



TASAI
THE AFRICAN SEED ACCESS INDEX



Kenya Brief 2016 - The African Seed Access Index

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December 2016

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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 to smallholder farmers in Kenya. This country brief summarizes the key findings of The African Seed Access Index (TASAI) study conducted in 2016 to appraise the structure and economic performance of Kenya's seed sector. With a focus on four grain crops that are important to food security—maize, sorghum, beans and cowpea—the study evaluates the enabling environment for a vibrant formal seed sector. It covers 19 indicators that are divided into the following categories: Research and Development, Industry Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers. To give perspective, this brief assesses the performance of Kenya's seed industry over time, as a similar study was conducted in 2013. It also offers a comparison to Uganda's seed industry, where similar studies were conducted in 2013 and 2016. Appendix 1 summarizes all 19 indicators across the two countries. TASAI seeks to encourage public policy makers and development agencies to create and maintain enabling environments that will accelerate the development of competitive formal seed systems serving smallholder farmers.

Overview

Like 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 where farmers produce, obtain, maintain, develop, and distribute seed resources, from one growing season to the next (FAO, 1998). Because of limited exposure, low availability of most varieties, inability to purchase seeds, limited access to agro-dealers, or other reasons, most smallholder farmers in Kenya still rely at least in part on informal seed systems. In cases where the farmer is unable to retain part of the harvest, or where a farmer decides to plant a different variety, seed is generally acquired from the local community, including markets as well as farmers' social networks. This is true particularly for crops other than maize. Standards in the informal seed systems are not monitored or controlled by government policies and regulations; rather, they are guided by indigenous knowledge and standards, and by social structures.

The formal sector focuses on breeding and evaluating improved varieties, and producing and selling seed of these varieties that is certified by the Kenya Plant Health Inspectorate Service (KEPHIS), the government entity responsible for regulating seed in Kenya. As shown in Table 1, Kenya's formal seed sector comprises numerous institutions, including government (e.g., KALRO, KEPHIS, public universities, and county extension agents), parastatals (e.g., Kenya Seed Company, Simlaw, KALRO Seed Unit), private sector (MNCs and local seed companies), and development agents (NGOs and CBOs). Associations such as the Plant Breeders Association of Kenya and the Seed Trade Association of Kenya (STAK) also play an important role in information sharing and advancement of members' interests.

Table 1: Role of key players in Kenya's formal seed sector

ROLE	KEY PLAYERS
Research and breeding	KALRO; CGIARs, universities; MNCs; local seed companies
Variety release & regulation	KEPHIS
Breeder and foundation seed production	KALRO; Universities; CGIARs; MNCs; local seed companies
Seed production	KALRO, local seed companies, MNCs, community organizations
Processing and packaging	KALRO Seed Unit, local seed companies; MNCs
Education, training, extension	Universities, Seed companies, extension agents, NGOs, rural agro-dealers
Distribution and sales	Private sector seed merchants; Kenya Seed Company, KALRO Seed Unit and other parastatals, rural agro-dealers; NGOs

Key Acronyms: AFSTA - African Seed Trade Association; CBO - Community Based Organization; ISTA – International Seed Testing Authority; KALRO - Kenya Agriculture and Livestock Research Organization; KEPHIS - Kenya Plant Health Inspectorate Service; MNC - Multinational Corporation; NGO - Non-Governmental Organization; STAK - Seed Trade Association of Kenya.



Number of active breeders

For the four focus crops (maize, sorghum, beans, and cowpeas), in 2015 Kenya had 37 public and 26 private breeders serving over 6 million farming households. Of these 63 breeders, 34 specialize in maize, 17 in beans, 7 in sorghum, and 5 in cowpeas. The number of breeders has decreased by 5 since 2013, as four of the breeders moved to other jobs and one of them has passed away. The reduction in the number of breeders exacerbates an already existing shortage of breeding expertise in Kenya. Discussions with seed sector stakeholders further highlighted a scarcity of breeders outside of the four focus crops, and revealed that, as a result, a number of scientists are engaged in the breeding of more than one crop, often in areas outside their core specialization. The limited breeding capacity in turn reduces the number of crop varieties available, thus limiting choice in the seed market. Kenya's wider agro-ecological diversity also translates to more work for breeders. On average, seed companies rate the adequacy of breeders at 59% (fair).

