

Kenya Country Report 2022

The African Seed Access Index

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TASAI
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LIST OF ACRONYMS

AATF	African Agricultural Technology Foundation	MoALD	Ministry of Agriculture and Livestock Development
ADC	Agricultural Development Corporation	MLND	Maize Lethal Necrosis Disease
ASAL	Arid and Semi-Arid Lands	NGOs	Non-Governmental Organizations
CIAT	International Center for Tropical Agriculture	NPT	National Performance Trials
CGA	Cereal Growers Association	NPTC	National Performance Trials Committee
CGIAR	Consultative Group on International Agricultural Research	NVRC	National Variety Release Committee
CIMMYT	International Maize and Wheat Improvement Center	PBAK	Plant Breeders Association of Kenya
COMESA	Common Market for Eastern and Southern Africa	QBS	Quali Basic Seed
DUS	Distinctness, Uniformity and Stability	STAK	Seed Trade Association of Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics	VCU	Value for Cultivation and Use
ISTA	International Seed Testing Association	WEMA	Water Efficient Maize for Africa
KALRO	Kenya Agricultural and Livestock Research Organization		
KCEP	Kenya Cereals Enhancement Programme		
KCSAP	Kenya Climate Smart Agricultural Project		
KEPHIS	Kenya Plant Health Inspectorate Service		
HHI	Herfindahl Hirschman Index		



INTRODUCTION

The increased use of productivity-enhancing technologies, including mechanization, irrigation, fertilizer, and improved seed¹, are critical to improving food and nutritional security across Africa. For field crops, a competitive formal seed sector is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. Improved seeds can deliver state-of-the-art technology to farmers including higher yields, disease and pest resistance, climate change adaptation, reduced post-harvest losses, and improved nutrition. To deliver these benefits, The African Seed Access Index (TASAI) conducts seed industry assessments at the national level and uses the findings 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 in Africa.

This report summarizes the key findings of the study conducted by TASAI in 2022 to appraise the structure and economic performance of Kenya's formal seed sector in 2021. TASAI studies focus on the four grain and legume crops important to a country's food and nutritional security (the "four focus crops"). In Kenya, these crops are maize, sorghum, bean (dry bean), and cowpea. Maize and dry bean are the most important food crops that feed over 85% of Kenyan households (Otieno et al. 2019). Cowpea and sorghum are the most important crops in the arid and semi-arid lands (ASALs), though recently, green grams (or mung beans) have been gaining popularity. This report builds on five similar TASAI studies conducted in Kenya in the following years 2014, 2016, 2018, and 2020.

1 TASAI uses "improved seed" as the short form of "quality seed of improved varieties".

OVERVIEW OF KENYA'S FORMAL SEED INDUSTRY

Like most other African countries, Kenya's seed industry consists of two systems: the informal and formal systems. This Country Report focuses almost exclusively on the formal seed systems.

The informal system refers to a system in which seed is produced, maintained, and distributed through informal networks. These activities "tend to be decentralized and might revolve around local entrepreneurship, seed banking, community-based seed production, or seed villages" (McGuire & Sperling 2016). In many cases, farmers keep seed from the last harvests and exchange it with neighbors and relatives and sell to other farmers through rural markets. Seed from this system is of variable varietal purity as well as physical and sanitary quality.² In Kenya, the informal seed sector accounts for 80-90% of seed (Ayieko et al. 2021) although this percentage is much lower in maize (about 60%). The use of informal seed is particularly common in legumes and among smallholder farmers who practice subsistence production.

The formal system is a structured and regulated value chain for the production and distribution of early generation and certified seed varieties. This process involves many actors and institutions, whose activities range from the breeding of varieties to the multiplication, processing, and distribution of certified seeds. The different stages of improved seed production are regulated by governments based on approved policies, laws, regulations and standards. The sale of seed from this system takes place through limited distribution channels such as registered seed merchants³ and agro-dealers. In Kenya, an estimated 22% of all seed used by farmers is certified seed obtained from the formal system (Tegemeo 2019). The corresponding percentages for the four focus crops are 66% for maize, 20% for bean, 15% for cowpea, and 13% for sorghum. In Kenya, the formal seed sector has been gaining popularity due to the high quality of seed that is delivered through it. This is mostly driven by the need to address agricultural challenges associated with climate change which can only be overcome by adopting improved seeds.

2 "Seed System Definitions," Agrilinks, USAID, accessed December 6, 2022 <https://www.agrilinks.org/post/seed-system-definitions>

3 The Seeds Regulations of 2016 defines "seed merchants" as "a person, firm or institution registered by KEPHIS as suitable to produce, process or market seed." In this report we use seed companies to represent seed merchants.



The Kenya Seed Policy of 2010 outlines the government's strategy to develop, promote, and regulate a modern and competitive seed industry. The Seeds and Plant Varieties Act of 2012 is the national seed law that comprehensively addresses plant breeders' rights, the variety evaluation and release processes, and harmonization with other related Acts of Parliament as well as regional and international agreements to which Kenya is a signatory. The industry is regulated by the Kenya Plant Health and Inspectorate Service (KEPHIS). Table 1 lists the agencies in charge of various aspects of Kenya's formal seed industry.

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

ROLE	KEY PLAYERS
	Domestic entities: Kenya Agricultural and Livestock Research Organization (KALRO), University of Nairobi, Egerton University, Kenyatta University, Jomo Kenyatta University of Science and Technology, Maseno University, Chuka University, Rongo University, University of Eldoret
Research and breeding	International organizations: African Agricultural Technology Foundation (AATF), AGRA, CGIAR centers such as International Maize and Wheat Improvement Center (CIMMYT), International Center for Tropical Agriculture (CIAT), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
	Seed companies (multinational, regional, and local)
Variety release and regulation	Kenya Plant Health Inspectorate Service (KEPHIS), Ministry of Agriculture and Livestock Development (MoALD)
Seed production and processing	Seed companies
Education, training, and extension	County governments, National Government, Non-Governmental Organizations (NGOs), Seed companies, AGRA
Distribution and sales	Seed companies, agro-dealers, county governments, NGOs
Advocacy	Seed Trade Association of Kenya (STAK), Cereal Growers Association (CGA), Kenya Plant Breeders Association (PBAK), Kenya National Farmers' Federation (KENAFF)

METHODS

TASAI studies cover 22 indicators divided into five categories: **Research and Development**, **Industry Competitiveness**, **Seed Policy and Regulations**, **Institutional Support**, and **Service to Smallholder Farmers** detailed in Table 2. In most TASAI studies, the bulk of the performance data reported comes from the year preceding the year in which the study is conducted (“the study year”) because that is the year for which the most recent data are available. Accordingly, the data reported in this Country Report pertain primarily to 2021; however, whenever 2022 data were available, they are included in the report.

