



TASAI

THE AFRICAN SEED ACCESS INDEX



Kenya Brief 2018 - The African Seed Access Index

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INTRODUCTION

A competitive seed sector is key to ensuring the timely availability of high-quality seeds of improved, appropriate varieties at affordable prices for smallholder farmers. 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.

This country brief summarizes the key findings of The African Seed Access Index (TASAI) study conducted in 2018 to appraise the structure and economic performance of Kenya's seed sector. The study evaluates the enabling environment necessary to build a vibrant formal seed sector, focusing on four grain and legume crops important to food security in Kenya – maize, sorghum, bean, and cowpea – the cultivation of which covers about 21% of the country's arable land. The 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 Kenya with 18 other African countries where TASAI has conducted similar studies between 2016 and 2018. In addition, the present study also compares its findings with previous TASAI studies of Kenya conducted in 2013 and 2015.

Overview

Like in most other African countries, the seed industry in Kenya consists of two systems: the informal sector and

the formal sector. This policy brief focuses almost exclusively on the formal seed sector.

The informal sector broadly refers to the system in which farmers produce, obtain, maintain, and distribute seed resources from one growing season to the next (FAO, 1998). Due to limited exposure, low availability of most varieties, inability to purchase seed, limited access to agro-dealers, or for other reasons, most smallholder farmers in Kenya still rely on the informal seed sector. Standards in the informal seed sector are not monitored or controlled by government policies and regulations; rather, they are guided by indigenous knowledge and standards, and by local social structures. The locally grounded nature of these transactions means that there is scant performance data available on the informal sector.

The formal sector focuses on breeding and evaluating improved varieties, as well as producing and selling certified seed. Seed is certified by the Kenya Plant Health Inspectorate Service (KEPHIS), the government entity responsible for regulating seed in Kenya. On average, about 80% of farmers in Kenya use certified hybrid and open-pollinated varieties (OPVs) of maize seed, with hybrids accounting for 75% (Feed the Future, 2016). Kenya's formal seed sector comprises a number of institutions (Table 1), including government (e.g., KALRO, KEPHIS, public universities, and county extension agents), parastatals, private sector (MNCs and local seed companies), and development agents (NGOs and CBOs). Established in 1982, the Seed Trade Association of Kenya (STAK) brings together seed companies and other key players in the industry.

ROLE	KEY PLAYERS
Research and breeding	KALRO, universities, seed companies
Variety release and regulation	KEPHIS
Seed production and processing	Seed companies
Education, training, and extension	Seed companies, KEPHIS, KALRO, extension agents, NGOs, rural agro-dealers, STAK
Distribution and sales	Seed companies, rural agro-dealers, NGOs

Key acronyms: AATF – African Agricultural Technology Foundation; AFSTA – African Seed Trade Association; CGIAR – Consultative Group on International Agricultural Development; CIAT – International Center for Tropical Agriculture; CIMMYT – International Maize and Wheat Improvement Center; COMESA – Common Market for Eastern and Southern Africa; EAC – East African Community; ICRISAT – International Center for Research in the Semi-Arid Tropics; IITA – International Institute of Tropical Agriculture; ISTA – International Seed Testing Association; KALRO – Kenya Agriculture and Livestock Research Organization; KEPHIS – Kenya Plant Health Inspectorate Service; MNC – Multinational Corporation; NAAIAP – National Accelerated Agricultural Inputs Access Programme; NGO – Non Governmental Organization; OPV – Open Pollinated Variety; STAK – Seed Trade Association of Kenya.



RESEARCH AND DEVELOPMENT

Number of active breeders

According to the Plant Breeders Association of Kenya, a total of 60 breeders produce seed for all crops in the country. Of these, there are 34 active breeders for the four priority crops – maize, sorghum, bean, and cowpea. Twenty-three of these breeders are based at public agricultural research institutes under the Kenya Agriculture and Livestock Research Organization (KARLO) and various universities. Of the 34 breeders, 18 work with maize, 6 work with bean, 6 work with sorghum, and 4 work with cowpea. Of the remaining 11 private breeders, 10 work with maize and 1 works with sorghum. Private multinational seed companies also rely on breeders based at their research stations outside Kenya.

On average, seed companies rate their satisfaction with the number of active breeders as “fair” (53%)¹. They are most satisfied with the number of maize breeders, which they rate as “good” (61%), while satisfaction ratings for the number of breeders for the other three crops – bean (56%), sorghum (48%), and cowpea (47%) – are “fair.” While these ratings are not low, there is scope for improving levels of satisfaction among seed companies by increasing the number of public breeders, especially for sorghum and cowpea.

Varieties released in the last three years

Figure 1 shows the 3-year moving average of variety releases since 2000. Far more new varieties were released for maize than for other crops: between 2015 and 2017, 98 new varieties of maize were released, compared to 18 new varieties of sorghum, 16 new varieties of bean, and 4 new varieties of cowpea. This reflects similar proportions over the broader period from 2000-2017: during these years, 314 varieties of maize were released, compared to 31 bean, 30 sorghum, and 10 cowpea varieties.

The most recent sorghum variety releases occurred in 2015, while the latest bean and cowpea variety releases took place in 2016 and 2017, respectively. More varieties were released between 2015 and 2017 than in any other period, especially for maize and sorghum (Figure 1). It is noteworthy that sorghum, which has been an orphan crop² for many years, is now gaining popularity. More than half of the available sorghum varieties have been

released in the last three years - most of them in 2016. This is primarily due to the emerging importance of sorghum as an industrial crop in the brewing industry.

Breeding programs have focused on developing varieties of maize that are resistant to maize lethal necrosis disease (MLND), are drought tolerant and are tolerant or resistant to maize streak virus; and varieties of bean are nutrient-enriched through bio-fortification with iron and zinc.