Varieties released in the last 3 years

In the three years between 2013 and 2015, KEPHIS released 35 maize varieties, 15 sorghum varieties, 10 bean varieties, and 2 cowpea varieties. The three-year moving average for maize and beans increased in 2015, while that of cowpeas remained the same. Sorghum on the other hand registered a decline in the moving average for the same period (Figure 1). It is particularly important to note that 2015 was a good year for beans, with 6 new varieties released. This is mainly due to implementation of breeding agreements or partnerships between the public and private companies. Figure 1 shows that the latest three-year average for maize is 20 varieties, which is also significantly higher than the other three crops. Most of the new maize variety releases in the past three years were done by parastatals and local private companies in partnerships with international research organizations operating in the country.

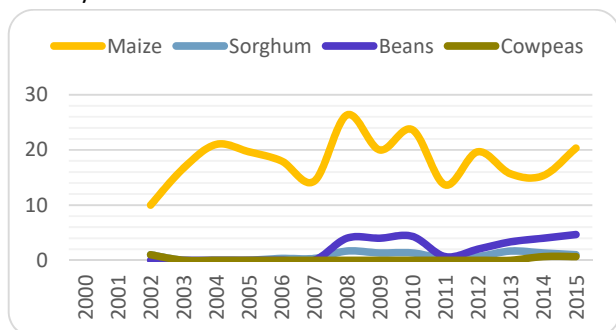


Figure 1: Number of varieties released in Kenya (three year moving average)

Over the years, maize breeding has been given more attention than other crops. For example, there were no releases of cowpea varieties between 2001 and 2013, compared to more than 200 maize variety releases over the same period. This is in part because maize is the most widely cultivated crop in the country, given its importance for food security. Also, the productivity of hybrid maize declines significantly whenever seed is recycled, unlike beans and cowpeas that are openly pollinated. This “ability to recycle” lowers demand for bean and cowpea seed, thereby discouraging investment in pulses.

Availability of foundation seed

On average, seed companies scored their satisfaction with the availability of foundation seed as 60%. (All scores reported in this brief are based on industry self-reporting of satisfaction). While this is rated as “good,” it is important to take a closer look at the numbers, which reveal that private seed companies are less satisfied (42%) than the parastatals (72%). This is because parastatals have their own breeders and produce their own foundation seed. By contrast, most of the private seed companies source foundation seed for beans and cowpeas from KALRO. The ratings for the parastatals have not improved since the 2013 study.

Average age of varieties sold

Some of the varieties on the Kenyan market are old and may not meet the challenges facing farmers today. The average age of varieties on the market in 2015 was as follows: maize – 9.4 years, sorghum – 24.1 years, beans – 14.7 years, and cowpeas – 16.9 years. Note that since data on seed sales by variety is considered strategic by seed companies, the reported mean is a simple average that is not weighted by sales volume. While the average age of varieties is relatively old, it is important to note that maize, beans, and cowpeas all have several varieties that have been on the market for less than three years. Sorghum is the exception, where even the youngest variety is ten years old. The oldest varieties on the market for each crop are as follows: maize – 49 years, sorghum – 46 years, beans – 34 years, and cowpeas – 29 years. It is worth considering if the government should put in place measures to retire old varieties. Old varieties exist because of continuous demand from farmers.

Percentage of 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 tolerance to extreme weather conditions such as drought, flooding, or frost. Most of the varieties – half of all the



maize varieties, and all of the sorghum and cowpea varieties – released between 2013 and 2015 are characterized as either early-maturing or drought-tolerant. In contrast, only 5 out of 14 bean varieties are considered climate-smart. Early maturity is the most common climate-smart feature in maize and bean varieties, while sorghum and cowpea varieties were bred for drought-tolerance. This is due to the agro-ecological areas where these crops are grown.

