



**TASAI**  
THE AFRICAN SEED ACCESS INDEX



## **South Africa Brief 2017 - The African Seed Access Index**

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## INTRODUCTION

A competitive seed sector is key to ensuring timely availability of high quality seeds of improved, appropriate varieties at affordable prices for farmers in South Africa. This country brief summarizes the key findings of The African Seed Access Index (TASAI) study conducted in 2016/17 to appraise the structure and economic performance of South Africa’s seed sector. With a focus on four grain crops important to food security — maize, soya bean, sunflower, and wheat — the study evaluates the enabling environment for a vibrant formal seed sector. These four crops constitute the main food and feed commodities in South Africa. Maize and wheat are the two most important grain crops, while soya bean meal is the preferred source of protein for animal feed. Sunflower is increasing in popularity, partly due to its good performance under dry conditions (Department of Agriculture, Forestry and Fisheries, 2016). Together, these four crops cover about 34% of South Africa’s arable land, and constitute 53% of daily calorie consumption (FAOSTAT, 2017). In addition, these four crops accounted for 98% of the market share of agronomic seeds in South Africa in 2014/15 (Department of Agriculture, Forestry, and Fisheries, 2015).

TASAI seeks to encourage public policymakers and development agencies to create and maintain enabling environments that will accelerate the development of competitive formal seed systems serving smallholder farmers. The TASAI study covers 20 indicators divided into the following categories: Research and Development, Industry

Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers. Appendix 1 summarizes all 20 indicators and compares South Africa to 12 other countries in which similar studies were conducted.

## Overview

The seed sector in South Africa is more developed than in other African countries. Whereas most other countries on the continent are characterized by low adoption rates of improved seed varieties and heavy reliance on the informal seed sector, the system in South Africa is highly formalized, mature, and fully privatized. Maize seed testing laboratories had been established by the 1940s, and the first hybrid seed programme was launched in 1959. By 1980, almost all of South Africa’s commercial maize area was planted to hybrids (Byerlee and Eicher, 1997). However, it is important to note that, unlike other African countries, the system is designed to serve mostly large-scale commercial farmers, who produce most of South Africa’s agricultural output.

South Africa’s formal seed sector comprises numerous institutions, including government (e.g. DAFF, ARC), private sector, and universities (Table 1). The formal sector focuses on breeding and evaluating improved varieties, and producing and selling seed varieties certified by the South African National Seed Organization (SANSOR), a non-profit organization accredited by the government as the seed certification authority. Established in 1989, SANSOR brings together seed companies and other key players in the industry.

Table 1: Role of key players in South Africa’s formal seed sector

ROLE	KEY PLAYERS
Research and breeding	Seed companies, multinational corporations ARC, universities, CIMMYT, ICARDA
Variety release and regulation	DAFF, SANSOR
Seed production and processing	Seed companies, multinational corporations ARC, SANSOR
Education, training, and extension	Seed companies, DAFF, ARC, SANSOR, NGOs
Distribution and sales	Seed companies, agro-dealers, private merchants, cooperatives

**Key acronyms:** ARC – Agricultural Research Council; DAFF - Department of Agriculture, Forestry & Fisheries; CIMMYT – International Maize and Wheat Improvement Center; GM – Genetically modified; HHI – Herfindahl-Hirschman Index; ICARDA – International Centre for Agricultural Research in the Dry Areas; IITA – International Institute of Tropical Agriculture; OPV – Open Pollinated Variety; SANSOR - South African National Seed Organization; WEMA – Water Efficient Maize for Africa



### Number of active breeders

In 2015, South Africa had 44 active breeders working on the four priority crops of maize, soya bean, sunflower, and wheat (Department of Agriculture, Forestry, and Fisheries, 2015). The breakdown by crop is as follows: 27 for maize, 7 for soya bean, 10 for sunflower, and 9 for wheat<sup>1</sup>. Of the 44 breeders, six (two for maize, one for soya bean, and three for wheat) work in the public sector at South Africa's two Agricultural Research Council (ARC) institutions. Most private sector breeders are employed by the top three multinational corporations present in the country (Monsanto, Pannar, and Pioneer). It is important to note that these figures do not include breeders at public universities; all public universities with a faculty of agriculture employ at least one plant breeder; some, such as the University of the Free State, employ up to eight.