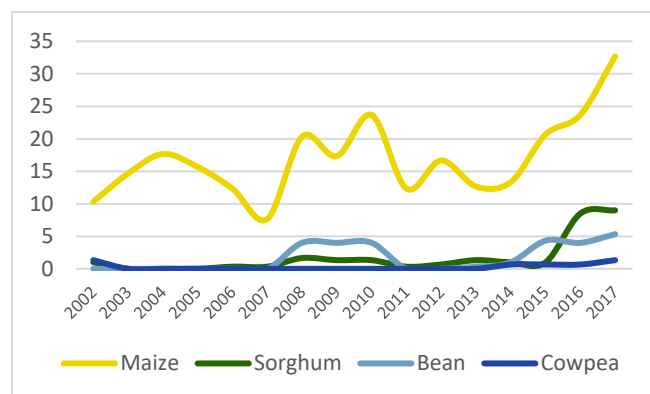


Figure 1: Number of varieties released in Kenya (three-year moving average)

Availability of foundation seed

On average, seed companies rate their satisfaction with the availability of foundation seed for all four crops as “good” (71%). They are most satisfied with maize (77%) and least satisfied with cowpea (65%). Satisfaction ratings for the availability of foundation seed for sorghum and bean are 76% and 68%, respectively. These ratings vary across companies: multinational seed companies, most of which maintain their own foundation seed, are very content with the availability of foundation seed (88% average rating).

Kenyan-owned seed companies, most of which rely on public institutions, were also satisfied with the current situation (70% average rating). However, 3 out of the 13 seed companies that produce seed for at least one of the three crops bean, cowpea or sorghum are not very satisfied with the availability of foundation seed. These companies rated their satisfaction with the current situation between 20% and 50%.

For local companies, the primary sources of foundation seed for the four crops are KALRO, universities, other private companies, and CGIAR centers – the International Maize and Wheat Improvement Center (CIMMYT) for

¹ All scores are based on industry self-reporting of satisfaction on the following scale (and are color-coded as follows): 0-19.99% (extremely poor), 20-39.99% (poor), 40-59.99% (fair), 60-79.99% (good), and 80-100% (excellent).

² Orphan crops are important staple food crops in many parts of the world, but since they are not traded internationally, they receive less attention in terms of research and agricultural training and extension.



maize and the International Center for Research in the Semi-Arid Tropics (ICRISAT) for sorghum. Foundation seed for bean was mainly sourced from KALRO and local universities, and from outside of Kenya, namely from Mexico, Brazil, and the USA. A private company, Quali Basic Seed, which specializes in the production of basic seed for maize, started operations in 2017 and supplies foundation seed to several companies in Kenya. This is a positive step in enhancing access to early generation seed of new maize varieties for companies that do not have parent seed production programs.

These findings are consistent with the *Kenya Early Seed Generation Study* (Feed the Future, 2016), which revealed a notable shortage in the supply of breeder seed within Kenya. With respect to maize, the study highlighted that supply-side constraints overrode constraints on the demand side. The supply-side constraints included lengthy certification processes, a lack of adequate demand forecasts, insufficient land for seed production, and limited irrigation use in seed production.

Average age of varieties sold

The average age of the varieties currently on the market is as follows: 12.6 years for maize, 14.3 years for bean, 16.8 years for cowpea, and 24 years for sorghum. Maize has the youngest varieties on average, a reflection of its importance to food security. However, in general, the most popular varieties, i.e., varieties most commonly purchased by farmers, are older. Some of the oldest varieties on the market today are sorghum varieties; in fact, some sorghum varieties are over 40 years old. The continued production of such old varieties was attributed to farmer loyalty and a lack of superior newer varieties, especially in the case of sorghum and cowpea.

Number of varieties sold

In 2017, the numbers of varieties sold to farmers were as follows: 65 maize varieties, 11 sorghum varieties, 30 bean varieties and 9 cowpea varieties. The numbers sold, as reported by seed companies, are close to the number of varieties currently being produced, as reported by KEPHIS (Table 1).

Comparing the number of varieties sold in 2017 with the number released between 2000 and 2017 presents a contrasting picture of the commercialization of varieties. The

number of maize and sorghum varieties sold in 2017 account for only 21% and 30% of the varieties released between 2000 and 2017³. For bean and cowpea seed, the percentage is much higher: 97% and 90% respectively (Table 1).

Table 1. Number of varieties released and sold

Crop	Released for production (2018) ⁴	Sold in 2017 (reported by companies)	Released between 2000 and 2017	# of varieties sold in 2017 as % of released (2000-2017)
Maize	63	65	314	21%
Sorghum	7	11	30	37%
Bean	32	30	31	97%
Cowpea	5	9	10	90%

According to plant breeders, the cause of low commercialization of maize varieties is farmers' preference for old varieties, especially hybrid 614. Farmers like this variety because they consider it to be reliable, in that it provides yields under unfavorable weather conditions. Farmers like its taste, it does not lodge easily in the wind or wet soil conditions, resistance to insects and the stalks make good fodder for cattle.

According to seed companies, commercialization of new varieties is constrained by high marketing costs which

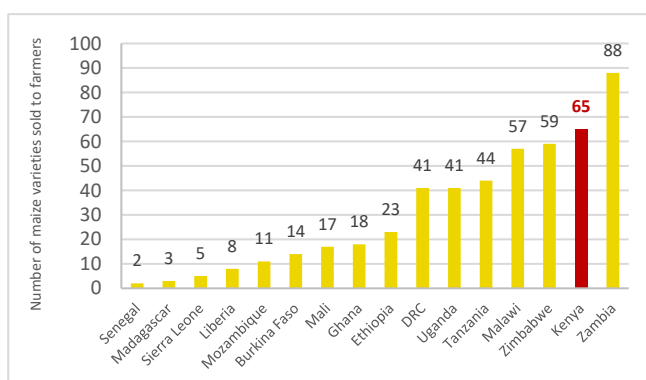


Figure 2: Number of maize varieties sold to farmers

when added to the already high costs of production, reduces profit margins. Seed companies are also reluctant to commercialize newly released varieties while the old ones are still performing well in the market. Despite the low commercialization of recently released maize varieties, the number of varieties sold in Kenya is the second highest among 17 African countries⁵ (Figure 2). For sorghum, Kenya ranks fourth in terms of the number of varieties sold (11), after Burkina Faso (17), and Mali and

³ This % is only indicative as it is an upper-limit, as some varieties sold were released before 2000.

