



SHEFS

Mainstreaming of Neglected and Underutilised Crop
Species in South Africa

POLICY BRIEFING



OVERVIEW

Primary Objectives

The primary objective of this policy brief is to reveal the important role that neglected and underutilised crop species (NUS) can play in creating a food system in South Africa that:

- Ensures sustainable and healthy food for people in South Africa
- Addresses malnutrition and food insecurity; vulnerability to climate change and other environmental changes; and socioeconomic issues facing South Africa
- Brings about inclusivity and equity in the food system.

The Problem

The current South African food system is centred around a few cash crops and does not fully recognise the value of neglected and underutilised crop species (NUS). This lack of agro-biodiversity (crop variety) exacerbates existing concerns around increasing rates of food insecurity and malnutrition; growing socioeconomic challenges for rural smallholder farmers; and the country's vulnerability to future shocks from global environmental change, including climate variability/stress.

The Solution

Mainstreaming of NUS in the food system could help to alleviate some of these issues. This means facilitating and incentivising production of NUS by smallholder farmers, so they not only achieve subsistence, but also have a surplus to sell; upscaling value chains to facilitate their marketing and distribution; working to address the stigma associated with these crops; and in doing so, incorporating NUS into the current food system so they are given equal importance to major commercial crops.

Policy Recommendations Overview

1. Acknowledge and endorse the critical value and role of NUS in the food system
2. Support research and development of NUS to enhance their value
3. Education, training and capacity development to facilitate the intensification of high-quality NUS production
4. Establish and incentivise the creation and development of value chains.



OVERVIEW OF THE CURRENT FOOD SYSTEM AND THE SOLUTION

In South Africa, food production is dominated by the commercial agricultural sector. The smallholder sector is an informal and poorly-developed alternative. The system lacks agro-biodiversity as it is centred around a few major cash crops (such as in *Table 1*) and lacks variety from neglected and underutilised crop species (NUS: including orphan, indigenous and traditional crop species) (such as in *Table 2*). Statistics published on production and trade of crops in South Africa do not include NUS, highlighting the dominance of cash crops¹. While the existing system of agriculture may have succeeded in ensuring national food security in the past, its ability to continue doing so in the future is being challenged and many are now calling for greater diversification of rural cropping systems^{2,3}.

Category	Mainstream Crops	Production (tonnes)
Cereal	Sugar cane	17,388,177
Cereal	Maize	16,820,000
Roots and Tubers	Potatoes	2,450,541
Fruit	Grapes	2,032,582
Cereal	Wheat	1,535,000
Fruit	Oranges	1,453,251
Legume	Soybeans	1,316,000
Fruit	Apples	924,375
Seed	Sunflower seed	874,000
Vegetable	Onions, dry	705,267

Table 1: Top 10 most produced crops in South Africa by weight, FAOStat 2017.



OVERVIEW OF THE CURRENT FOOD SYSTEM AND THE SOLUTION

Category	Underutilised Crop
Cereals	Sorghum
	Teff
Legumes	Bambara groundnut
	Lablab
	Cowpea
	Marama bean
Roots and Tubers	Taro
	Sweet potato
Leafy Vegetables	Jews Mallow
	Spider plant
	Amaranth
	Nightshade
	Wild water melon

Table 2: Priority drought tolerant and/or nutrient dense neglected and underutilised crops in South Africa.

Mainstreaming of NUS into the dominant food system can help achieve a more sustainable and healthier food system. This will require creating an inclusive food system that supports smallholder farmers (who are the custodians of NUS), prioritises local food systems and supports local food chains. Diversifying current cropping systems by increasing NUS production can be an important part of the solution towards addressing malnutrition, food insecurity, vulnerability to climate change and environmental issues currently facing South Africa. In order to achieve this, the government will need to support and fund further research in this area and subsequent policy changes are needed to facilitate the production of NUS and the development of NUS value chains.



