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# Harvest

Securing South Africa's Food Resources

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# Spotlight on sorghum

A pathway for food security and climate change adaptation

A sorghum crop with well-developed panicles. In KZN

Climate change is one of the most severe challenges to food security in South Africa and beyond. It has significantly modified both rainfall and temperature regimes across the world, resulting in a noticeable shortening of agricultural seasons, erratic rainfall patterns and higher ambient temperatures. The effects of climate change are more severe in the smallholder farming sector due to the low adaptive capacity of these farmers. Overcoming the serious challenges caused by climate change requires the adoption of resilient methods of food production. This is especially important since meeting the existing demands on agriculture with existing farming practices is likely to lead to more intense competition for natural resources, and hence, increased greenhouse gas emissions, further deforestation and land degradation.

## Sustainable sorghum production systems

The use of sustainable farming systems such as conservation agriculture (CA) by farmers in the smallholder sector can go a long way in addressing food security issues. In addition to the adoption of appropriate cropping systems as a coping strategy, selection of resilient crops that can thrive in harsh conditions is a worthwhile strategic decision that farmers may make to adapt to changing and variable weather patterns. Several studies have looked at how small grain crops can increase food security, especially in semi-arid areas. These studies highlighted the numerous advantages associated with production of such crops, particularly sorghum (Sorghum bicolor L. Moench). Sorghum is one of the five most important cereal crops in the world due to its ability to tolerate and adapt to stress conditions. It has high nutrient-use efficiency, is drought tolerant and can be cultivated on over 80% of the world's agricultural land.

Moreover, sorghum is high in dietary fibre and is rich in antioxidant phenolic compounds. Due to these traits, sorghum could make a larger contribution to food supplies than is currently the case, especially in regions with the greatest need.

## Sorghum production challenges

Despite the important traits and anticipated increase in demand, sorghum is under-supported so its enormous potential remains untapped. Some of the glaring challenges facing smallholder sorghum farmers include agronomic factors such as limited access to improved seeds, which leads to low average yields, as well as pests (e.g. quelea birds) and diseases. In addition, socio-economic factors such as poor infrastructure in the marginal areas where sorghum is grown, marketing and logistical issues, under-developed agricultural practices and farming equipment, attitudes and social perceptions all hinder production. Consequently, average

## Testing for Diseases and disease resistance in Beans

Dry beans are a cost-effective and abundant source of protein globally, but their cultivation poses several challenges. Bacteria and fungi, among other microscopic organisms, can cause diseases that negatively impact yield and profitability. Of these, bacterial diseases are particularly threatening, as controlling them is often more challenging than fungal diseases.

In South Africa, the most significant bacterial diseases affecting dry beans are Common Bacterial Blight, Halo Bacterial Blight, and Bacterial Brown Spot, which are all seed-borne. These diseases primarily impact the foliage and pods, including the seeds, and can enter host plants through natural openings or wounds. In addition, they spread through water splashing, leading to a loss in production and unmarketable goods.

Managing these diseases begins with planting disease-free seeds. By incorporating laboratory testing, seed producers can remove batches of contaminated seed sources, thereby preventing the spread of disease and giving confidence to the buyer that the seed is disease-free. Testing beans for diseases and disease resistance is important for several reasons:

1. **Preventing disease outbreaks:** Testing helps identify any diseases present in the bean plants before they spread, allowing for effective prevention measures to be taken.
2. **Improved crop management:** Knowing which diseases are present and how to manage them effectively can help growers maintain healthier plants and improve crop yield.
3. **Identifying resistant varieties:** By testing beans for disease resistance, researchers can identify varieties that are more resistant to specific diseases, which can help farmers select the best varieties for their location and reduce the need for pesticides.
4. **Better food safety:** Testing ensures that beans are safe for consumption, as some diseases can produce harmful toxins that may contaminate the beans.