⁴ Reported by KEPHIS in the Daily Nation newspaper of April 21, 2019.

⁵ Data for Kenya, Sierra Leone, Uganda and Liberia is from 2017; data for other countries is from 2016. South Africa is excluded.



Zimbabwe (12 each). The low commercialization of the recently released maize and sorghum varieties may be due to the slow introduction of the varieties in the market where older varieties are still popular. This is not surprising, given that the average age of sorghum varieties is 24 years, while that of maize varieties is 12.6 years.

Number of varieties dropped between 2008 and 2018

Table 2 below provides data on the varieties dropped (i.e., no longer sold) by at least one seed company between 2008 and 2017. However, some of these varieties may continue to be available in the market. All in all, 17 varieties of maize were dropped. The reasons for dropping varieties included difficulties in synchronizing female and male lines in the field, low demand and high production costs, a lack of breeder seed, poor performance over time, and lower demand for varieties that become susceptible to disease. Four sorghum varieties were dropped due to low demand and a need to replace them with varieties suitable for brewing. Four bean varieties were dropped due to susceptibility to pests and diseases, and low productivity. No cowpea variety was dropped.

Table 2: Varieties dropped by seed companies, 2008-2017

Crop	Number of varieties dropped	Examples of varieties dropped	Reasons for dropping varieties
Maize	17	Pan 683, 67, DH0SC, Duma413, KH500 - 34a, DLC1, WH105, 302, 504, 501, WS103, KH500Q, 631Q, WS303, WSQ104, WS402	Problems of synchronizing female and male lines during production; high cost of production; low demand; lack of breeder seed; poor performance over time
Sorghum	4	Serena, Gadam, Seredo	Unsuitable for brewing; low demand
Bean	4	AKK8, GLP2, GLP92	Susceptibility to pests and disease; low yield
Cowpea	0	0	-

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. Drought-tolerance was the most common climate-smart characteristic among

varieties released in 2015-2017: 66% of maize varieties, 56% of sorghum varieties and 13% of bean varieties were drought tolerant. Of the varieties released in 2015-2017, 50% of cowpea varieties were early-maturing, compared to 6% for both bean and maize. Most of the drought -tolerant maize varieties were bred in collaboration with the CIMMYT and the African Agricultural Technology Foundation (AATF) under the Drought Tolerant Maize for Africa (DTMA) program.

INDUSTRY COMPETITIVENESS

Number of active seed companies

According to KEPHIS, there were 143 registered seed companies⁶ by the end of 2018. Of these, 20 are engaged in the production and marketing of seed for at least one of the four focus crops: 16 produce maize seed, 14 produce bean seed, 12 produce sorghum seed, and 11 produce cowpea seed. Thirteen are private seed companies, while 7 are public companies or universities. The other 123 registered seed companies are companies dealing in other crops (including horticulture crops) or companies that import seed for their own production.

The estimated aggregate volume of seed sold for the four crops in 2017 was 46,316 tons, most of which (95% or 43,954 tons) is maize seed. The volume of maize and sorghum seed sold has steadily increased between 2013 and 2017. Table 3 shows a breakdown of aggregate seed sales by crop.

Table 3: Aggregate seed sales in 2013, 2015 and 2017

CROP	Aggregate seed sales ⁷			Estimated demand ⁸
	2013	2015	2017	
Maize	35,671	38,835	43,954	50,000
Sorghum	274	1,075	1,165	No data
Bean	428	1,332	1,165	1,578
Cowpea	424	463	310	No data

The volumes of seed sales in comparison to the estimated demand for seed indicate that there is room for growth in maize and bean seed production. Although data was not available for sorghum and cowpea, it is expected that there is ample room for growth for both.

Market share of top seed companies

The market share of the four top seed companies is calculated based on seed sales reported by seed companies.

⁶ The Seeds Regulations (2016) uses the term “seed merchants” and not “seed companies”. Registered seed merchants are defined as “a person or firm or institution registered by KEPHIS as suitable to produce, process or market seed” (Government of Kenya, 2016).

⁷ Sources: KEPHIS for 2013 data, TASAI for 2015 and 2017.

⁸ Data on estimated seed demand is taken from the *Kenya Early Generation Seed Study* (Feed the Future, 2016).



As shown by Figure 3, by crop, the market shares of the top four companies are: 98% for cowpea, 96% for maize, 95% for sorghum, and 87% for bean. These figures show that a few companies dominate the market for all four crops. For maize and cowpea seed, the market share has not changed significantly between 2013 and 2017. The market share for the top four maize seed companies remained unchanged between 2015 and 2017 (96%). The market share for the top four sorghum seed companies has steadily increased from 81% in 2013 to 95% in 2017. At the same time, the market share for bean seed has decreased from 95% in 2013 to 87% in 2017.

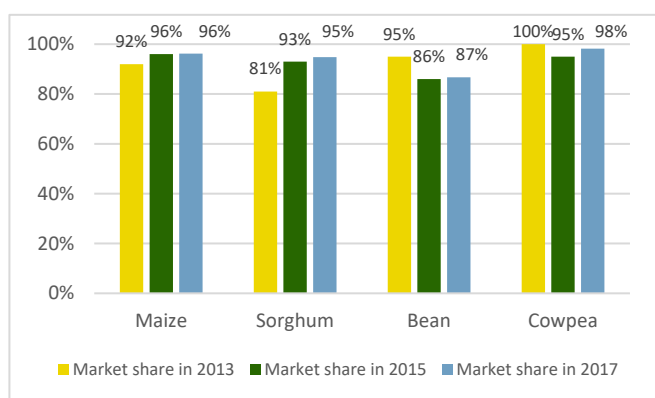


Figure 3. Trend in market share of top four companies

The Herfindahl-Hirschman Index (HHI) 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. The HHI was calculated for all seed companies for each crop. Market concentration for sorghum (4,858), cowpea (4,619), and maize (4,450) is high, while market concentration for bean (3,101) is lower. The market shares of the top four companies and the HHI results both indicate insufficient levels of competition in the seed market for three crops – sorghum, cowpea and maize.