On average, seed companies' satisfaction with the number of active breeders is excellent (88%).<sup>2</sup> The highest level of satisfaction is for sunflower (96%), though excellent ratings were also given to maize (84%), soya bean (88%), and wheat (85%). However, satisfaction ratings for the number of active breeders in public research institutions were much lower - fair at 50%. Partly due to restructuring and revised financing models, the level of government support given to public institutions as well as the number of breeders at those institutions have declined in recent years.

### Varieties released in the last three years

Between 2014 and 2016, 362 varieties were released for the four crops: 236 were maize, 71 were soya bean, 38 were sunflower, and 17 were wheat varieties. Figure 1 shows the three-year moving average of variety releases since 2002. Maize varieties include yellow and white open pollinated varieties (OPVs), hybrids, genetically modified (GM) hybrids, and high-quality protein hybrids. The dominance of maize varietal releases is illustrated in Figure 1, though the number of soya bean releases is steadily increasing. The high number of variety releases is indicative of active breeding programs, a competitive market, and the increasing availability of new technologies.

The rapid uptake of genetically modified (GM) crops has spurred demand for new varieties in South Africa. The area planted to GM maize has increased from 3000 ha in 2000 to 2.38 million ha in 2015, and the number of GM maize varieties being released has increased accordingly. Approximately 90% of South Africa's total maize area is currently planted to GM varieties. Seed companies tend to release a new maize variety first as a conventional variety, and then again after one year as a GM variety with GM traits added. It is not unusual that one new conventional maize variety would have up to three GM varieties, one with insect resistance (Bt), one with herbicide tolerance (HT) and one variety that is stacked (Bt+HT), all with the same base germplasm. For soya bean, most GM (herbicide tolerant) varieties are imported from South America.

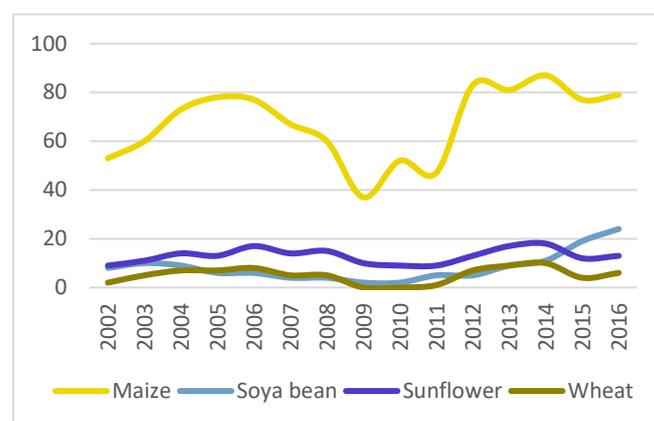


Figure 1: Number of varieties released in South Africa (three-year moving average)

### Availability of foundation seed

On average, seed companies rate their satisfaction with the availability of foundation seed as good (67%). The highest satisfaction rate is for maize, which is rated excellent (80%), while sunflower and wheat both received a "good" rating at 66% and 73%, respectively. Soya bean was rated "fair" (49%), though there was a large disparity between the ratings of multinational (80%) and local (20%) companies.

Multinationals enter the South African seed market through the acquisition of local seed companies. These companies produce their own foundation seed and report having access to a wide range of breeding materials from parent companies. In contrast, most parastatals and small local companies source their early-generation seed

<sup>1</sup> Some breeders work on more than one crop.

<sup>2</sup> All scores reported in this brief are based on industry self-reporting of satisfaction ranging from 0% (completely dissatisfied) to 100% (completely satisfied).



through collaborative agreements with the ARC or international research institutions such as the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Agricultural Research in the Dry Areas (ICARDA).