Table 2: TASAI Indicators

	Crop-specific	Impact on seed access ^a
A RESEARCH AND DEVELOPMENT		
A1 Adequacy of active breeders	Yes	+
A2 Number of varieties released	Yes	+
A3 Number of varieties with ‘special’ features	Yes	+
A4 Availability of basic seed	Yes	+
B INDUSTRY COMPETITIVENESS		
B1 Number of active seed companies/producers	Yes	+
B2 Quantity of seed produced and sold	Yes	+
B3 Number of varieties sold	Yes	+
B4 Average age of varieties sold	Yes	-
B5 Market concentration	Yes	-
B6 Market share of state-owned seed company	Yes	-
B7 Efficiency of seed import/export processes	Yes	+
C SEED POLICY AND REGULATIONS		
C1 Length and cost of variety release process	Yes	-
C2 Status and implementation of national seed policy framework	No	+/-
C3 Harmonization with regional regulations	No	+
C4 Adequacy of efforts to eradicate counterfeit seed	No	+
C5 Use of government subsidies	No	+/-
D INSTITUTIONAL SUPPORT		
D1 Performance of national seed association	No	+
D2 Adequacy of seed inspection services	No	+
E SERVICE TO SMALLHOLDER FARMERS		
E1 Availability of agricultural extension services for smallholder farmers	No	+
E2 Concentration of agro-dealer network	No	+
E3 Availability of seed in small packages	Yes	+
E4 Seed and grain prices at planting time	Yes	+/-

^a A plus/negative sign signals a positive/negative correlation between the indicator and smallholder farmers’ access to improved seed.

To assess the progress of Kenya's formal seed sector, this Country Report draws comparisons with the findings from previous studies.⁴ In addition, since TASAI has conducted similar studies in 21 other African countries, this report also draws relevant cross-country comparisons where possible. More detailed temporal (across previous studies) and cross sectional (across other African countries) comparisons are now available through an online dashboard available at <https://www.dashboard.tasai.org>.

Using TASAI survey tools, data collection focused on three key seed industry players: seed companies, plant breeders, and representatives of government entities active in Kenya's seed sector. Of these, seed companies were the study's primary source of information. For several indicators, TASAI supplemented quantitative data with self-reported average levels of industry satisfaction on a 0-100 scale, with the following brackets: 0-19.99% **extremely poor**, 20-39.99% **poor**, 40-59.99% **fair**, 60-79.99% **good**, and 80-100% **excellent**.

In 2021, there were 185 seed merchants registered by KEPHIS to produce, process, and/or market certified seed or planting material of any crop in the country. Of these, 61 were registered to produce, process, and/or market seed of at least one of the four focus crops, and, of the 61, 23 were active in the production and sale of certified seed in 2021. All 23 active companies were interviewed for this study. Due to the high demand for maize in the country most seed companies were involved in the maize seed business (Table 3). Of the 23 seed companies that were surveyed, 18 were privately owned, while 5 were publicly owned. Senior managers from all the 23 targeted seed companies were interviewed. Table 3 gives a breakdown of seed companies surveyed for each crop.

In addition to the 23 seed company senior managers, 21 breeders from seed companies and agricultural research institutions were interviewed. The study also interviewed

4 Since the TASAI sampling methodology has improved over the course of the country studies, the number of years in the temporal comparison may vary for the different indicators.

breeders from public institutions who had not yet registered their seed units⁵ as seed companies but were actively involved in breeding any of the focus crops.

Table 3: Breakdown of respondents by crop (2021)

Crop	Number of registered seed companies (government data)	Number of registered seed companies surveyed (TASAI data)
 Maize	15	18
 Bean	9	14
 Cowpea	5	5
 Sorghum	6	10

Further, interviews were conducted with the following players in Kenya's seed sector: the Kenya Plant Health Inspectorate Service (KEPHIS); the Seed Trade Association of Kenya (STAK); the Ministry of Agriculture and Livestock Development (MoALD); some county governments;⁶ the Plant Breeders Association of Kenya (PBAK); the African Seed Trade Association (AFSTA); the Cereal Growers Association (CGA); Gatsby Africa (formerly Kenya Markets Trust); Agri Experience; the African Agricultural Technology Foundation (AATF); the International Maize and Wheat Improvement Centre (CIMMYT); the International Crops Research Institute for the Semi-Arid Crops (ICRISAT); and the Alliance for a Green Revolution in Africa (AGRA) (Table 4).

5 Seed units are specialized sections within public research institutions that produce basic seed for sale to seed companies. Since the mandates of research institutes restrict them to variety development and maintenance, they register the seed units as seed companies.

6 Kenya's devolved governance has 47 county governments. In this structure, key government agricultural functions are undertaken by the county governments.

Table 4: Other actors that were surveyed

Category of actors	Actors
Regulator	Kenya Plant Health Inspectorate Service (KEPHIS)
Other public institutions	Kenya Agricultural and Livestock Research Organization (KALRO), Universities, County governments
Ministry of Agriculture	Ministry of Agriculture and Livestock Development (MoALD), State Department for Crop Development & Agricultural Research
Private sector	Seed Trade Association of Kenya (STAK)
Other institutions	Gatsby Africa, AGRA, Agri Experience, African Agricultural Technology Foundation (AATF), International Maize and Wheat Improvement Centre (CIMMYT), International Crops Research Institute for the Semi-Arid Crops (ICRISAT), Plant Breeders Association of Kenya (PBAK), Cereal Growers Association (CGA)

RESEARCH AND DEVELOPMENT

NUMBER OF ACTIVE BREEDERS

A functioning seed system needs vibrant public and private breeding programs to develop improved varieties that respond to farmer and consumer needs. The number of active breeders is indicative of the level of investment in research and development.⁷ In addition to tracking the number of breeders working on the four focus crops, the study also measured the level of satisfaction reported by seed companies with public breeding programs. The latter reflects the ability of active breeders in public institutions to produce new varieties.

Table 5 presents the breakdown of public and private breeders for the focus crops. The public sector consists of government-owned seed companies and state corporations

⁷ TASAI studies define an “active breeder” as a breeder who is currently engaged in breeding/maintaining a variety or a breeder who had either developed and released at least one variety or was developing a variety of the crop of interest at the time of the TASAI study.

that have registered their seed units as seed companies. The private sector consists of local, regional and multinational seed companies with active breeders.

Kenya had 48 breeders in 2021. Sixty percent of the breeders worked for public entities. Of the 18 private seed companies, 13 companies employed their own breeders. Some of the locally owned private companies employed breeders on a need basis, that is when seed companies are involved in breeding activities. On the contrary, all the five surveyed government-owned seed companies operated with their own breeders, either directly or indirectly.