ENVIRONMENT

Suitability of Land for Growing NUS

South Africa is generally semi-arid with 70% of its land categorised as unsuitable for rain-fed crop production due to a combination of poor rainfall and poor soils (NUS have not been considered in this classification). The parts of the country where most smallholder farmer communities are concentrated have the least amount of rainfall⁴, which is one factor contributing to low crop productivity in these areas. This in turn contributes to these areas having higher incidences of food insecurity, malnutrition and poverty.

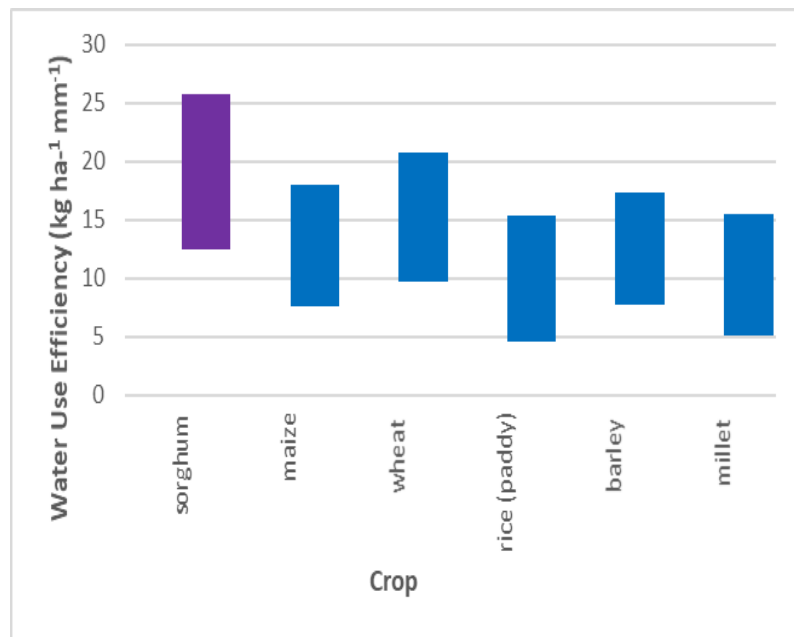


Figure 1: Water use efficiency (kg ha⁻¹ mm⁻¹) of sorghum (an underutilised cereal crop) compared with mainstream cereal crops.

Some NUS such as bambara groundnut, cowpea, pigeon pea, millets, sorghum and African leafy vegetables (e.g. amaranth, wild mustard) have properties that allow them to grow under water-scarce conditions in semi-arid areas. This means that they could make use of land that is unsuitable for growing cash crops, offering better prospects in marginal production areas. For example, *Figure 1* illustrates that sorghum is more water efficient (i.e. requires less water to produce the same yield) than other mainstream cereals. There are also areas of South Africa that are largely used for livestock (*Figure 2*) that could potentially be suitable for growing NUS. Reclassification of land suitability is required to acknowledge land that, while not suitable for growing cash crops, is suitable for NUS. Policies are then needed to support and incentivise farmers to use this land to grow NUS.