Overall, much of the maize and wheat foundation seed is sourced from parent companies and research institutions in the US and Europe; soya bean foundation seed is largely sourced from South America (particularly Argentina, Brazil, and Uruguay), while sunflower seed comes from Australia.

### Average age of varieties sold

Information on the ages of varieties being sold on the South African market is not readily available. However, by combining the 2016 variety list with the Plant Breeders' Rights database, it is possible to calculate ages for 49% of maize varieties, 69% of soya bean varieties, 16% of sunflower varieties, and 64% of wheat varieties.

Within this sub-section, the average ages of the varieties currently on the market are as follows: four years (maize), four years (soya bean), five years (sunflower), and seven years (wheat). There was little difference in minimum and maximum ages between crops: All crops had varieties less than one-year old on the market, while the oldest varieties were 16 years old (maize) to 18 (sunflower) and 19 years old (soya bean and wheat). Few varieties are older than nine years old, and soya bean has seen a marked increase in the number of varieties on the market during the last four years.

### Varieties with climate-smart features

To be classified as climate-smart, a crop variety must meet at least one of two criteria – early maturity and/or tolerance to extreme weather conditions such as drought, flooding, or frost. Breeding drought-tolerant maize has long been a priority in South Africa, and almost all hybrid maize varieties in the country confer some resistance to drought. In recent years there has been increased focus on early-maturing and ultra-early maturing maize varieties.

In the past decade, several public and private initiatives have focused on breeding drought-tolerant varieties. The Drought Tolerant Maize for Africa project, established by CIMMYT and the International Institute of Tropical Agriculture (IITA) in 2006, aimed to distribute 60,000 MT of

improved maize seed to farmers across Sub-Saharan Africa in 2016. Meanwhile one of the private seed companies has been field-testing GM drought tolerant maize in South Africa since 2008, with samples of conventional drought tolerant maize released to South African small-holder farmers in 2015. Furthermore, South African maize breeding companies that participated in the public-private partnership Water Efficient Maize for Africa (WEMA), gained access to some of the released hybrids and GM technology.

From 2014 to 2016, 362 maize varieties were added to the national variety list, of which all (100%) were climate-smart with drought tolerance characteristics and / or early maturing characteristics. Some of the sunflower, soya bean, and wheat varieties also had early/late maturing characteristics.

## INDUSTRY COMPETITIVENESS

### Number of active seed companies

In 2016, 46 seed companies in South Africa produced or marketed of at least one of the four focus crops. Of these, 18 were involved in breeding, seed multiplication and/or selling of their own varieties: 16 produced maize, 12 produced soya bean, 9 produced sunflower, and 4 produced wheat. A further 27 companies licensed their seed to other companies, and at least seven companies were affiliates of another company.

Based on information from SANSOR and the South African Grain Information Service, the estimated aggregate sales of the four crops in 2016 was 57,841 metric tons. The 2015/16 crop season occurred during a drought period, which heavily impacted seed sales. In several production areas, maize and soya bean seed was sold but was not planted. Of the estimated sales for 2016, maize seed accounted for about 57% (33,223 tons) and wheat seed 25% (14,515 tons). It is important to note that the severe drought resulted in some carry-over seed in the market, and some companies were unable to share seed sales figures.

### Market share of top seed companies

Market share is calculated using seed sales reported by seed companies. By crop, the market shares for the top four companies are: 94% (maize), 60% (soya bean), 90% (sunflower), and 99% (wheat). However, about 65-70% of



the soya bean area and 50-60% of the wheat area in South Africa are planted to farmer-saved seed.