Due to climate change challenges and dynamic changes in food systems, the demand for varieties with diverse attributes has been increasing in the country. These trends may explain why private companies in 2021 employed 19 breeders, which is approximately 111% higher than the number of private breeders employed in 2019. The 7% increase in active breeders in the public sector (from 27 to 29) can be attributed to the inclusion of two universities that registered seed companies in 2021 although they did not have seed units.

Table 5: Number and adequacy of active breeders in Kenya

Crop	Number of public breeders		Number of private breeders		Total number of breeders			Satisfaction rating (out of 100%)		
	2019	2021	2019	2021	2017	2019	2021	2017	2019	2021
 Maize	11	14	7	10	18	18	24	61	67	65
 Bean	6	6	0	4	6	6	10	56	58	53
 Cowpea	4	3	0	2	4	4	5	47	50	55
 Sorghum	6	6	2	3	6	8	9	48	65	57
Total^a	27	29	9	19	34	35	48			

extremely poor
poor
fair
good
excellent

^a In some cases, the same breeder may work on multiple crops, so the total number of breeders may not equal the sum of breeders by crop.

The increase in the number of active breeders since 2017 indicates that Kenya's breeding capacity has grown. However, satisfaction ratings for active public breeders dropped for maize, bean and sorghum. From 2019 to 2022, seed companies' level of satisfaction with public breeders for sorghum declined from 'good' to 'fair', although the number of breeders has increased since 2017.

The study found that stakeholders in the public sector believed that the biggest problem in the seed industry was the lack of infrastructure to facilitate breeding for basic seed. Private seed companies concurred that public institutions lacked sufficient funds to run appropriate breeding programs to improve varieties of the focus crops.

As displayed in Table 6, most breeders for the four focus crops in 2021 were men - 40 men vs. 8 women breeders overall. Importantly, the ratio of men to women breeders in public vs. private entities is very different: 3:1 vs. 18:1, with the private companies surveyed employing one female breeder in 2021. The reason for the lack of women, according to private seed companies, is that breeding activities in private companies often require frequent travel to field sites, which women breeders find hard to cope with. In contrast, in public companies, about 1/3 of the breeders are women, breeders are based at research stations, thereby reducing the need for frequent travel between field sites.

Table 6: Breakdown of active breeders in Kenya by gender (2021)

Crop	Number of public breeders		Number of private breeders		Total
	Men	Women	Men	Women	
 Maize	11	3	9	1	24
 Bean	5	1	4	0	10
 Cowpea	2	1	2	0	5
 Sorghum	4	2	3	0	9
Total	22	7	18	1	48

VARIETIES RELEASED IN THE LAST THREE YEARS

The number of varieties released in each period is a good measure of the functioning of the variety development and release system. The greater the number of varieties released in a country, the higher the chances of enhancing smallholders' access to improved seed. In addition to higher yields, new varieties often carry desired traits such as climate smartness, disease/pest resistance, and nutrition-enhancements. Importantly, the release of varieties also needs to be supported by the commercialization and bulking of early generation seed before the varieties can become more accessible to farmers.

Between 2019 and 2021, 41 varieties were released: 35 maize; 5 bean; and 1 sorghum variety.⁸ This represents a significant

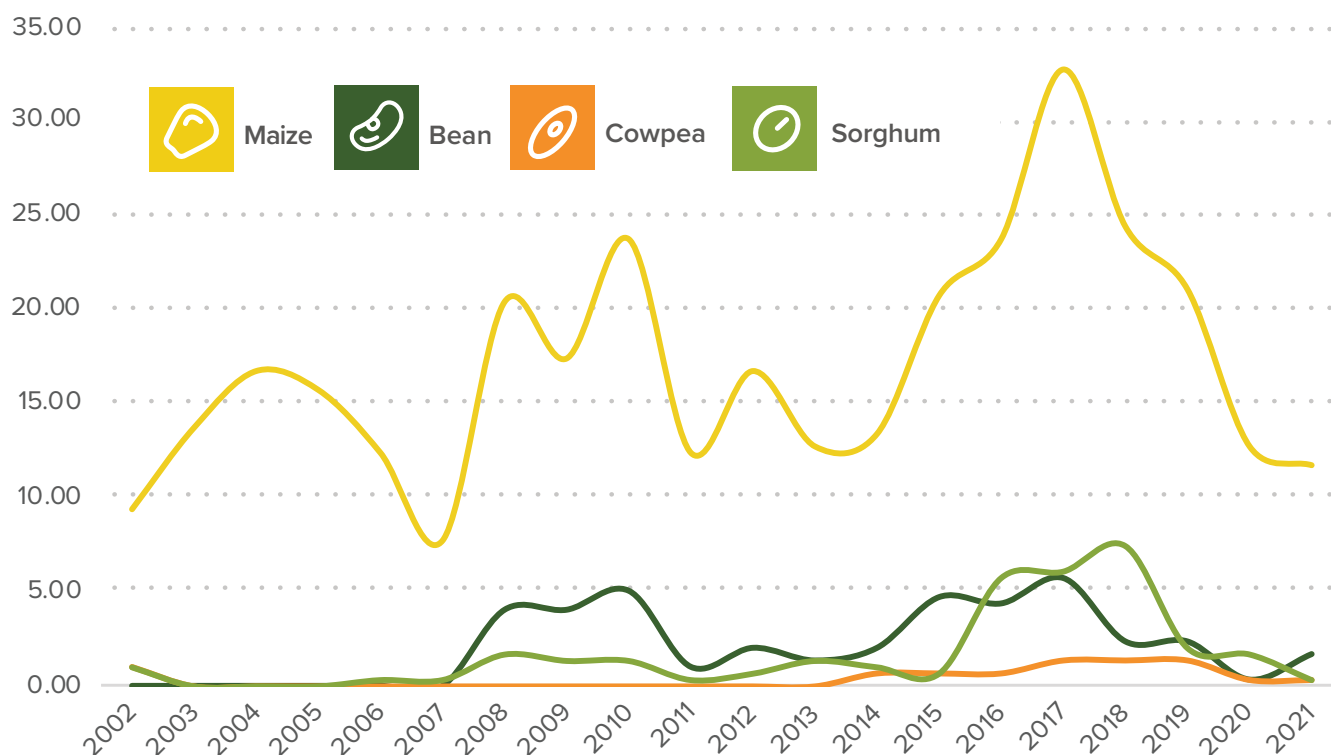
decrease from the 106 varieties released between 2016 and 2018 (73 maize, 7 bean, 4 cowpea, and 22 sorghum varieties).