Market share of government parastatal

There are seven government-owned organizations involved in the production and marketing of certified seed for the target crops in Kenya – one agricultural research institute, four public universities and two state-owned corporations. These organizations are involved in the breeding and/or production of at least one of the four target crops.

In 2017, the market share of these government-owned organizations was 64% for maize seed, 50% for bean seed,

70% for cowpea seed and 17% for sorghum seed. The drop in market share for maize seed, down from 74% in 2015 to 64% in 2017, is significant, given that the volume of seed sold over this period has increased. While the market share of the government organizations for bean seed has nearly doubled, from 28% in 2015 to 50% in 2017, it has decreased for sorghum seed from 90% to 17% over the same period (Figure 4).

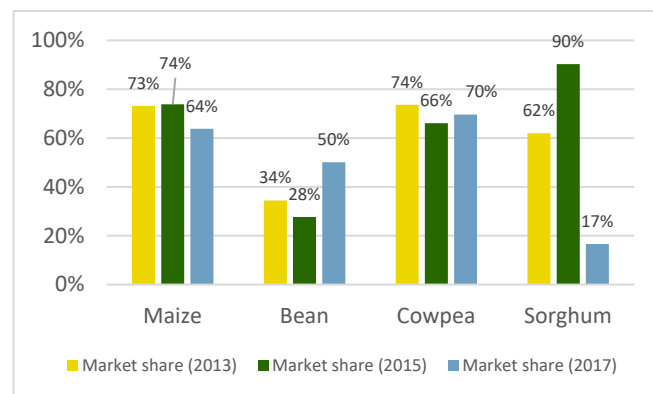


Figure 4. Market share of government parastatals

Length of import/export process for seed

The length of the seed import process is calculated as the number of days to address all the administrative requirements for importation, that is, to obtain an import permit and to clear the seed at the port of entry. According to KEPHIS, import/export permits are processed on the same day, provided that the application is made within working hours. However, delays arise when applicants are not conversant with the procedures, e.g., use of different names for the same varieties in different countries and failure to comply with the compulsory phytosanitary requirements. Seed companies reported that, on average, it takes 7 days to import seed into Kenya. This is a significant improvement from the 38 days reported in 2016 and 26 days reported in 2014 (Table 4). The importing companies rate the process as “excellent” (80%).

Table 4: Trend in seed import/ export process

Import/export process	2013	2015	2017
Import days	26	38	7
Satisfaction with import process	59%	50%	80%
Export days	12	14	10
Satisfaction with export process	NR ⁹	69%	74%

Despite the positive responses from the seed companies, they noted that the process could be further improved by enhancing the capacity of the customs officials at the

⁹ Data was not collected in 2014.



various border points. For example, some of the officials are not fully conversant with import requirements for seed.

It is worth noting that the number of days to import seed into Kenya (for the focus crops) is the lowest among the 15 countries surveyed by TASAI that imported seed during the study period (Figure 5).

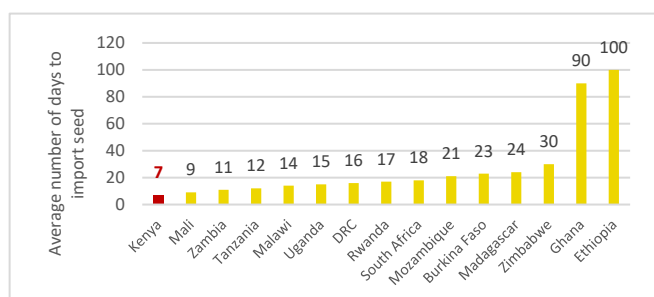


Figure 5: Number of days to import seed in selected African countries

In Kenya, two companies imported 7,000 MT of maize from Zimbabwe, Zambia, and South Africa in 2017. These companies noted that KEPHIS strictly enforces seed importation laws. Besides registering with KEPHIS as a seed merchant, the importer must also apply for and receive a seed import permit from KEPHIS, as well as a phytosanitary certificate from the country of origin. The importer must obtain the international orange certificate (ISTA certificate) from the official seed tester in the country of origin. Upon arrival at the border point of entry, KEPHIS takes samples from the consignment for testing. The importer must wait for clearance by KEPHIS before beginning distribution.

Six companies exported seed for the four crops in 2017. The bulk of seed exports go to other East African countries, namely Uganda, Rwanda and Tanzania. The companies exported 3,910 MT of maize, one company exported 250 MT of sorghum and one company exported 10 MT of cowpea. The companies reported that, on average, it takes 10 days to export seed – a slight improvement from the 12 days and 14 days reported in 2013 and 2015, respectively. One company reported taking 90 days to export seed to Rwanda and Tanzania. Despite this outlier, the companies rate the process as “good” (74%).

SEED POLICY AND REGULATIONS

Length of variety release process

The length of the variety release process is the period of time from the submission of an application for a variety

release to the time of its release by the relevant authority. Most seed companies reported that it took 36 months to release a variety in 2017. The duration varied from 24 months (reported by a KALRO bean breeder) to 60 months (reported by one university and one private company, for maize and sorghum respectively).

Seed companies were not very satisfied with the variety release process, rating it as “fair” (52%). The main reasons for their relatively low satisfaction level were the high cost of the process and the unpredictable weather, which affected the results from the field trials. Several companies view the process as being too time-consuming and bureaucratic, and in need of a complete overhaul.

Compared to several other African countries with relatively vibrant seed sectors, Kenya’s variety release process is fairly long. As is to be expected, the relatively long release process is also reflected in the satisfaction ratings reported by breeders, as shown in Table 5.