INDUSTRY COMPETITIVENESS

Number of active seed companies

The number of registered seed companies in Kenya has grown from less than 10 at the turn of the millennium to 112 in 2016. These companies can be categorized as parastatals, local private companies, African multinationals, and non-African multinationals. However, most registered seed companies are in fact seed merchants that are not involved in seed production or any breeding activities. They import seed, often for their own commercial agricultural activities, and only distribute seed within their own commercial production enterprises. Out of the 112 seed companies, only 22 are active in their own seed production and/or marketing of at least one of the four study crops. Maize seed is currently produced by 19 companies, sorghum by nine companies, beans by 12 companies, and cowpea by nine companies. The total number of companies dealing with any of the four crops has increased slightly from 21 in 2013 to 22 in 2015, due to recent recognition of Maseno University as an active seed producer. Out of the 22 active seed companies, 15 are privately-owned, four are public entities, and three are universities. All seed companies surveyed felt that there was still room on the market for more seed companies.

Time it takes to import/export seed

The time it takes to import seed is rated by seed companies as fair at 50%. On average in 2015, it took 38 days to import seeds (down from 43 days in 2013) and 14 days to export seeds. The difference in length of time for import versus export of seed reflects the more stringent import requirements in place in Kenya compared to its trading partners, including Uganda and Tanzania. Seed companies in Uganda report taking only 6 days on average to import and 9 days to export seeds in 2015. The short import/export process is attributed to significant improvements in customs procedures implemented by the Uganda Revenue Authority. In 2015, seed imports into Kenya were mostly from Zambia and South Africa, while exports went to other East African countries such as Burundi, Rwanda, Somalia, South Sudan, Tanzania, and

Uganda. Two seed companies rely almost entirely on imports of their seed stocks from parent companies.

Market share of top seed companies

The combined market shares for the top four companies producing maize, sorghum, beans and cowpeas are represented in Figure 2. For maize, beans and cowpeas, the combined market share of the top four companies, while still high, was slightly lower in 2015 than in 2013. The most notable decrease (from 95% in 2013 to 82% in 2015) in market concentration was observed in the bean seed market. This decrease is attributed to the increase in the number of seed companies in the market, which went up from 8 to 12 between 2013 and 2015.

The Herfindahl-Hirschman Index (a way to quantify industry competitiveness) is also given in Appendix 1. (The index ranges from near zero for perfect competition to 10,000 for pure monopoly). Both measurements show an industry that is dominated by a few large players. Market concentration increased significantly for the sorghum seed market between 2013 and 2015. The main reason for this increase is that one company doubled its production, and consequently its market share, over the past two years. Reflecting these developments, the HHI for sorghum also rose from 1,974 in 2013 to 4,576 in 2015.

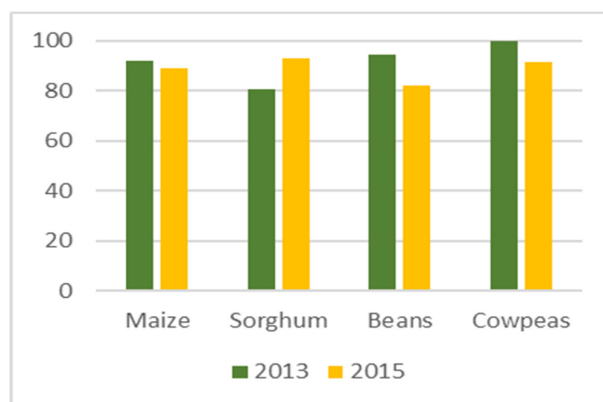


Figure 2: Market share (%) of top four companies

The HHI index shows that there is fair competition in only the bean seed market. The competition in the other three crops is categorized as poor or extremely poor. In 2015, maize contributed 93% of the seed market size, out of the total of the four crops. This is a slight decrease from 97% in 2013.