Figure 1 shows the 3-year moving averages⁹ of crop variety releases between 2002 and 2021. The number of varieties released as estimated by three-year moving average has fluctuated. The sharp spikes (particularly for maize) reflect various one-off project-funded breeding activity initiatives. For example, between 2015 and 2017 the Water Efficient Maize for Africa (WEMA) breeding program brought together the African Agricultural Technology Foundation (AATF), KALRO, a private seed company, and the International Maize and Wheat Improvement Center (CIMMYT) to produce new varieties. In addition, there was increased funding to maize breeding programs in their efforts to address the outbreak of Maize Lethal Necrosis Disease (MLND) in 2011. The fluctuations since 2002 are indicative of a lack of continuous breeding and variety release process.

⁸ "National Crop Variety List - Kenya," kephis.org, accessed on December 6, 2022, http://www.kephis.org/images/pdf-files/UPDATED_2022_JANUARY_NATIONAL_VARIETY_LIST.pdf

⁹ A 3-year moving average is a statistic that captures the average change in varieties released every three years.

Figure 1: Trend in the number of varieties released (3-year moving average)



VARIETIES WITH SPECIAL FEATURES

Varieties may have special attributes, such as climate-smart, fast-cooking, nutrition-enhanced or industry-demanded features. While acknowledging the increase in biotic stresses (pests, weeds, and diseases) due to climate change, TASAI studies narrowly define “climate-smart features” as those that respond to extreme weather events that affect current farming practices, such as droughts, floods, and frost. Climate-smart features include drought tolerance, early maturity, or extra-early maturity. Use-related varieties include those that have fast-cooking or nutrition-enhanced features, as well as those that have good milling qualities. Industry-demanded varieties are those that are suitable for making starch, livestock feed, and for brewing as well as those that have a high oil content.

Seed companies are expected to sell varieties that meet the needs and preferences of their customers. In Kenya, 63.4% of the varieties released in the last three years had one or more special feature (Table 7). In contrast, 71% of Ghana’s and

78% of Uganda’s released varieties had at least one special feature in the last three years.

In Kenya, the emphasis has been on climate-smart features, as drought is a major challenge for the country’s agriculture. Correspondingly, 56% of all 41 varieties released in Kenya between 2019 and 2021 were drought tolerant (20 maize, 1 bean, 1 cowpea, and 1 sorghum variety). Other special features relate to use or industry demands. Of those maize varieties with special features released in the 2019-2021 period, 18% had industry-demanded features. The one sorghum variety released had an industry demanded feature (good malting quality). When it comes to the two bean varieties with use-related features, one had nutrition-enhanced features.

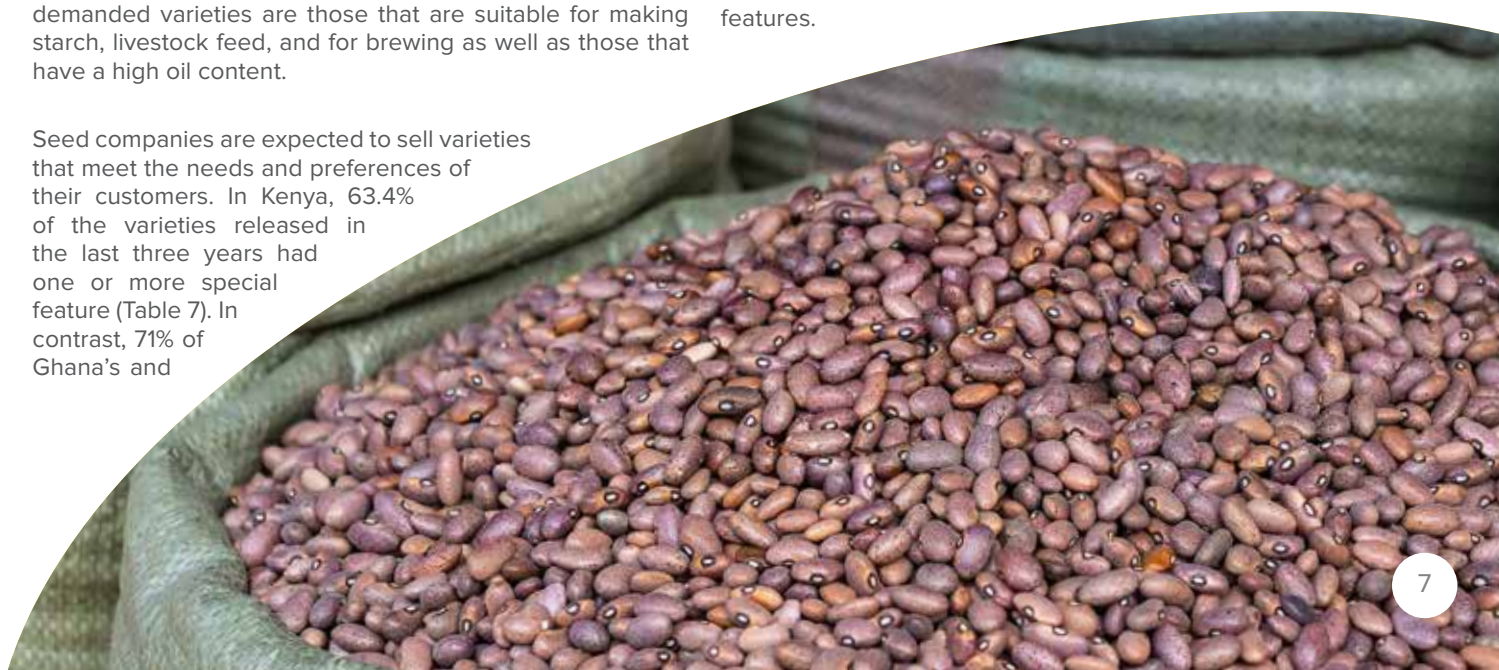




Table 7: Number of varieties released that have special features (2019 - 2021)

Feature	Description	Number of varieties released				
		Maize	Bean	Cowpea	Sorghum	Total
All varieties released		35	4	1	1	41
All varieties released with special features		22	2	1	1	26
Climate-smart features	All	22	2	1	1	26
	Drought tolerance	20	1	1	1	23
	Early / extra-early maturing	2	1	0	0	3
Use-related features	All	N/A	2	0	N/A	2
	Low flatulence	N/A	1	0	N/A	1
	Nutrition-enhanced (iron and zinc)	0	1	0	0	1
Industry-demanded features	All	4	N/A	N/A	1	5
	Good for silage/fodder	1	N/A	N/A	0	1
	Excellent white color	1	N/A	N/A	0	1
	Good milling	2	N/A	N/A	0	2
	Good malting quality	0	N/A	N/A	1	1

a "N/A" means that the information requested does not apply to the crop.