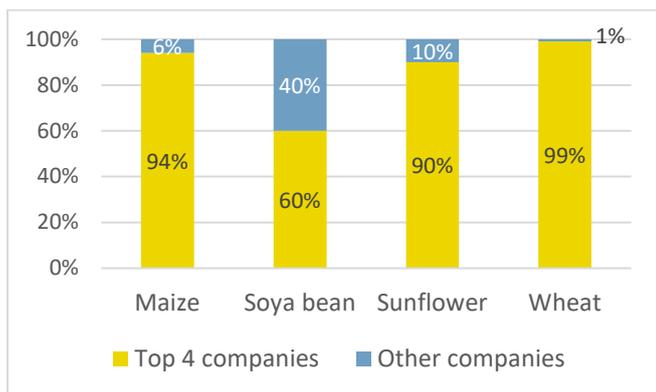


Figure 2: Total market share (%) of top four companies

The Herfindahl-Hirschman Index was also used to quantify industry competitiveness. The index, a sum of squared market shares, ranges from near zero for perfect competition, to 10,000 for a pure monopoly. HHI was calculated for all the seed companies, for each crop. The market concentration is good for soya bean (1,226) and poor for maize (3,079), and sunflower (3,159). The HHI for wheat is extremely poor (7,168) due to the dominance of one company. In addition, the main wheat seed producers are farmers. These figures indicate that the South African seed sector is generally concentrated and specialized. However, since the top companies are global giants, intense competition among them results in a strong push for investment and delivery of high quality products at competitive prices.

### Market share of government parastatal

The first South African private seed company (Sensako) was established in 1959. Since then, the government's role in seed breeding and marketing has decreased significantly. Its role, for the four focus crops, is now limited to the two ARC institutes – the Grain Crops Institute (maize, soya bean, and sunflower) and the Small Grains Institute (wheat). ARC produced 11 tons of maize seed in 2016, which was sold to a government farmer support program. ARC still has a reasonable amount of wheat seed in the market, but their varieties are licensed to a number of private seed companies and ARC is not involved in sales.

### Length of import/export process for seed

South Africa is a net exporter of seed, primarily to other African countries such as Zambia, Mozambique, and Uganda, but also as far as Argentina, Italy, India, Uruguay,

South Korea, and Pakistan. Several seed companies import from other African countries, especially Zambia and Zimbabwe, and countries outside Africa including Argentina, Mexico, Italy, Germany, and the USA.

The National Plant Protection Organisation mandates that the seed imports/export process not exceed 30 days, but there are often delays due to bureaucracy at the point of entry/exit. Seed companies reported that the average time to import and export seed within the eastern and southern Africa region is 18 days and 12 days, respectively. However, importing from and exporting to destinations outside Africa may take up to 90 days. Companies rate their satisfaction with both the import and export process as good, with scores of 66% and 61%, respectively.

## SEED POLICY AND REGULATIONS

### Length of variety release process

The time it takes to release a variety refers to the time from application for release of a variety to the time the variety is released by the relevant authority. In South Africa seed companies rate their satisfaction with length of the variety registration and release process as excellent for maize (86%), soya bean (85%), and sunflower (80%), and good for wheat (70%). Wheat scored slightly lower due to one company's concerns about the management of the Plant Breeders' Rights and field trial requirements (the fulfilment of distinctiveness, uniformity, and stability).

The average length of the release process for the four crops combined was 15 months. Though most companies (8 of 14) reported a duration of 12 months, several companies reported 24 and 36 months, and one company even reported 60 months. By crop, the average length of the release time varied from a minimum of 17 months for soya bean to 28 months for wheat. Wheat generally takes longer to be released because varieties must conform to miller and baker requirements. The wheat industry argues that this focus on wheat grain qualities, which has more to do with food processing requirements, is negatively impacting breeding for increased yields. Average release times for maize and sunflower varieties were 19 and 22 months, respectively.



## Status of seed policy framework

The draft National Policy on Plant Improvement (2012) is the overall policy guiding the seed industry in South Africa. Though still in draft form, the policy is intended to inform all legislation related to the propagation of material, including genetically superior propagating material, the use of improved varieties, the promotion of breeding, fair trade, and increased participation by a range of stakeholders.