Market share of government parastatals

In Kenya a large share of the seed market is still controlled by the government parastatals, which dominate the market in maize (68% market share), beans (64% market share), and cowpeas (86% market share). While there are



no regulatory barriers to entry into the Kenyan seed sector, private-sector participants have expressed that the dominance of state-supported players is discouraging to potential investors. With the exception of cowpeas, the combined market share of public companies fell slightly from 2013 to 2015.

SEED POLICY AND REGULATIONS

Length of variety release process

It takes an average of 33 months for a variety to go through the release process with slight variation by crop as follows: 32 months for maize, 36 months for sorghum and cowpeas, and 30 months for beans. This is a slight improvement from the average time of 36 months reported in 2013. Seed companies rated their satisfaction with this duration as “poor,” with an average satisfaction rating of 47%. The companies noted that KEPHIS continues to rely on rain-fed trials and suggested that it should switch to irrigated trials. Also, the commercial interest of the applicant, or speed with which the applicant is able to provide the required information and fees, may affect the duration of the variety release process. Notably, the length of the process is significantly longer than in Uganda, where on average it takes only 19 ½ months to release a new variety.

Quality of seed policy

Kenya’s Seed Policy was last updated in 2010. The quality of the seed policy framework is measured as an opinion rating by seed companies. This rating remained almost unchanged from 65% in 2013 to 62% in 2015. According to several seed companies, there have been a number of positive movements including reforms at KEPHIS that have made the organization more efficient. While seed producers in Kenya had varying opinions on seed policy, the majority were of the view that seed trade is overregulated and costly to seed companies.

Quality of seed regulation and enforcement

Satisfaction with the quality of seed laws and regulations remained relatively unchanged from 61% in 2013 to 63% in 2015. However, satisfaction with the quality of the enforcement system went up slightly from 53% to 61%. Most of the companies were hopeful that the regulatory environment would improve since the main regulator (KEPHIS) has started accommodating their views. However, the actual impact of this positive gesture by KEPHIS was not captured in the 2015 data collected since it had just been initiated (in December 2015).

That said, the industry highlighted certain areas where more attention is needed, namely:

- improving the inspection/certification process by reducing the number of authorization steps;
- lowering charges for seed trials and packaging labels, mark of quality, and licensing fees;
- supporting seed dissemination to smallholder farmers;
- increasing KEPHIS’ capacity to handle many concurrent seed trials to reduce the length of the variety release process, or alternatively accrediting additional private certification bodies;
- fast-tracking the process of acquiring an import permit;
- institutionalizing the self-regulation of seed certification.

By November 2016, the Seeds and Plant Varieties (Plant Breeders Rights) Regulations (2016) and the Seeds and Plant Varieties (Seeds) regulations (2016) had been submitted to the Government printers for publication. In addition, Kenya is also in the process of harmonizing the seed regulations to conform to the COMESA Seed Trade Regulations. This will have an impact on KEPHIS guidelines for seed certification and the Seed and Plant Varieties Act (CAP 326), among other policy instruments.

Adequacy of seed inspectors

Seed companies’ satisfaction with the availability of inspection services is rated as “good” at an average of 62%. This is similar to the rating in 2013 (64%). KEPHIS employs hundreds of staff, of whom 64 are involved in seed inspections. This is a slight increase from 60 inspectors in 2013. To ensure effectiveness and efficiency in service delivery, KEPHIS has distributed inspectors to key sites, including all formal border points and international airports. Also, KEPHIS may, in consultation with the most active seed companies, set up a desk/office within their premises. Seed companies expressed concern about the limited inspection at retail level may result in stocking expired seed, fake seeds, or illegal repackaging.

Efforts to stamp out fake seed

Government efforts to stamp out fake seed are rated by the industry as “fair” with a score of 50%. This is an improvement from the rating of 39% in 2013. KEPHIS indicated receiving an average of 6 reports of fake seed per year, which is a reduction from 36 cases in 2013. However, this may be partly due to under-reporting. Seed companies noted that there have been some efforts to



stamp out fake seeds as KEPHIS has tightened enforcement systems at the agro-dealer level. However, the greatest hindrance is still the lenience of law enforcers (police and courts). It is important to note that in 2015, KEPHIS in collaboration with the Seed Trade Association of Kenya (STAK) introduced several security measures on seed packets to address the challenge of fake seed, including an embossed KEPHIS logo on gold foil and lot numbers. What remains now is raising awareness of these features among farmers.