NUMBER OF VARIETIES SOLD

An increase in the number of varieties sold in a country often reflects an increased choice of varieties available to farmers.

Table 8 shows the number of varieties sold by seed companies. Between 2019 and 2021, the number of maize varieties sold by seed companies declined because they were susceptible to the Maize Lethal Necrosis Disease (MLND), and drought. According to seed companies, the decline in the number of bean and cowpea varieties sold since 2017 may be attributed to farmers' dependence on the informal seed sector. The decline in the number of sorghum varieties sold was caused by a response to the demand for industrial features and drought tolerance.





Table 8: Number, name, and age of commonly sold varieties

Crop	Number of varieties sold			Name of commonly sold variety	Age of variety in years (2021)	Average age of commonly sold varieties (2021) (All varieties sold)
	2017	2019	2021			
 Maize	65	67	65	KDV1	15	21.8 (11.3)
				H614	35	
				Pan 15	17	
				Pan 691	20	
 Bean	30	22	21	Kat/Bean 1 (Katheka)	34	17 (18.7)
				Chelalang	13	
				NYOTA	4	
 Cowpea	9	6	5	K 80	21	27 (20.5)
				M 66	33	
 Sorghum	11	9	9	Gadam	27	39 (18.8)
				Seredo	51	

AVERAGE AGE OF VARIETIES SOLD

In vibrant seed systems, farmers regularly replace old varieties with new ones. In many African countries, old varieties often persist, even though newer varieties tend to outperform older ones as they are bred for traits that respond to the demands of farmers, consumers, and industry. A lower age of varieties signals higher rates of variety turnover. TASAI tracks the age of commonly sold varieties by crop.¹⁰

In 2021, the Kenyan seed market was still characterized by relatively old varieties. The age of the varieties sold ranged from 4 years to 51 years old (Table 8). The average age of popular maize varieties was 22 years, while it was 17 years for bean, 27 years for cowpea and 39 years for sorghum. Based on the average age of all varieties sold for the four focus crops sorghum has the oldest varieties, which reflects

the low number of varieties released. Farmers continue to use the old varieties that they know, partly because they are more familiar with them. The oldest maize variety sold in 2021 was 35 years old, while the most commonly sold bean variety was 34 years old. The age of the oldest cowpea variety was 33 years, while the oldest sorghum variety was 51 years old. Old varieties have persisted in the seed market due to three potential reasons. First, many commonly sold varieties (particularly maize) have special attributes such as drought tolerance and early maturity, which are in high demand. Second, since the respective seed markets for bean, cowpea, and, to some extent, sorghum are particularly small, the costs of market campaigns and promotions are considerably high for companies seeking to commercialize new varieties. Thus, most companies do not have incentives to have new varieties introduced into the market. Third, Kenya lacks a strong public extension service that promotes improved crop varieties. Furthermore, most of the project-based variety development programs only fund varietal release activities and ignore commercialization of the same.

¹⁰ Note that these are simple averages. Ideally the average ages should be weighted by volumes sold of each variety, but this information is not available.

SOURCES AND AVAILABILITY OF FOUNDATION (BASIC) SEED

Seed companies use foundation (or basic) seed to produce certified seed for sale to farmers. In many African countries, limited access to basic seed from public research institutions often limits seed companies' ability to scale up production. In Kenya, the general process to obtain basic seed from public research institutes is as follows: seed companies apply to a research institution specifying the variety and quantity needed. The list of available varieties is published on KEPHIS' website, and occasionally in the newspapers. The seed company and the supplier sign an agreement laying out each party's obligations, payment details, royalties to be paid, licensing arrangements, and conditions for termination, if applicable. If the seeds are offered on a royalty-free basis, the buyer is expected to pay for at least the cost of producing the basic seed. In some cases, the source institution offers a testing license to the seed company, allowing it to first

test the variety to verify its attributes before deciding to commercialize it. The research institution invoices the company for the basic seed and upon payment, the company receives the seed.

Sources of basic seed: Table 9 shows public and private sources of basic seed for the focus crops in 2021. In Kenya in 2021, a seed company's own basic seed was the leading source of basic seed for all the crops except bean (42% for maize, 50% for cowpea, and 57% for sorghum). For maize, Quali Basic Seed (QBS) was the second most important source of basic seed, followed by KALRO. KALRO is also an important supplier of cowpea, bean, and sorghum basic seed. For crops that are not highly commercialized, public-sector institutions While QBS is emerging as a key supplier of basic seed, it largely relies on breeder seed from other seed companies and research institutions, as QBS does not have in-house breeders. Instead, it produces basic seed as instructed by its clients and acts as an intermediary in the supply of basic seed in the country. CIMMYT is an important supplier of maize basic seed. However, as of 2022, all the maize breeder seed from CIMMYT are multiplied by QBS for seed companies. In addition, entities such as the International Center for Tropical Agriculture (CIAT) participate in the breeding of bean varieties.

Table 9: Sources of basic seed by crop, number of transactions, and percentage of total transactions (2021)

Source of basic seed	Maize		Bean		Cowpea		Sorghum	
	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total
CIMMYT/CIAT	3	13%	1	8%	0	0%	0	0%
KALRO	4	17%	5	38%	2	50%	2	29%
Other	1	4%	3	23%	0	0%	0	0%
Own	10	42%	3	23%	2	50%	4	57%
QBS	6	25%	1	8%	0	0%	1	14%
	24	100%	13	100%	4	100%	7	100%

Seed companies were asked to assess three aspects of the availability of basic seed: quality of seed received, timeliness of delivery, and whether they had received the requested quantities. In addition, the overall availability of basic seed in the country was calculated based on the satisfaction rating of the three aspects provided.

Seed companies' assessment of the quality of basic seed: Seed companies' rating for the quality of maize seed supplied was "excellent" for CIMMYT, QBS, own source and good for KALRO (Table 10). For all crops, the quality rating was "good" for seeds supplied by KALRO. Other sources were rated "poor" for maize and "good" for bean.

Seed companies' assessment of the quantity of basic seed: Seed companies' rating of the quantity of seed supplied was "excellent" for CIMMYT, QBS, and own source (Table 10).

Seed companies' assessment of timeliness of delivery of basic seed: Seed companies that produced bean, cowpea, and sorghum seed all received basic seed on time from all sources except other sources.

Seed companies' assessment of the availability of basic seed: Satisfaction ratings across all four aspects declined from 2019 to 2021 (Figure 2). This decline was likely driven by the increased use of third parties (or intermediaries) for the provision of basic seed as opposed to direct sourcing. Also, most seed companies started using own basic seed in 2021. For example, own basic maize seed accounted for over 68% in 2019 and 42% in 2021 (Table 9). The study also found, in some cases, the breeder seed that companies receive, to produce basic, is of low quality.