ENVIRONMENT

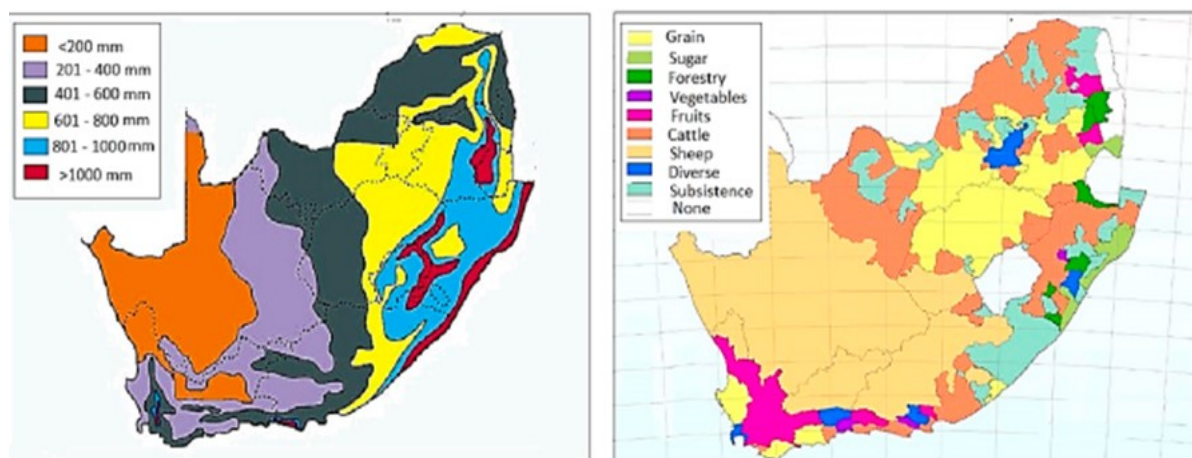


Figure 1: Rainfall Distribution and Farming Systems across South Africa.

Environmental Degradation

The current food system in South Africa is also contributing to environmental degradation. It is estimated that agriculture contributes ~12% of global anthropogenic greenhouse gas (GHG) emissions⁵. Commercial agriculture relies on external inputs and energy to drive machinery, as well as agrochemicals and fertiliser to increase yields — all of which are associated with soil and water contamination.

There are potential environmental benefits to growing NUS as they are agroecologically adapted to their local environment and typically grown in more traditional and diversified ways. This means they may require less input (depending on the way that they are upscaled) and could contribute less soil and water pollution than cash crops.

ENVIRONMENT

Climate Change

Low agro-biodiversity means that current food production lacks resilience and is vulnerable to climate change. Projections suggest that South Africa will experience increasingly extreme weather, droughts and floods⁶. Its water profile is rapidly moving from water scarce to water stressed⁷. Low and vulnerable rainfall patterns increase water scarcity and threaten the sustainability of food production in rural areas. In future, there will be increasing pressure on agriculture to produce more food using less water.

Increasing production of NUS will increase agro-biodiversity and therefore improve the resilience of the system to climate change. Several NUS have been shown to have low water requirements (e.g. sorghum, millets, amaranth); drought and heat stress tolerant properties; and disease and pest resistance. These properties make them resistant to increasing water scarcity and therefore, they could play a central role in drought mitigation strategies. Taro and bambara groundnut, for example, are NUS which are projected to become increasingly suitable for growing in certain areas due to these climatic changes (*Figure 3*).