The Plant Improvement Draft Bill (8B, 2015) is intended to update the prevailing law, the Plant Improvement Act (1997), which the industry considers to be outdated. The Bill includes several improvements. Notable among them is that the bill authorizes other organizations to implement national certification schemes, currently the preserve of SANSOR. The bill further recommends increased enforcement and penalties for non-compliance to industry regulations, harmonization with international industry standards, and the insertion of mandatory value for cultivation and use (VCU) tests as part of the variety testing and release process. At the moment, these tests are voluntary.

In South Africa, plant breeders' rights are guided by the Plant Breeders' Rights Policy of 2015, which has been updated from the 2011 policy document. The policy informs on-going amendments to the Plant Breeders' Rights Bill (B11B) of 2016. The Bill provides a step-by-step application procedure, designates a registrar for varietal protection, and outlines the extent of this protection. When enacted, the Bill will replace the Plant Breeders' Rights Act 15 of 1976, which was amended as Act 15 of 1996.

Overall, seed companies are satisfied with the quality of the seed policy, rating it "good" (79%).

## Quality of seed regulations and enforcement

Seed companies similarly rate their satisfaction with the enforcement of seed laws and regulations "good" (69%). One larger seed company commented that enforcement of regulations is not very strict and enables easy market entry by new companies, which may not benefit the industry in the long-term.

## Adequacy of seed inspectors

South Africa's national seed testing laboratory was established in the 1940s, with seed companies and cooperatives establishing additional facilities since the 1980s. SANSOR was accredited by the government as a seed certification authority and has appointed an in-house seed testing committee to meet the requirements of the International Seed Testing Association. In South Africa, seed inspection functions are carried out by SANSOR, which trains staff from the private sector to become qualified inspectors and monitors their performance. There are an estimated 180 inspectors (field inspectors and seed samplers) within the SANSOR system.<sup>3</sup> Seed companies rate their satisfaction with the adequacy of seed inspectors as good (79%).

## Efforts to stamp out fake seed

DAFF has the authority and duty to enforce compliance with plant and seed control legislation. SANSOR inspectors are also authorised to investigate transgressions of the plant improvement act and the plant breeders' rights act, though it has delegated its responsibilities – including investigating contraventions of seed ownership and fake seed issues – to Agri-Inspect, a private policing company. More recently, an Anti-Infringement Bureau has been appointed as a watchdog to ensure protection of intellectual property rights on plant varieties, which is an important issue in South Africa's highly competitive private seed sector.

Fake seed is generally not a major problem in South Africa due to the short supply chain between seed producers and commercial farmers. Seed companies indicated that a total of six cases involving the sale of fake seed were reported to them in 2016, though this may be an underestimate. On average, seed companies rate their satisfaction with the government's efforts to stamp out fake seed as fair (50%), as currently there are no procedures in place by government to mitigate against this problem. According to the seed companies, the main sources of fake seed are unscrupulous traders and merchants. Furthermore, seed companies expressed their frustration with farmers who replant farm-saved seed; they feel that this "privilege" is misused and could lead to trading of fake seed,

<sup>3</sup> In addition, government employs an estimated 400 inspectors across the entire agriculture sector; however, due to the seed sector's already high standards, and because the rest of the agriculture sector has more pressing

problems, government inspectors interact little with seed companies. As such, the 400 governments inspectors are not included in our count.



limiting the investment in research and development for OPVs.

### Use of smart subsidies

The South African government supports emerging farmers (mostly historically disadvantaged black farmers getting into commercial farming) through three programs: the Comprehensive Agricultural Support Programme, Ilima/Letsema, and LandCare. In recent years, the government has spent close to 2 billion rands (about US\$ 167 million) on these programmes, which aim to ensure the sustainability and commercial viability of emerging farmers and beneficiaries of agrarian reform, support sustainable agriculture, promote rural development, address land degradation, and encourage the sustainable use of natural resources. These programmes do not specifically focus on seed or seed subsidies, thus figures are not available on a disaggregated level.