Table 5. Comparison of variety release process in Africa

Country	Average time (months)	Satisfaction (out of 100)
Burundi	13	79
Zimbabwe	18	83
South Africa	20	83
Mali	24	60
Zambia	24	84
DRC	26	62
Uganda	28	75
Sierra Leone	30	83
Tanzania	31	70
Malawi	34	58
Kenya	36	52
Senegal	36	74
Ghana	42	43
Madagascar	43	54
Ethiopia	46	71

One key aspect of the variety release process is the National Performance Trials (NPTs), which are carried out for a period of two seasons. In case the variety does not perform well over one of the two seasons, the NPTs are conducted for three seasons. Other than NPTs, a new variety also undergoes one season of testing to determine the variety’s distinctness, uniformity and stability (DUS). Each season of NPT is charged at US \$1,200 per entry. In case a third season is required, the applicant must pay an additional US \$1,200. The DUS test costs US \$600. In total,



therefore, the release process costs US \$3000, assuming no additional seasons are required. The cost of variety release in Kenya is notably higher than in several other countries, including Tanzania, Zambia and Zimbabwe¹⁰.

Table 6: Average cost of variety release in African countries

Country	Average cost of variety release (US \$)
Kenya	3,000
Tanzania	540
Zambia	1,070
Zimbabwe	350

Status of seed policy framework

Kenya's seed sector is guided by the National Seed Policy of 2010, the Seed and Plant Variety Act Cap 326 (revised in 2012), and the Kenya Plant Health Inspectorate Service Act of 2012. In addition, two important sets of regulations are the Seed and Plant Varieties (Seeds) Regulations of 2016 and the Seed and Plant Varieties (Plant Variety Evaluation and Release) Regulations of 2016. Both sets of regulations have been harmonized with COMESA seed regulations, which address seed certification, inspection, variety release, and seed movement in the region.

Kenya is a member of the East African Community (EAC) and is part of the ongoing efforts to develop the EAC Seed Bill, the EAC Seed Regulations (Seed Certification; Plant Variety Evaluation and Release; Plant Variety Protection) as well as the draft EAC Seed Standards for six crops, including those in this study.

Quality of seed regulations and enforcement

Seed companies report being satisfied with the quality of the current seed policy and law, rating these as "excellent" (80%). This is a major improvement from the "good" rating of 63% in 2015. The increase is most likely due to the ongoing implementation of the recently passed seed regulations. Companies were less satisfied with the enforcement of regulations, which they rated as "good" (73%). Despite satisfaction levels having improved (up from 61% in 2015), seed companies are still concerned about some aspects of the enforcement of the regulations. These include the high cost of the variety release process and the low fines meted out to offenders, which are not an effective deterrent.

Adequacy of seed inspectors

By end of 2018, Kenya had a total of 47 seed inspectors, 35 of whom were public inspectors employed by KEPHIS and 12 of whom were private inspectors. According to KEPHIS, only 2 out of 12 authorized private inspectors are active. An additional 30 inspectors have been trained but have not yet been accredited. KEPHIS intends to train more seed inspectors in 2019. The number of inspectors in Kenya is the fifth highest among the countries surveyed by TASAI, after South Africa, Zambia, Zimbabwe and Tanzania (Figure 6).

On average, seed companies rate their satisfaction with

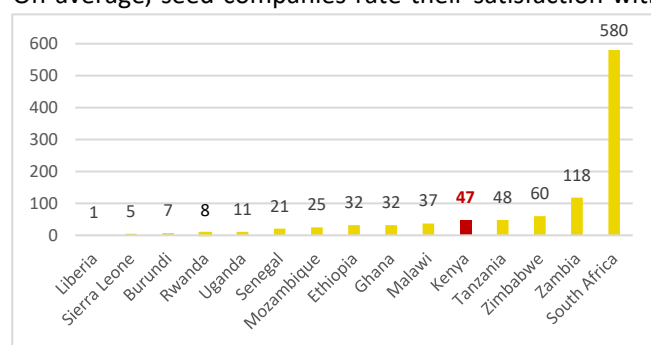


Figure 6: Number of seed inspectors in selected African countries

seed inspection services as "good" (69%). This is a slight improvement from the 62% rating in 2015. Seed companies which export/import seed are satisfied with the inspection services at the border points, rating these as "good" (79%). However, seed companies rate the inspection services at the farm and retail level a little lower at 69%. Generally, most seed companies are satisfied with the seed inspection services.

In 2017, KEPHIS trained and accredited the first batch of private seed inspectors. These inspectors are intended to complement the seed inspection services provided by KEPHIS. More than half of the seed companies interviewed (10 out of 18) have had their staff trained and accredited as authorized seed inspectors.

Most of the remaining companies (7 out of 8) intend for their staff to undergo this training in 2019. Only one company did not intend to send its staff for training. This is because the company is still young and relatively new to the seed business. Only 10 out of 18 seed companies intend to use private inspectors in 2019. The reasons for this slow start are that the process is still in the early stages given that as the first batch of seed inspectors was

¹⁰ Among the 19 countries surveyed by TASAI, these countries have released the most varieties.



approved in 2018. It was noted that before private seed inspectors could start operating, they have to obtain letters of commitment from their employers safeguarding their independence without undue influence or threats. They will then be attached to experienced public inspectors in order to attain the acceptable level of competency, after which KEPHIS would reduce its role in seed inspection and allow them to operate independently. Such a process has worked very well in other countries such as Zambia. Seed companies are institutionalizing the new mode of engagement before they deploy the trained private inspectors.

Efforts to stamp out fake seed

Seed companies indicated that they received a total of 17 reports of fake seed sales involving forgery of packaging materials in 2017. This figure is likely to be an underestimate, as most cases of fake seed sales are not officially reported since the trade is illegal. Some seed companies collude with conmen/unethical businessmen to produce packaging materials in excess of the orders they receive from seed companies. The excess packaging materials are then used by conmen to package and sell uncertified seed.

However, seed companies are satisfied with government efforts to stamp out fake seed, rating their satisfaction at 72%. This is a significant improvement from the rating of 50% given in 2015 and 39% in 2013. Furthermore, alongside Rwanda, this is the highest rating out of all countries where the TASAI study has been conducted (Figure 7).