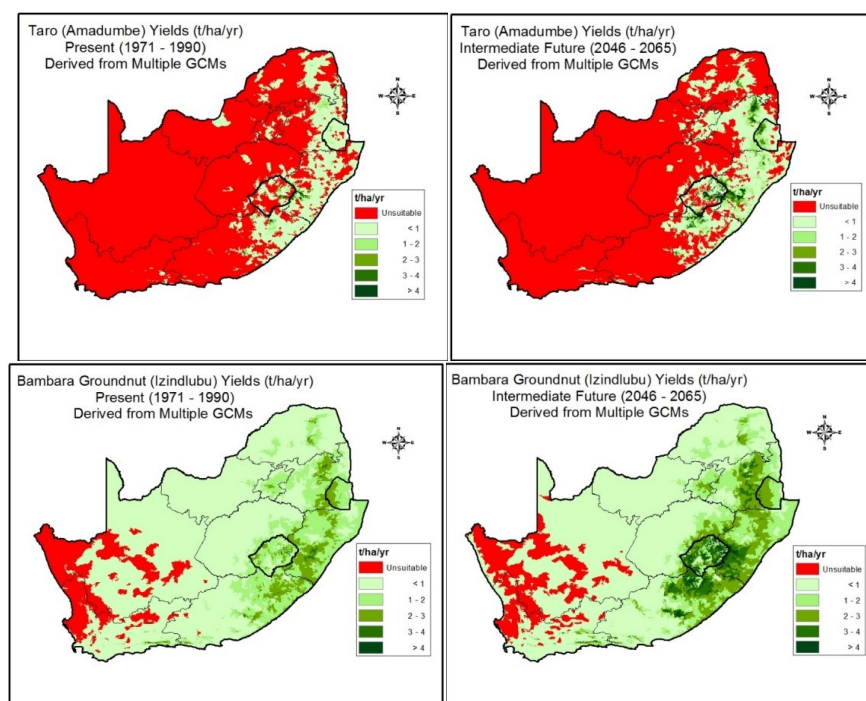


Figure 3: mean annual yields (t/ha/year) over South Africa under present conditions (left) and projected immediate future conditions (right) for Taro (top) and Bambara Groundnut (bottom).

MALNUTRITION AND HEALTH

While stunting and underweight have reduced in South Africa in the last 20 years, they are still prevalent, and the overall burden of nutrition-related disease has been growing due to a rapid increase in overweight and obesity in all age groups (*Figure 4*). Two factors contributing to this increase in malnutrition are low dietary diversity and food insecurity.



Figure 4: Global Nutrition Reports Statistics on malnutrition in under 5s, 5-19 year olds, and adults⁸.

Dietary Diversity

There is low dietary diversity in South Africa with 60% of daily caloric intake coming from five crops (maize, wheat, rice, potato and sorghum)⁹. Evidence shows linkages between low agro-biodiversity and the failure of the current food system to deliver adequate quantities of healthy, nutritionally balanced food¹⁰. Many cash crops are energy dense but lack micronutrients. If consumed alone, they are unlikely to provide adequate nutrition and may contribute to micronutrient deficiencies. Processed foods, made in large part from the ingredients derived from cash crops such as sugarcane and maize, have become a major component of diets in South Africa and are associated with overweight in both children and adults, as well as chronic diseases such as diabetes and cancer¹¹.



MALNUTRITION AND HEALTH

A diverse diet of nutrient dense foods can help address both obesity and undernutrition. Certain NUS are nutrient dense and could be useful in diversifying diets and addressing micronutrient deficiencies in poor rural communities. For example, 25.8% of women of reproductive age are anaemic⁸, a condition which is most commonly caused by iron deficiency. *Figure 5* illustrates the higher iron content of some underutilised crops compared with mainstream crops which could help to address anaemia prevalence. NUS tend to be eaten as whole, minimally-processed foods rather than as processed foods with large amounts of added fat, sugar and salt. Therefore, replacing consumption of some popular foods with NUS could also help to reduce the burden of overweight and obesity. Mainstreaming of NUS therefore has the potential to reduce malnutrition, improve nutritional status and improve health outcomes. The development of NUS value chains could also improve availability and affordability of these foods in urban settings. To increase demand for these crops, the government could increase awareness and education on which NUS have potential nutritional benefits.