## INSTITUTIONAL SUPPORT

### Availability of extension services

Approximately 2,210 agricultural extension workers are employed by DAFF (Koch and Terblanche 2013). These extension officers largely serve subsistence, smallholder, and emerging farmers, at a ratio of approximately one extension worker to every 1,059 farming households. This ratio is higher than other African countries such as Ethiopia (1:592) or Kenya (1:910), and provincial extension officers have limited resources to support farmers. Larger-scale commercial farmers are largely served by private company agronomists. Few seed companies employ extension officers, and the ones that do concentrate on organizing farmer days rather than providing on-farm support. Seed companies reported their satisfaction with extension services as fair (46%). This is an increase on the 35% satisfaction reported in the TASA 2015 study, though there is wide variability in the responses by company.

### Quality of national seed trade association

SANSOR was established in 1989 and is registered as a non-profit company according to the Companies Act (71, 2008). SANSOR represents the seed industry both locally and internationally and aims to protect and further the interests of the seed trade to the benefits of its members (SANSOR, 2017). Its membership comprises 71 full members, 2 third-party distributors, 23 associate members, 6

international members, 7 affiliated members, and 8 honorary members. Seed companies rated the overall quality of SANSOR as excellent (81%). Figure 3 illustrates the seed companies' level of satisfaction with SANSOR's performance in six service areas. SANSOR was rated as excellent in all service areas, with its highest rating for democracy in elections and decision making (87%) and its lowest rating in activity on important seed sector issues (81%). The other four areas (effectiveness of advocacy, managerial ability, providing value to members, and ability to mobilize resources) all scored between 82% and 86%.

SANSOR represents the South African seed sector at many international fora, including the African Seed Trade Association, the International Seed Federation, the Organisation for Economic Cooperation and Development, the Association of Official Seed Certifying Agencies, and the International Seed Testing Association. Through its website, SANSOR provides important, current information on South Africa's formal seed sector, as well as news and events that may be relevant to its members.

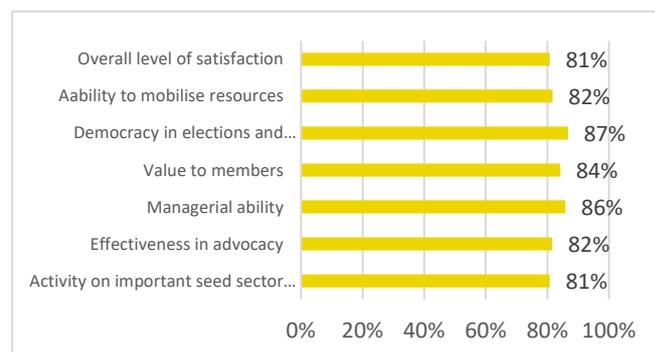


Figure 3: Members' satisfaction with SANSOR

## SERVICE TO SMALLHOLDER FARMERS

### Concentration of rural agro-dealer network

According to the seed companies surveyed, the concentration of agro-dealers in South Africa is not a substantial limiting factor to seed access. Due to the input distribution network developed by the commercial farming sector, seed and complimentary inputs are generally available in key farming regions. Commercial farmers often order large quantities of specific seed varieties with specific treatments, either directly from the seed company or through their local agency.

By contrast, smallholder farmers in former homeland areas tend to be under-served, though there has been progress in infrastructure and financial services in these regions over the past 20 years. Smallholder farmers often



buy their seed from local cooperatives, spaza shops (small general dealers), or hardware stores in nearby towns. Transport costs and middle men often increase the cost of inputs for smallholder farmers and the choice of seed varieties is usually limited. While many seed companies interviewed by TASA recognize the challenges of seed access by smallholder farmers, most do not see this market segment as profitable.