INSTITUTIONAL SUPPORT

Availability of extension services

According to the Centre for Agriculture and Biosciences International (CABI), the ratio of public sector extension workers to farmers in Kenya is about 1:910. This is a slight improvement from the 2013 ratio of 1:1000, but it is still lower than the desired level of 1:400. However, this number is likely to change as extension service provision will soon be fully devolved to the county level (meaning that the counties will manage the extension systems at their level). In addition, seed companies employ their own extension agents who double as salespersons. The total number of extension staff from these companies dropped from 197 in 2013 to 135 in 2015. However, this excludes over 500 extension officers employed by the government parastatal, ADC. Seed companies rated their satisfaction with availability of extension services at an average of 51%. Most seed companies believe that lack of farmer awareness of improved seed is a major impediment to wide-scale adoption in Kenya

Quality of national seed trade association

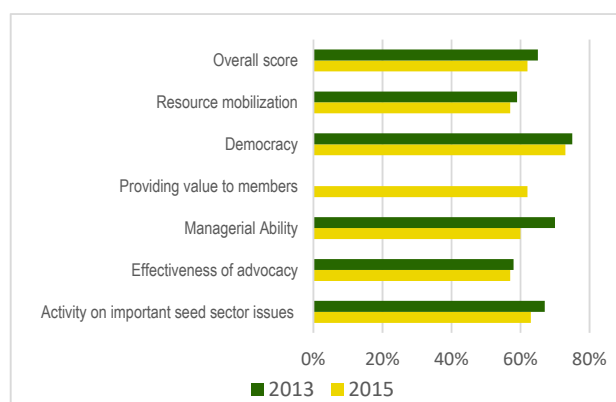


Figure 3: Members' satisfaction with STAK

The Seed Trade Association of Kenya (STAK) is the recognized national voice for the seed industry. The STAK membership in 2016 was 32. Figure 3 breaks down the level of members' satisfaction of STAK, in seven different attributes. The services offered by STAK are, on average, rated

as "good" by its members with a score of 62%. This is similar to seed companies' overall rating of 65% in 2013. In both years, STAK is rated well in aspects of democracy and fairness in elections, management capacity and activity level on important seed sector issues. However, seed companies note that STAK could improve in areas of advocacy towards government and in resource mobilization. On average, STAK is rated higher than the Uganda Seed Traders' Association (USTA), which scored 51%.

SERVICE TO SMALLHOLDER FARMERS

Concentration of rural agro-dealer network

The recently launched Seed Sector Platform KENYA (www.seedsectorplatformkenya.com) lists over 5,240 agro-dealers in Kenya. This is 15% higher than the number in KEPHIS records. The number is significantly higher than in Uganda, which has about 1,167 agro-dealers. It is common in Kenya to find small towns and markets with more than one agro-dealer, commonly referred to as agro-vet, given their involvement in both agricultural and veterinary inputs. While the number of agro-dealers may be adequate, seed companies' level of satisfaction with agro-dealers varied. In general, larger companies rated agro-vets higher than smaller companies, because agro-dealers tend to prefer dealing with bigger and better-known companies whose products are more popular among farmers.

Availability of seed in small packages

Kenyan seed companies perform well when it comes to making seeds available in small packages that meet the needs of smallholder farmers. In 2015, 79% of the seed sold by the seed companies was packaged in bags weighing 2 kg or less. While this number is down from 89% in 2013, it still represents an excellent rating. The figures for individual crops are as follows: 73% for maize, 96% for sorghum, 93% for beans and 100% for cowpeas. Small packages are an important incentive to promote the utilization of certified seed among smallholder farmers. Kenya's smallholder farmers account for over 75% of the total agricultural output and about 70% of marketed agricultural produce. They work land sizes of about 0.2 to 3 hectares. Given the seed rate for different crops, such smallholder farmers often demand small packages in order to minimize surpluses that may go to waste. Small packages also allow smallholder farmers to experiment with different varieties of the same crop. The advantages of small packages notwithstanding, seed companies expressed concern about the high cost of packaging and labels, which render small packages less economically viable. This fact has contributed to the slight reduction in the availability of seed in small packages.