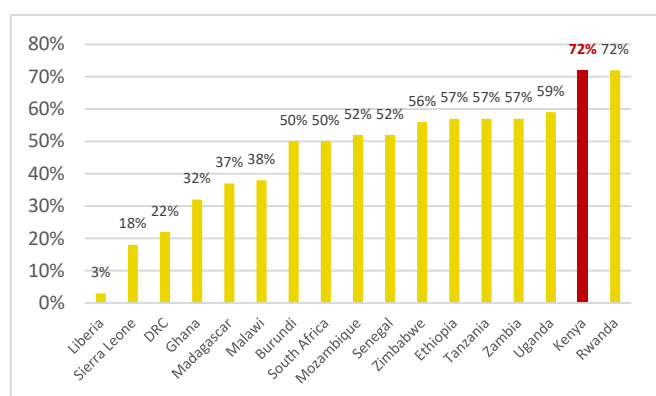


Figure 7: Satisfaction with government efforts to address fake seed

Additional efforts employed by the government to eliminate fake seed include a review of seed laws and regulations to foster compliance, human and physical capacity-building within KEPHIS, industry awareness through print and radio media, enhancing collaboration with police and

other agencies, the roll-out of a free Short Message Service (SMS)-based system called *Mulika Mbegu Mbovu* (Stop Bad Seed), which enables farmers to report seed quality problems directly to KEPHIS, the creation of awareness among farmers on how to identify fake seed, and encouraging farmers to buy seed from approved sellers and not from open markets.

It was found that the seed label has been very effective in stamping out fake seed, as each packet of seed has a unique code which a farmer can send to a KEPHIS system for verification of particular seed materials. Seed companies rated the effectiveness of this technology in eradicating fake seed at 81%, since it is still new and some farmers have not been activating the labels. According to seed companies, in 2017 almost all of the seed sold (98.5%) included the new seed labels.

Use of smart subsidies

The Ministry of Agriculture, Livestock and Fisheries is implementing a national agro-input subsidy program called the National Accelerated Agricultural Inputs Access Programme (NAAIAP). Started in 2007, the NAAIAP has been implemented in 44 out of Kenya's 47 counties with the objective of raising the productivity of resource-poor farmers. The target has been households with less than 1 hectare of land. The subsidy provides 10 kg of maize seed, 50 kg of planting fertilizer and 50 kg of fertilizer to be used as top dressing. Hybrid maize is provided in suitable regions, while OPVs are used in the drier eastern parts of the country (MALF 2013). To date, the NAAIAP has reached 536,000 farmers against a target of 2.5 million farmers. Average yields from participating farmers have increased from 288 kg per ha to 1,080 kg per ha. To date, 5,126 MT of maize seeds have been supplied by the 5,113 accredited agro-dealers that the NAAIAP works with (Jacob Mutua, 2019).

Following the devolution of agriculture to county governments from 2013 onwards, several counties have taken over NAAIAP activities, and now implement their own seed subsidy programs. This study focused on six counties that implemented the county-based seed subsidy programs for different crops: Kakamega, Siaya, Tharaka Nithi, Laikipia, Embu and Machakos. In total, ten seed companies participated in the county governments' subsidy programs in 2017. Whereas some counties paid for seed before delivery, others received seed on credit. In most cases, seed companies delivered seed to the county



headquarters, from where seed was then shared to sub-counties, wards and finally to farmers. In those counties, the subsidy was 100%, meaning the county government paid for the whole cost of seed, including procurement and distribution. Farmers were, however, expected to collect seed from ward headquarters, chiefs' offices or village elders' bases. Individual farmers' needs related to farm size, crop or variety preferences were not considered. This is because county procurement staff oversaw the process with little or no consultation with the competent agriculture staff or KEPHIS. To overcome these challenges, KEPHIS is liaising with counties to provide lists of registered seed merchants, retrain their agricultural staff on the standards and procedures for accessing quality seeds. KEPHIS is also urging counties to send samples of procured seed to KEPHIS labs for testing on quality before they are distributed to farmers.

In 2017, maize was the most subsidized seed (about 839 tons), followed by sorghum (141 tons), bean (50 tons) and cowpea (42 tons). However, the quantities for maize and bean were relatively small, representing about 1.9% and 4.3% of the national total seed sales for these crops, respectively. For sorghum and cowpea, the proportions were higher, at 16% and 14%, respectively.

Seed supply was open to all registered seed merchants. However, the county governments preferred buying seed mainly from government parastatals because it was easier to obtain seed on credit through a government-to-government transaction.

The seed subsidy from county governments has the potential to expand access to quality seed as well as to expand the market for seed companies. However, it also risks undermining future market development and seed companies' marketing efforts and can encourage farmer dependency on free seed programs. It is too early to gauge the success or failure of these particular programs.

Seed companies rated all aspects of the seed subsidy process as only "fair": transparency of the seed procurement process (51%); clarity in requirements and procedures (54%); efficiency in government payments (41%); and predictability in the procurement process (51%).

INSTITUTIONAL SUPPORT

Availability of extension services

The main role of both private and public extension officers is to train farmers on the management of particular varieties for achievement of optimal yields and returns. The number of extension personnel in Kenya has been declining since 2012, when various government activities in the agriculture sector (including extension services) were devolved from the national ministry to the county governments. It is estimated that by 2017, there were only 5,000 public extension workers in Kenya, translating to an extension worker-to-farmer ratio of 1:950. To promote seed sales, seed companies have to employ their own extension officers who operate as marketers or agronomists.

Given the low number of public extension workers, seed companies interviewed rated their satisfaction with the adequacy of extension services as "poor" (48%). They noted that public extension officers are not usually considered to be effective in their work, as they are not well facilitated by the county governments.

Effectiveness of seed promotion activities

This section tracks seed companies' opinions on the effectiveness of seed demonstrations and field days. These are used by seed companies to stimulate the diffusion of varieties. Between 2015 and 2017, 78% of seed companies (14 out of 18) used seed demonstrations. They rated the effectiveness of this approach as "excellent" (81%) for enhancing diffusion. In addition, 73% of the seed companies (15 out of 18) used field days. They rated the effectiveness of that approach as "good" (73%).