Table 10: Satisfaction rating of the quality, quantity, and timeliness of basic seed received by source organization (2021)

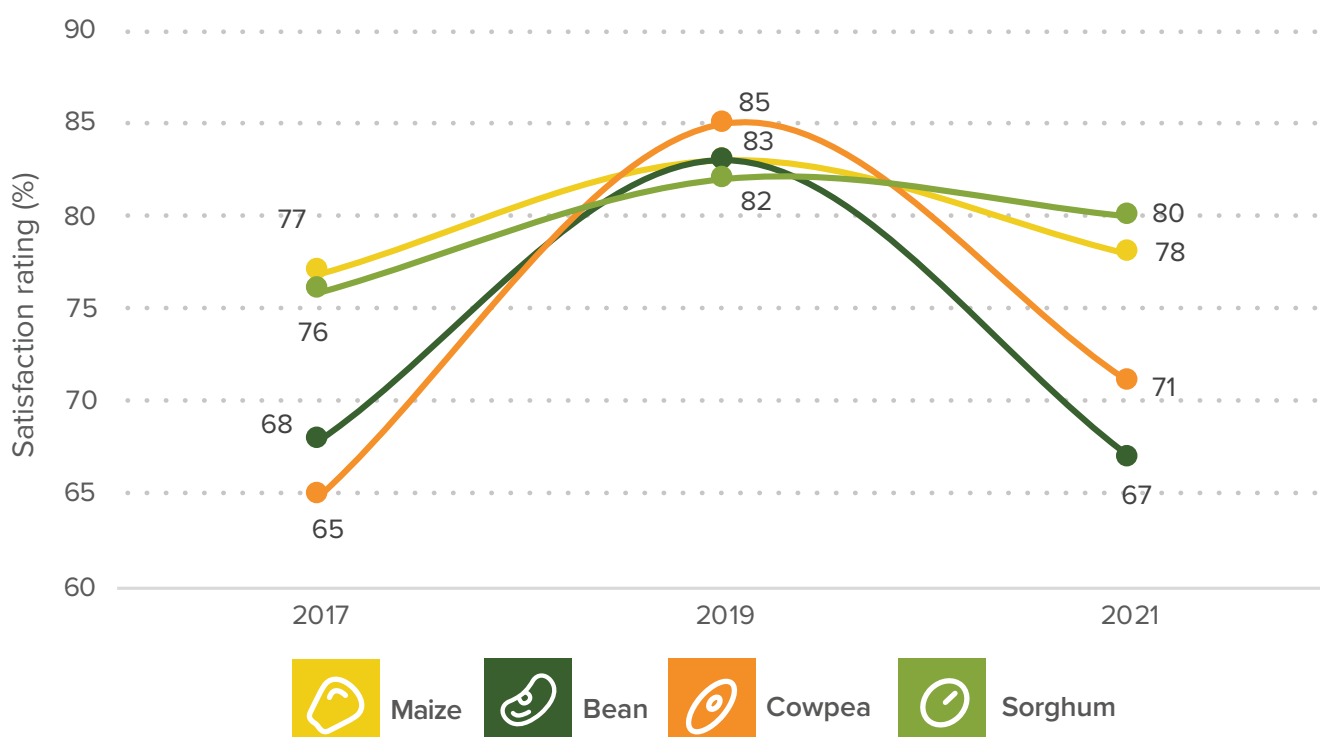
Crops		CIMMYT	CIAT	KALRO	QBS	OWN	OTHER
 Maize (n=23)	Quality	93	N/A	73	87	88	30
	Quantity	80	N/A	45	85	88	20
	Timeliness	87	N/A	60	78	82	20
 Bean (n=13)	Quality	N/A ^a	90	64	100	80	63
	Quantity	N/A	70	64	100	60	50
	Timeliness	N/A	90	58	100	60	60
 Cowpea (n=4)	Quality	N/A	N/A	70	N/A	80	N/A
	Quantity	N/A	N/A	70	N/A	80	N/A
	Timeliness	N/A	N/A	65	N/A	60	N/A
 Sorghum (n=7)	Quality	N/A	N/A	75	100	85	N/A
	Quantity	N/A	N/A	70	100	83	N/A
	Timeliness ^b	N/A	N/A	65	100	75	N/A

extremely poor poor fair good excellent

a "N/A" means that the information requested does not apply to the source organization.

b Quality, quantity and timeliness of basic seed are all opinion ratings and reflect how satisfied seed companies were with these attributes for the basic seed that they received.

Figure 2: Overall satisfaction rating of availability of basic seed



INDUSTRY COMPETITIVENESS

NUMBER OF ACTIVE SEED COMPANIES

Competition breeds excellence: the presence of more active seed companies increases competition and creates incentives for companies to innovate and improve. A vibrant seed sector depends on a robust private sector where seed companies invest in developing, producing, processing, and marketing improved varieties to farmers. This section tracks the number of registered seed companies that produced and marketed seed of one or more of the focus crops.

In 2021, a total of 23 companies were engaged in active seed production and marketing for at least one of the focus crops. As shown in Table 11, of the 23 seed companies surveyed, 18 sold maize seed, 14 sold bean seed, 5 sold cowpea seed, and 10 sold sorghum seed. Although Kenya's seed sector is liberalized, discussions with seed companies revealed that some companies cannot engage in active or sustained seed production due to limited access to land for seed production, especially because of the required isolation distances. However, there are efforts to address this by availing land that is under-utilized by the government-owned Agricultural Development Corporation (ADC) farms. Other companies find the market to be highly competitive, especially in the Kenyan highlands. Further, a lack of access to capital hinders seed companies' entry and participation in seed production.

Comparing 2021 and 2019 data, there has been a slight increase in the number of companies dealing with all the focus crops except cowpea (Table 11). This increase supports the general view that seed business in Kenya is profitable. Overall, between 2019 and 2021 two seed companies entered into the seed business while one company exited.

Table 11: Breakdown of active seed companies

Crop	Number of active seed companies in 2019	Number of active seed companies in 2021
 Maize	17	18
 Bean	13	14
 Cowpea	6	5
 Sorghum	9	10
Total	22	23

GENDER IN MANAGEMENT OF SEED BUSINESSES

TASAI tracks the number of women in management and ownership positions in seed companies. For this study, management positions include managing director/chief executive officer, distribution manager, operations manager, finance and administration manager, research and development manager, country lead, and sales and marketing manager. Comparing 2019 and 2021 data, the number management positions held by women increased from 45 to 72 (Table 12). However, the relative proportion of management positions held by women relative to men declined significantly (from 48% to 35%). This implies that women became less represented in seed company management over time.