Seed-to-grain price ratio

Assuming stable grain prices at planting time, seed-to-grain price ratios capture two aspects of seed systems. First is the extent to which a crop variety is improved, as reflected in the costs of seed production; second is the cost of transacting in the seed market (Nagarajan & Smale, 2005). In other words, a high ratio (implying a high seed price) either denotes a high-yielding seed or high transaction costs. The findings reveal that the high-yielding maize hybrid seeds have the highest ratios (4 for hybrids from public companies and 5 for hybrids from multinational companies). The ratios for lower-yielding crops such as cowpeas and beans are less than 2. Given these ratios, the price of seed in Kenya does not appear to be a major constraint to adoption of certified seed.

OPPORTUNITIES AND CHALLENGES

The private sector is responding to the increasing demand for certified seeds in Kenya. This is evidenced by an increase in the number of seed companies, higher market share of private seed companies in some of the key crops, and more varieties being released between 2013 and 2015. In addition, seed policy harmonization efforts within the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) present the industry with wider market opportunities. Further, there are significant developments at KEPHIS to address regulatory challenges and encourage uptake of certified seeds by farmers. These include the use of various information technology tools such as sms messaging and various online services aimed at disseminating key information to end users.

However, challenges persist in Kenya's formal seed sector. Since maize lethal necrosis (MLN) has become a major threat to maize production in Kenya, seed companies have had to test their seeds for the disease. This has resulted in additional costs. Reliance on rain-fed production of both seed and grain leaves the country susceptible to drought. Fake or counterfeit seed continues to be a major threat to seed companies. This problem is exacerbated by farmers' lack of knowledge to differentiate fake from genuine seeds. Corruption and rent-seeking behavior have adversely affected some local companies. Several county governments are charging extra taxes and promoting seed merchants that are based in their administrative areas to the detriment of national ones.

CONCLUSION

It has been nearly two decades since Kenya's seed sector has been liberalized. For a country with an excellent private sector reputation in many sectors (air travel, tourism, information and communication technologies, banking, flower production, horticulture for export, retailing, etc.), privatization of the crop seed sector seems to be lagging behind. The seed sector in Kenya has registered some improvements between 2013 and 2016 in the number of and satisfaction with variety releases, a slight reduction in the market share of the government parastatal, and a reduction in the number of cases of fake seed. Several indicators have not registered any significant progress over the past three years. Performance has declined on several key indicators. For example, it takes more time to import and export seed than before and there are fewer active breeders working on the four key crops. Given Kenya's strong performance in other private sector-led industries, there is room for optimism in the Kenyan seed sector. A level playing field, smart and efficient regulations, greater enforcement against fake seed can improve the enabling environment for the seed industry and can ensure timely availability of high quality seeds of improved, appropriate varieties at affordable prices to smallholder farmers in Kenya.