Food Insecurity

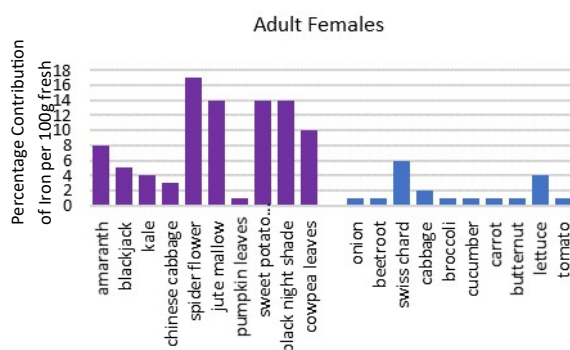
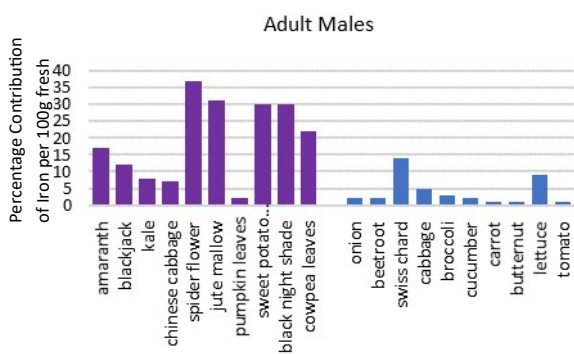
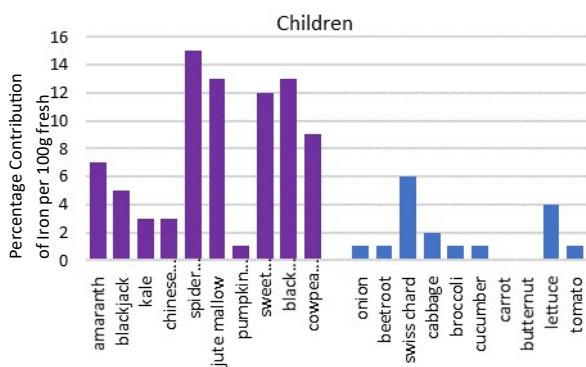
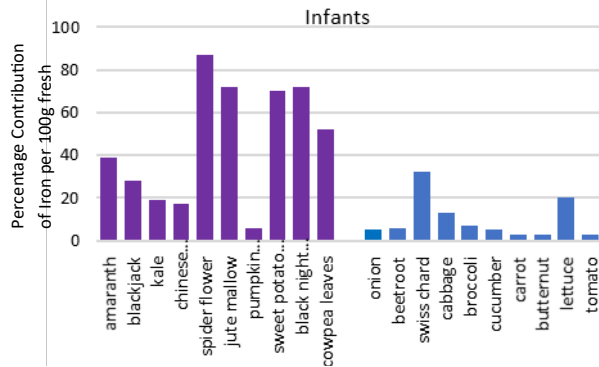
Although the current food system has the capacity to feed the South African population, food remains inaccessible to about 26% of people¹⁰. Approximately 16 million people in South Africa are food insecure - many in rural areas¹⁰. Agriculture is the main source of livelihood for many poor rural households but they often cannot sustain subsistence and have limited buying power due to low incomes and high food prices³. It is projected that the proportion of the population suffering from chronic hunger, undernutrition and obesity owing to food insecurity will increase⁴. In order to address food insecurity, South Africa needs affordable, healthy, nutrient dense and sustainably produced food .

NUS have the potential to expand the land under cultivation, improve productivity of nutrient dense and sustainable food, and therefore address chronic food insecurity. Smallholder farmers require government support to develop their capacity in order to be able to effectively produce NUS. This would help them to grow sufficient amounts of nutrient dense food to not only achieve subsistence and be less dependent on having to buy from the commercial sector, but also potentially grow a surplus that they could market and use to generate economic capital. In order to do this, value chains would need to be upscaled, NUS would have to be developed and marketed in a way that is appealing to the wider population and the stigma surrounding NUS would need to be addressed. If NUS were more available at an affordable price this would also help to reduce food insecurity in the wider population.



MALNUTRITION AND HEALTH

Iron Content



Anaemia Prevalence

Anaemia prevalence: Infants

Aged 6-59 months = 41%

Anaemia prevalence: Adult Males

Aged 15-59 years = 12.2%

Anaemia prevalence: Adult Females

Aged 15-59 years = 22.0%

Figure 5: Comparison of estimated percentage iron contribution based on 100g fresh boiled product per person per day between *underutilised crops* and *mainstream crops*. Infants (1–3 years); children (4–19 years); male adults (19–65 years); female adults (19–65 years).

SOCIOECONOMIC DEVELOPMENT

Smallholder farmers face numerous socioeconomic constraints such as low access to credit, lack of collateral, absence of infrastructure, limited access to finance and markets. This contributes to areas with high concentrations of small holder farmers having the highest prevalence of poverty and food insecurity.

NUS value chains are currently undeveloped and so there is an opportunity for increasing income, creating employment and rural economic development through developing the NUS value chain. NUS offer meaningful opportunities for sustainable development solutions under low input agricultural systems to reduce poverty through strengthening the local economy.