Overall, testing for diseases and disease resistance is crucial for ensuring healthy crops, reducing the risk of disease outbreaks, and improving food safety. At SciCorp Laboratories, we specialize in providing testing solutions to farmers, seed producers, and agricultural service providers nationwide. Our laboratory is staffed with highly trained professionals dedicated to delivering accurate and timely results. Investing in laboratory pathogen testing and including laboratory testing in breeding programs for resistance selection is a wise decision for any farmer or seed producer looking to maximize crop health and productivity. Schedule your testing appointment today to learn more about our services. With SciCorp Laboratories, you can take the first step towards healthy and profitable crops.

yields of sorghum in African smallholder farming areas remain below 1 ton/ha. This is in spite of increased recognition of the commercial importance of sorghum. It is therefore imperative that researchers and policy-makers recommend appropriate cropping systems that are not only sustainable but also resilient in light of the current productivity challenges faced especially by smallholder and rural farmers.

**Opportunities for increased sorghum production**

In order to improve production in smallholder areas, it is necessary to create awareness of the potential benefits that sorghum presents to these farmers. This is especially important since some farmers apparently used to grow sorghum in the past but abandoned the crop in favour of maize due to the aforementioned challenges. Providing them with information on the potential benefits and opportunities the crop presents could

entice these farmers to resume sorghum production. It is also important to avail improved varieties that are suited to local conditions. A study commissioned by the Department of Science and Innovation (DSI) to explore the establishment of market opportunities for sorghum in South Africa highlighted the development of a sorghum advanced germplasm development (pre-breeding) programme as a key step in improving sorghum productivity and making it more competitive. Currently, there are no active hybrid sorghum breeding programmes in South Africa, with the country relying heavily on importing seed from Australia and elsewhere. The Agricultural Research Council (ARC) does, however, have a breeding programme for open pollinated varieties which can be retained and replanted, thus reducing costs for resource-poor farmers. Clearly, more effort needs to be made to ensure availability of a larger number of suitable sorghum varieties.

**Reviving smallholder farmer sorghum production**

The Department of Agriculture, Land Reform and Rural Development (DALRRD) contracted the ARC to conduct a 3-year project to revive smallholder sorghum production and assist smallholder farmers with increasing their yields. The project was carried out at study sites in four different provinces: Nongoma in KwaZulu-Natal, Houtnek in the Free State, Clau Clau in Mpumalanga and Mphanama in Limpopo. The project aimed to assess the potential impact of climate change variables (rainfall, temperature) on the productivity of sorghum and to recommend appropriate crop management strategies to adapt to and mitigate climate variability. The study also sought to create and increase awareness on selected soil and water conservation strategies for sustainable sorghum production among rural smallholder and resource-poor farmers, and to create awareness on sorghum marketing



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Farmers covering sorghum panicles with manabags in Free State



Farmers' day event in Free State

need to develop sorghum cultivars that are less attractive to quelea birds. Interactions between the ARC and the farmers involved in the DALRRD-funded project showed a shift in social perceptions of sorghum by the end of the project. There was increased awareness of the role that sorghum can play in ensuring food security at household level as well as processing and marketing opportunities. Before the project, there was virtually no sorghum production at three of the project sites – Clou Clou (Mpumalanga), Nongoma (KZN) and Houtnek (Free State) – but towards the end of the project, an appreciable number of participating farmers were already producing sorghum on their own farms. Follow-up meetings and workshops with communities around the project sites showed that continued support and development of stakeholder platforms would go a long way in addressing the challenges faced by resource-poor sorghum farmers. ■

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adequate training, most smallholder and post-harvest processing. The beneficiary farmers received training on sorghum production, climate-smart agriculture (CSA) practices, and sorghum processing and marketing through formal workshops, farmer field schools and information days. The project showed that there is significant potential for sorghum production at each of the four study sites and that the participating farmers are willing to take up sorghum production provided that there are suitable market opportunities. The project also showed that with

and possibly the biggest deterrent to sorghum production is the damage by quelea birds that was observed during this study. Whilst farmers can opt to grow cultivars which are less prone to bird attack, these cultivars are high in tannins and are more suitable for malting. There is, therefore, a

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