### Availability of seed in small packages

Maize is the staple food for South Africa grown by both commercial and smallholder farmers. Of the four focus crops, maize is the only one that the seed industry tries to supply in small packaging. Most of the seed (90%) sold by the large seed companies is sold in packages of at least 20 kg. The few seed companies that sell seed in small packages of 2kg, 5kg, or 10kg sell almost exclusively open-pollinated varieties and a few non-GM hybrids. From key informant estimates, only 3% of maize seed is sold in packages of 2 kg or less.

Soya bean, sunflower, and wheat are not typically produced by smallholder farmers in South Africa, thus seed companies have no incentives to supply these seeds in small packages. All soya bean and wheat seed was reportedly sold in bags of 25 kg or more. For sunflower, only 1% of seed sold by one of the companies was in packages weighing less than 2 kg; the rest is in bags of 150 thousand or 180 thousand kernels. Seed companies rate their overall satisfaction with the availability of seed in small packages as fair (50%). However, the low availability of small packages of soya bean, sunflower, and wheat meant that very few companies reported satisfaction scores for this indicator. For maize, companies rated their satisfaction with the availability of seed in small packages as good (60%), though multinational companies rated their satisfaction much higher (90%) than local private companies (50%).

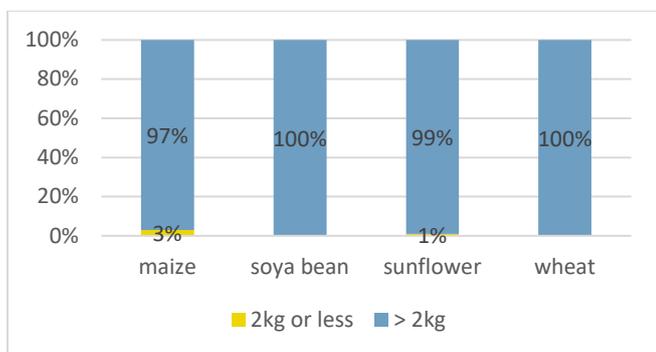


Figure 4. Percentage of seed sold in different package sizes

### Seed-to-grain price ratio

Assuming stable prices at planting time, seed-to-grain price ratios can reflect the attractiveness of a variety or affordability of improved seed relative to farmer recycled grain. Seed prices for white maize vary significantly by type, from OPV at about 14.00 ZAR/kg, conventional hybrids at 95.54 ZAR/kg, and GM stacked (Bt+HT) at 138.32 ZAR/kg. Seed-to-grain price ratios were very high for maize GM stacked and maize hybrid, at 52.2:1 and 34.4:1, respectively. The seed-to-grain price ratio for sunflower was also high at 22.9:1. Ratios for maize OPV, soya bean, and wheat were much lower at 5.0:1, 4.9:1, and 3.0:1, respectively. In comparison, seed-to-grain price ratios for maize hybrids in other African countries are significantly lower – Ethiopia and Zimbabwe are 7.1:1 and 9.3:1, respectively, for hybrid maize. While the high seed to grain price ratios imply reduced affordability by smallholder farmers, they also reflect the level of seed quality, productivity, and overall higher value through seed treatments.

## CONCLUSION

The South African seed industry has had a long and successful evolution from its embryonic inception in the 1890s to a strong and well-established private sector-led industry. Part of the key to its success has been the close interaction between private sector managers and government representatives. Its competitive environment ensures maintenance of seed quality, private seed testing laboratories expertise, and efficient management of seed certification schemes. The national seed traders' association (SANSOR) is highly effective in representing the interests of its members.

However, due to a highly commercialized agricultural sector, the seed sector has evolved to primarily serve the needs of large-scale commercial farmers. The industry performs poorly on measures that are specific to seed access for smallholder farmers such as availability of seed in small packages, the presence of a cost effective rural-agro-dealer network, and the availability of extension services. Thus, there is still great scope for improving access to seed for smallholder farmers in rural areas.



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## APPENDIX 1.

For a comparison of TASAI Indicators across 13 countries, please visit: <http://tasai.org/wp-content/uploads/TASAI-Appendix-CURRENT.pdf>





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