Given that female farmers are particularly responsible for the conservation, production, and processing of NUS, this offers opportunities to empower women through their inclusion in the food system and thereby promote gender equality.



HOW TO ACHIEVE THE MAINSTREAMING OF NUS

We have identified priority NUS crops for South Africa due to their environmental and nutritional benefits (*Table 1*). In order to mainstream these NUS, the government needs to support further research and future policy should focus on supporting the upscaling of NUS value chains.

Value Chains

There are several points in the value chain that can be targeted to help mainstream NUS. Stakeholder analysis is needed to identify key actors involved and analyse key limitations and opportunities to move forward.

- Breeding/crop improvement
 - Formularise the indigenous knowledge base (i.e. documentation of different species and their uses from local knowledge with appropriate intellectual property safeguarding in place).
 - Allow breeders to access material on NUS to allow them to incorporate it in their breeding programmes.
 - Deploy biotechnology techniques for NUS to assist in the development of improved varieties and identify favourable traits.
- Production
 - Formulation of crop and soil management strategies to optimise production.
 - Development of post-harvest handling and processing technologies to ensure the benefits of nutrient dense NUS are realised.
- Agro-processing
 - Development of processing techniques to add value and relevance to the end product.
 - Creation of novel food items and recipes using NUS.
 - Product development to make more attractive to consumers.
- Selling
 - Support distribution and trade.
 - Support for including NUS in retail and catering.
 - Promotion and labelling of NUS.
- Citizens
 - Marketing and branding efforts (e.g. organic/fair trade markets).
 - Promotion to combat stigma around NUS.
 - Stimulate consumer demand.
 - Increase awareness of potential health benefits due to nutrient density.



HOW TO ACHIEVE THE MAINSTREAMING OF NUS

Considerations for Policy Makers

- **Acknowledge and endorse** the critical value and role NUS
 - Formal acknowledgment by key decision makers of the value of NUS and their consideration as equal importance to major cash crops.
 - Commit to integrate NUS as a key element in future government policies and strategies including, the following drafts:
 - ◆ The National Policy on Comprehensive Producer Development Support
 - ◆ The Climate Smart Agriculture Strategic Framework for Agriculture, Forestry and Fisheries
 - ◆ The Indigenous Food Crops Strategy.
 - Recognise the importance of Indigenous Knowledge Systems by supporting the development and ethical recording of such systems.
 - Reclassify “Land Capability Classification” using an agro-ecology based approach to include NUS.
 - Revise the “Strategic Grains Reserves System” to include a broader set of crops.
 - Endorse NUS potential productivity and financial rewards.
 - Endorse NUS potential health benefits due to nutrient density.
- **Support research and development** of NUS to enhance the value of NUS within the food system
 - Allocate funding to address the current knowledge gaps focussing on the priority NUS (*Table 1*).
- **Support education, training and capacity development** to facilitate the intensification of high-quality NUS production
 - Establish education and awareness on the value of NUS to encourage uptake and adoption.
 - Provide extension officers and farmers with basic knowledge of the production and preparation of NUS and provide training to address undeveloped skills.



HOW TO ACHIEVE THE MAINSTREAMING

- Establish and incentivise the **creation and development of value chains** to allow NUS to be included in the dominant food system
 - Provide sufficient financial and material support to allow NUS value chains to be established and for NUS to be included in the dominant food system.
 - Include NUS in the crop choice of commodity crops that receive input and subsidy support for small-scale farmers.
 - Provide infrastructure for upscaling, distributing and marketing NUS
 - Promote innovation of new technologies that can be used to expand scale of production, manufacturing, storage and processing to add value to products.
 - Embrace informal traders and transporters (already active in the food systems, operate illegally), make it conducive for them to distribute food to poor communities.

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SHEFS is a programme aiming to provide policy makers with novel, interdisciplinary evidence to define future food systems policies that deliver nutritious and healthy foods in an environmentally sustainable and socially equitable manner.

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