Field demonstrations enable farmers to compare improved varieties and create opportunities for farmers to interact with seed and other input suppliers. Seed companies indicated that they appreciated both approaches.

Table 7: Opinion on effectiveness of seed promotion

Indicators of seed promotion	Seed demonstrations	Field days
No. of companies using this promotion activity (out of 18)	14	15
Effectiveness of seed promotion (100% is extremely effective)	81%	73%



Quality of the national seed trade association

Formed in 1982, the Seed Trade Association of Kenya (STAK) is the umbrella association of the private sector seed industry in Kenya. STAK currently has 38 members. Sixteen out of the 18 seed companies interviewed in this study are STAK members.

To gauge the performance of STAK, seed companies were asked to rate various important aspects related to its mandate and functions. STAK's overall performance was rated at an average of 61%, an improvement from the rating of 53% in 2013. The results showed that STAK still needs to work on its managerial ability, ensuring provision of value to members and its ability to mobilize resources. All the three aspects were rated below 60% (Figure 8).

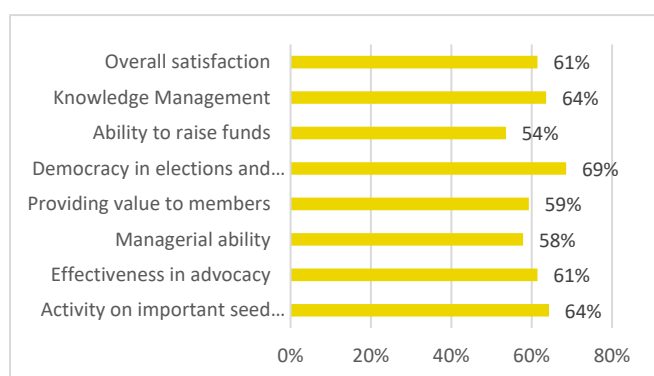


Figure 8: Members' satisfaction with national seed associations

The overall “good” rating may arise in part from the high expectations that members have of STAK, as these high expectations lead them to rate STAK relatively harshly. The association supports its members in various ways, namely: advocacy for a better regulatory environment in the country's seed sector; representing the private sector in efforts to develop regional harmonized seed laws and regulations for COMESA and the East African Community (EAC); working closely with KEPHIS in the design and roll-out of seed security labels; working with the CIMMYT and other organizations to respond to emerging diseases and pests, and linking members to regional and international organizations that have interests in Kenya's seed sector. In addition, STAK convenes or co-convenes more than 20 seed industry-related meetings each year, most notably the Annual STAK Congress.

All the respondents who were not active members indicated their willingness to join STAK in the future. One STAK member expressed two concerns about the association: i), the member alleged that some STAK members sell counterfeit seed;

and ii), the STAK board is dominated by men. In addition, seed companies who are non-members are already “free-riding,” since all STAK achievements, such as improvement of the regulatory environment, benefit both members and non-members.

Among the countries where TASAI studies have been conducted, the associations with higher ratings than STAK are the South African National Seed Organization (SANSOR) at 83%, the Seed Trade Association of Malawi (STAM) at 73%, Tanzania Seed Trade Association (TASTA) at 71%, Zambia Seed Trade Association (ZASTA) and the Ethiopian Seed Association (ESA) at 62% (Figure 9)¹¹.

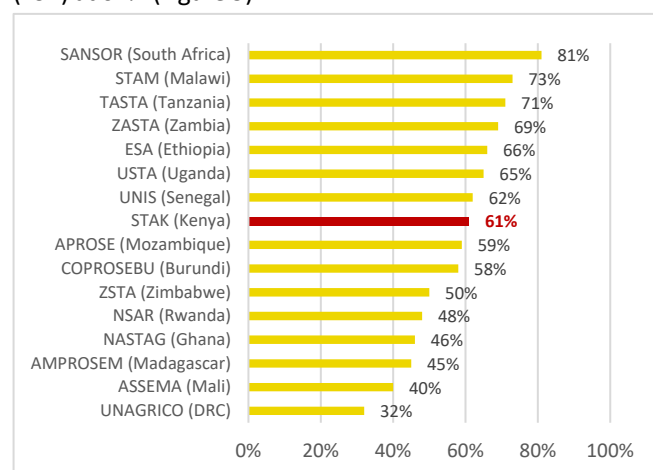


Figure 9: Overall ratings of national seed associations.

Concentration of rural agro-dealer network

All of the seed companies work with agro-dealers. The number of agro-dealers each company works with ranges from 21 to 3,000. The huge difference between the minimum and maximum figures indicates the large variation in the scales of operation among the seed companies.

The ratio of agro-dealers to agriculture households was 1:910. As expected, there were high concentrations of agro-dealers in maize-growing areas. For example, Nakuru and Embu counties had over 300 agro-dealers each, while Samburu county had only 8 agro-dealers (Seed Sector Platform KENYA, 2018).

¹¹ Out of the 18 countries, Liberia and Sierra Leone don't have active seed associations.



Availability of seed in small packages

Over 80% of the seed of the four study crops was sold in packages of 2kg or less. Seed companies were satisfied with the package sizes, with satisfaction ratings ranging from 83% to 86%. Seed companies packaged seed according to crops and farm sizes. For companies that are dominant in high potential areas of Rift Valley, where farmers have relatively large maize farms, seed is mainly sold in packages weighing more than 2kg. For cowpea, which is mostly a small-scale production crop, 100% of the seed is packaged in smaller packets of 2kg and less (Figure 10).