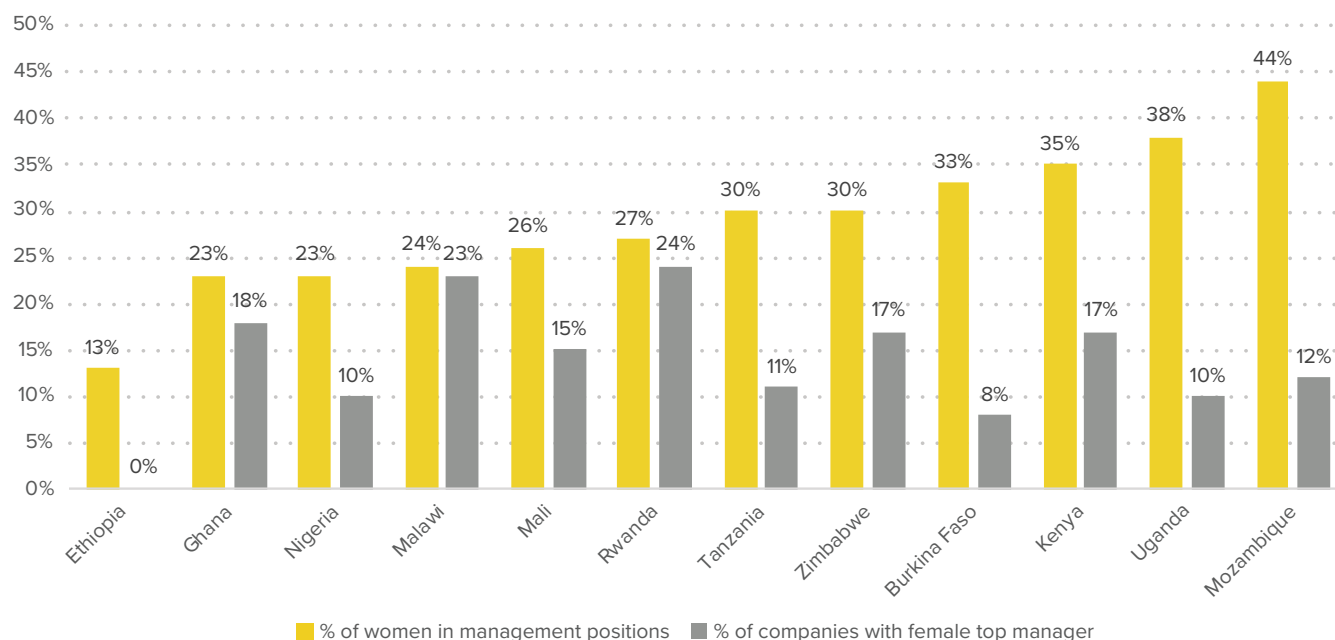
Table 12: Gender in management of seed businesses

Gender indicator	Number (n)		%	
	2019	2021	2019	2021
Women in management positions	45 (94)	72 (184)	48%	35%
Companies with at least one woman in a management position	16 (17)	18 (23)	94%	78%
Companies with a woman top manager	3 (22)	4 (23)	14%	17%
Companies with a woman owner	1 (8)	4 (8)	13%	50%

From 2019 to 2021, the number of companies with a woman top manager increased from 3 to 4, and those with a woman owner increased from 1 to 4.

Figure 3 shows the comparison of women in seed company management in other African countries studied by TASAI between 2020 and 2022. Kenya is third to Uganda and Mozambique in terms of the percentage of women in management positions, and fourth in terms of the percentage of companies with a female top manager.

Figure 3: Percentage of women in seed company management in select countries surveyed by TASAI



PRODUCTION AND SALE OF CERTIFIED SEED

To measure the overall size of a country's seed sector, TASAI tracks the volumes of seed produced and sold for the four focus crops. The data is presented as aggregate quantities in metric tons (MT) of certified seed produced and sold in the data collection year, as reported by active seed companies.

Table 13 shows trends in seed production between 2017 and 2021. Both the government and TASAI seed production data revealed that maize and bean production volumes increased significantly between 2019 and 2021, while those of cowpea decreased. The 2021 data shows that out of all focus crops, maize production and sales volumes were the highest (Table 13). While the overall trend is similar for both TASAI and government data, disparities do exist between production data collected by TASAI from seed companies

and that provided by KEPHIS. The small discrepancies in maize volumes may be because KEPHIS data is based on seed sampled and tested while unprocessed seed is not included. In addition, companies could also be including carry-over stocks. The data collected by TASAI is based on actual processed seed volumes. For the larger discrepancies observed in the other crops, it is possible that KEPHIS' production data excludes carryovers.

Table 14 shows the trends in seed sales between 2013 and 2021. Maize and bean seed sales increased between 2013 and 2021.

Cowpea sale volumes fluctuated between 2013 and 2021 while sorghum sales decreased between 2017 and 2021. This was due to a slump in the demand for sorghum that is used in the brewing industry leading to reduced demand for sorghum seed. Overall, the two crops have relatively few commercial uses and hence a lower value compared to maize and bean.

Table 13: Trend in seed production

Crop	Seed production in MT (TASAI data)			Seed production in MT (Government data)		
	2017	2019	2021	2017	2019	2021
 Maize	30,400	39,079	47,448	32,006	35,736	42,345
 Bean	1,490	1,523	2,743	603	890	675
 Cowpea	326	439	161	70	342	59
 Sorghum	882	943	614	398	78	245

Table 14: Trend in seed sales

Crop	Seed sales MT (TASAI data)				
	2013	2015	2017	2019	2021
 Maize	35,671	38,835	43,954	45,822	49,651
 Bean	428	1,332	1,165	1,421	2,463
 Cowpea	424	463	310	400	180
 Sorghum	274	1,075	887	655	392

MARKET SHARE OF TOP SEED COMPANIES

Competition among seed companies benefits farmers via lower prices, wider choices, increased innovation, and better customer service. To assess the level of industry market concentration, TASAI uses seed sales data for each crop, as reported by seed companies, to calculate the market share of the four largest firms, also known as the four-firm concentration ratio (CR4), and the Herfindahl-Hirschman Index (HHI).

Figure 4 shows, for each crop, the market share for the top four companies (CR4) over the five TASAI studies. From 2019 to 2021, the CR4 increased significantly for maize and sorghum and remained relatively unchanged for cowpeas and beans. Table 15 shows the HHI scores between 2013 and 2021. The overall conclusion is that the markets are highly

concentrated in Kenya; the only exception to this is bean, where the concentration of the market has changed from average to low between 2019 and 2021. The markets for the other three crops have been consistently concentrated since 2015.

