underutilised indigenous and traditional crops.

Examples of such crops include *Amaranthus spp* , wild mustard (*Brassica spp*),

sweet potatoes (*Ipomoea batata*), wild melon (*Curcubita spp*), taro (*Colocasia esculenta*), Bambara groundnut (*Vigna subterranea*), cowpea (*Vigna unguiculata*), maize landraces (*Zea mays*), millets [*Eleusine coracana* (pearl millet), *Panicum miliaceum* (proso millet), *Pennisetum glaucum* (pearl millet), *Setaria italic* (foxtail millet)] and sorghum (*Sorghum bicolor*).

The University Of KwaZulu-Natal's Prof Albert Modi and his research team have been funded by the WRC to work on these crops with the current project focusing on cereals and legumes (Project No. K5/2274).

Cereal crops, and maize in particular, are an important staple crop in South Africa and the region. However, major cereal crops such as maize, wheat and rice are not drought tolerant. For example, maize has high water requirement whilst wheat, barley and rice suffer high yield losses and crop failure during drought periods.

Climate change projections show decreases in yields of wheat (-22%), maize (-5%) and rice (-2%) due to increases in drought and temperatures. On the other hand, cereal crops, such as sorghum and millets, which are indigenous to sub Saharan Africa are drought tolerant and have potential to produce reasonable yields in areas where major cereal crops may fail.

This makes them very good alternatives for cultivation in low rainfall areas and during drought periods. In addition, climate change projections suggest that yields of sorghum and millets will increase, albeit slightly. However, a lack of information regarding basic aspects of their production still results in these crops being underutilised.

Similarly, research has shown that underutilised indigenous and traditional legumes such as bambara groundnut may be more drought tolerant compared to major legumes such as dry bean (*Phaseolus spp*) and groundnut (*Arachis hypogea*). Climate change modelling for Bambara groundnut showed an expansion inland in areas suitable for production and yield increases high yields for all provinces in the intermediate future (2046-2065).

The expansion in area suitable for production is attributed to certain areas becoming drier and temperatures increasing. This augers well for Bambara groundnut production into the future. Ongoing research has also confirmed that intercropping drought tolerant underutilised cereals and legumes can be productive and also contribute to improving resilience of cropping systems. In addition to being drought tolerant, underutilised indigenous and traditional crops are also nutrient dense and could thus contribute to dietary diversity in poor rural areas.

While research is still ongoing, there is a need to start promoting the uptake of underutilised indigenous and traditional crops in marginal agricultural production. Some challenges to this though are that seed for most of these crops is not readily available on the market.

The few farmers who still cultivate these crops rely on farmer saved or recycled seeds, which are often of inferior quality. However, as much as that is a challenge, it also creates an opportunity for developing farmer-driven seed systems for these crops. In this way, the farmers who have conserved these crops would be empowered and recognised for their contribution.

As the frequency of drought is expected to increase due to climate change, our hope may very well lay in tapping into our past.

## Growing knowledge and people

Dean and Head of the UKZN School of Agricultural, Earth and Environmental Sciences, Prof Albert Modi, is not only growing valuable knowledge on South Africa's underutilised indigenous and traditional crops, he is also mentoring a new generation of agricultural researchers and farmers. Prof Modi, seen in the photograph (left) with UKZN Honorary Research Fellow, Tafadzwa Mabhaudhi, was one of the recipients of the WRC Knowledge Tree Awards in 2015 in the category, Human Capacity Development. Prof Modi trained 15 Masters and PhD students while working on two WRC projects and published numerous papers on the ensuing research. He has also gone on to receive a UKZN Distinguished Teacher Award in the same year. This is a remarkable achievement, especially since Prof Modi is only the second Dean to achieve this honour. He was nominated by his students. Prof Modi is a crop scientist and champion of sustainable agriculture, and of the value of indigenous knowledge in informing scientific research. He has successfully led a number of research projects and was pivotal in the establishment of the Ezemvelo Farmers Organisation, which focused on the small-scale production of amadumbe for supply in commercial retail chains. This project, the first of its kind in South Africa, has facilitated a sustainable model for community farming.