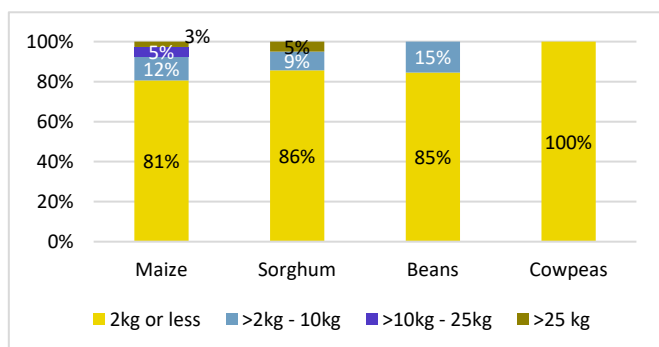


Figure 10: Percentage of seed sold in different package sizes

Seed-to-grain price ratio

Maize and sorghum have very high seed-to-grain ratios at the time of planting: 5.7:1 for hybrid maize, 5.1:1 for OPV maize and 4.3:1 for sorghum. Such a high ratio can motivate traders of fake seed to buy grain from the market and package it as seed. However, a comparison of prices per kg of hybrid maize in other countries paints a different picture. The average price per kg of hybrid maize seed in Kenya (US \$2.00) is among the lowest among the African countries covered in the TASAI studies (Figure 11).

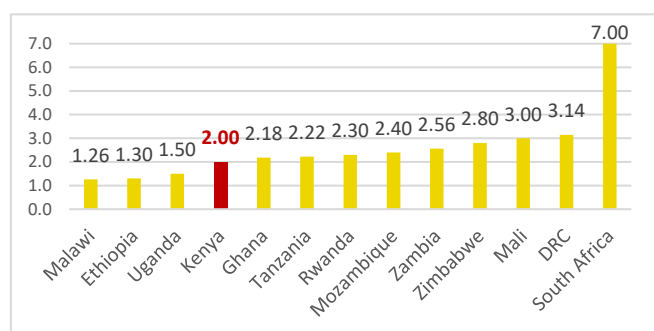


Figure 9: Average price (in USD) of hybrid maize in selected African countries

CONCLUSION

Kenya's seed sector is at the growth stage of development. Compared to previous TASAI studies conducted in 2013 and 2015, the seed industry in Kenya has made notable improvements in 2018. In addition, for various indicators, Kenya's seed industry outperforms many others across Africa. The improved performance bodes well for the sustainable growth of the sector.

To highlight a few positive indicators: The volume of seed sold has increased for some for the key crops, most notably maize, which is the dominant seed crop in the country; the number of varieties released and sold to farmers has increased over the years; seed companies have a favorable opinion of the import process, owing to the reduction in the number of days required to import seed; the introduction and roll-out of seed security labels has improved seed companies' perceptions of the government's efforts to address the challenge of counterfeit seed; and seed companies are satisfied with STAK's efforts as a platform for the private sector in their engagements with the government and other actors in the seed industry.

However, despite these notable successes, the industry still has more room for growth and improvement.

There is a need **to improve the availability of foundation seed for bean, cowpea and sorghum seed**, as several Kenyan-owned companies face challenges in accessing this material in sufficient quantities and in a timely manner.

There is a **need to improve the variety release process in Kenya**, which is notably longer and more costly than in other African countries. The process has been one of the primary concerns of seed companies, which view it as time-consuming and bureaucratic.

KEPHIS and STAK need to sustain their ongoing efforts to address counterfeit seed in the country. The new seed security labels are a key innovation in the industry and have contributed significantly to seed companies' appreciation of the government's efforts in responding to this problem. To sustain these efforts, there is a need for increased awareness-raising targeting agro-dealers and farmers. In addition, seed companies need to be routinely trained on the technical aspects of the seed labels.

STAK should sustain its efforts as a platform for the seed industry in Kenya. STAK is actively engaged in the key seed industry activities in the country. However, there is



still room for improvement. To improve, the STAK secretariat could proactively reach out to its current members to better understand their priorities and expectations. In addition, STAK could reach out to non-members, with the intention of increasing its relevance as an umbrella association for the private sector seed industry. These efforts would necessitate the STAK secretariat to increase its revenue base.

Seed companies should sustain their farmer awareness and outreach efforts by continuing to hold seed field days and demonstrations. These activities have shown to be very effective methods for market development through farmer outreach.

KEPHIS should sustain ongoing efforts to authorize private seed inspectors and seed laboratories. As the country's seed industry grows, the need for timely seed inspection and laboratory analysis services will also grow.

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APPENDIX 1.

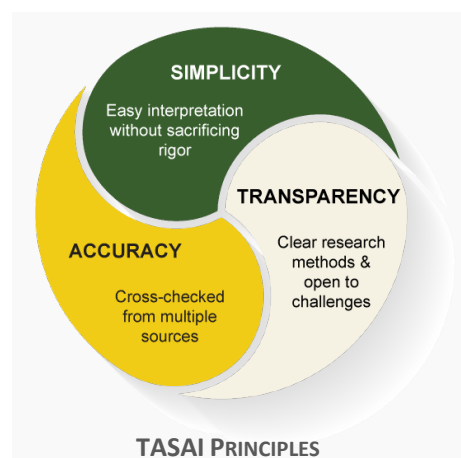
For a comparison of TASAI Indicators across different countries, please visit: <http://tasai.org/wp-content/uploads/TASAI-Appendix-CURRENT.pdf>



ABOUT THE AFRICAN SEED ACCESS INDEX

The **African Seed Access Index (TASAI)** is a seed industry research initiative housed at **Market Matters Inc.** (MM Inc.). **TASAI's goal** is to encourage African governments and other seed industry players to create and maintain enabling environments that will accelerate the development of a vibrant private sector-led seed system serving smallholder farmers. It is this enabling environment that TASAI seeks to measure, track and compare across Africa countries.

To assess the status of the seed industry value chain, TASAI employs **20 indicators** grouped into five categories: **Research and Development, Industry Competitiveness, Policy and Regulations, Institutional Support and Service to Smallholder Farmers.**



By the end of 2019, TASAI studies will have been completed in **21 African countries**: Burkina Faso, Burundi, Cote d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. In each country, TASAI **works closely with local seed industry actors**, government and international development agencies to share the TASAI findings and to identify the next steps for creating a vibrant national seed sector.

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