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APPENDIX 1. KENYA'S FORMAL SEED SECTOR, COMPARED TO UGANDA

COUNTRY PROFILE			KENYA		UGANDA	
			2013	2015	2013	2015
Focus crop 1			Maize	Maize	Maize	Maize
Focus crop 2			Sorghum	Sorghum	Sorghum	Sorghum
Focus crop 3			Beans	Beans	Beans	Beans
Focus crop 4			Cowpeas	Cowpeas	Millet	Millet
Number of farmers (millions)			6.3	6.4	8.8	9.1
Population (Million)			43	44	34.6	35.6
Size (KM ²)			569,250	569,250	197,100	197,100
Arable land (Million Ha) (% of size)			4.89	4.89	5.3	5.3
Ease of Doing Business rank (Rank out of 189)			136	108	150	122
Stage of seed sector development			Growth	Growth	Growth	Growth
A. RESEARCH AND DEVELOPMENT						
1	Number of active breeders	Maize	25	34	6	5
		Sorghum	10	7	2	3
		Beans	22	17	2	3
		Cowpeas	11	5	-	-
		Millet	-	-	1	1
		Total	68	63	11	12
		Satisfaction Score (out of 100)	--	54	36	28
2	Varieties released in last 3 years	Maize	47	61	18	19
		Sorghum	5	3	5	0
		Beans	10	14	11	3
		Cowpeas	0	2	-	-
		Millet	-	-	0	0
		Total	61	80	19	22
3	Availability of foundation seed	Score	68	60	43	52
4	Average age of varieties sold (years)	Maize	-	9.4	-	6.4
		Sorghum	-	24.1	-	14.5
		Beans	-	14.7	-	9.9
		Cowpeas		16.9	-	-
		Millet	-	-	-	22.7
5	Percent of varieties sold with climate–smart features (%)	Maize	-	51	-	55
		Sorghum	-	100	-	0
		Beans	-	36	-	56
		Cowpeas	-	100	-	-
		Millet	-	-	-	0
B. INDUSTRY COMPETITIVENESS						
6	Number of active crop seed companies for focus crop only	Maize	16	19	13	12
		Sorghum	8	9	8	8
		Beans	8	12	11	13
		Cowpeas	6	9	-	-
		Millet	-	-	5	2
		Total	21	22	14	13
7	Time it takes to import/export seed from neighboring countries (days)	Import seed	43	38	48	6
		Import score (out of 100)	-	50	55	71
		Export seed	-	14	18	9
		Export score (out of 100)	-	69	55	65
8	Market share concentration Herfindahl-Hirschman Index	Maize	6,450	5,438	1,509	1,317
		Sorghum	1,989	4,576	1,050	2,483
		Beans	3,223	2,472	1,125	1,269
		Cowpeas	3,240	3,505	-	-
		Millet	-	-	1,350	6,401
9	Market share of government parastatal	% mkt share	73	66	0	0



C. SEED POLICY AND REGULATIONS			KENYA		UGANDA	
			2013	2015	2013	2015
10	Length of variety release process	Time (months)	36	33	33	19.5
		Score (out of 100)		47	56	60
11	Quality of seed policy framework	Score (out of 100)	65	62	47	52
12	Quality of seed law / regulations	Score (out of 100)	61	63	44	55
	Quality of enforcement systems	Score (out of 100)	53	61	41	42
13	Adequacy of seed inspectors	Total inspectors	60	64	5	6
		Score (out of 100)	64	62	44	40
14	Efforts to stamp out fake seed	Reported cases in 1 year	36	6	-	-
		Score (out of 100)	37	50	41	37
D. INSTITUTIONAL SUPPORT						
15	Availability of extension services for smallholder farmers	Ratio to farmers	1:1000	1:910	1:3140	1:4,019
16	Quality of national seed trade association	Score (out of 100)	65	62	61	51
E. SERVICE TO SMALLHOLDER FARMERS						
17	Concentration of rural agro-dealers	Number of agro-dealers	-	5,240	2,064	1,167
18	Availability of seed in small packages (% of seed sold in packages of 2kg or less)	% volume sold	89	79	29.1	27
		Maize	89	73	24	32
		Sorghum	89	96	4	20
		Beans	100	93	27	3
		Cowpeas	100	100	-	-
		Millet	-	-	55	75
19	Seed-to-grain price ratio at planting time	Maize (OPV)	-	3.7	-	3
		Maize (Hybrid)	-	4.5	-	6
		Sorghum	-	3	-	2.3
		Beans	-	1.8	-	1.6
		Cowpeas	-	1.5	-	-
		Millet	-	-	-	1.7

Key

Score (out of 100)	80 to 100	60 to 79.99	40 to 59.99	20 to 39.99	0 to 19.99
Color Code					
Interpretation	Excellent	Good	Fair	Poor	Extremely poor
H-4 Index	<1000	1000-1999	2000-2999	3000 - 3999	>4000





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