Increases in the HHI for maize and sorghum imply that more of the 2021 sale volumes of these focus crops, compared to 2019, were controlled by a few seed companies. For cowpea, the market was dominated by the top four companies in 2019 and 2021. This could be attributed to persistent droughts, which limited the performance of smaller local seed companies. In 2021, the majority of the top four companies had a competitive edge over their small counterparts, as they had their own sources of basic seed as well as the financial capacity to engage in contractual arrangements with research institutions.

Figure 4: Market share for the four focus crops (CR4)

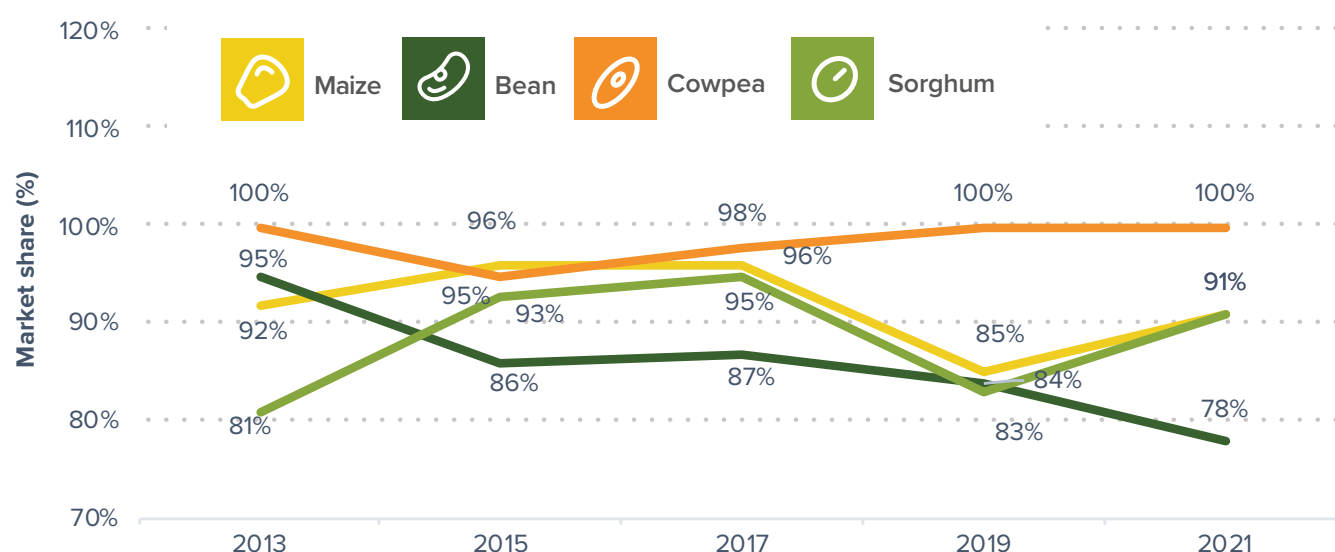


Table 15: Market concentration (HHI)^a

Crop	HHI (2013)	HHI (2015)	HHI (2017)	HHI (2019)	HHI (2021)
 Maize	6,450	5,438	4,450	3,261	3,479
 Bean	3,223	2,472	3,101	2,085	1,961
 Cowpea	3,240	3,505	4,619	3,797	4,195
 Sorghum	1,989	4,576	4,858	3,334	3,963

a The HHI is a measure of market concentration and is calculated by squaring the market share of each firm competing in a market, and then adding up the results. It ranges from close to zero for perfect competition to 10,000 for monopoly. The scale for HHI scores, ranges from extremely low to extremely high levels of market concentration: less than 1,000 is **extremely low**, 1,000-1,999 is **low**, 2,000-2,999 is **moderate**, 3,000-3,999 is **high**, and greater than 4,000 is **extremely high**, i.e., monopoly or near monopoly.

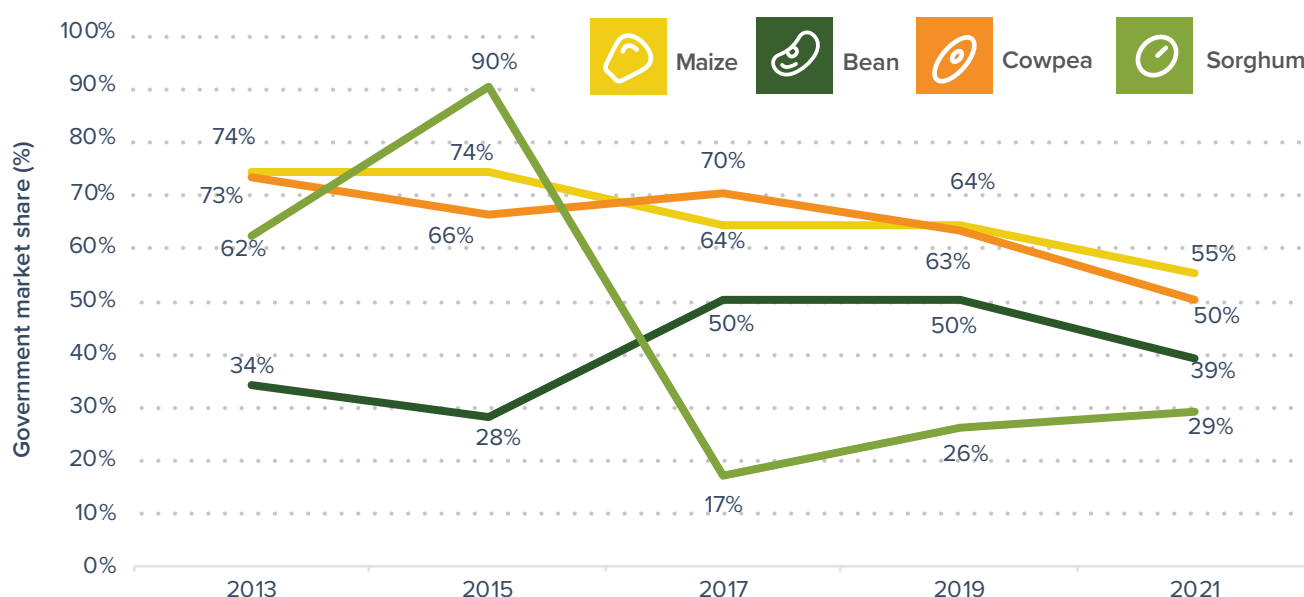
MARKET SHARE OF GOVERNMENT PARASTATAL

In some countries, public entities are still active players in the marketing and sale of certified seed. Public seed companies can play a critical role in meeting farmer demand for varieties that private seed companies deem less profitable. In addition to seed production, public companies may support other national objectives, such as university training and research. However, state-owned companies may benefit from preferential treatment, less stringent enforcement of regulations, access to competitor information, and indirect production subsidies. Collectively, these privileges are likely to result in unfair competition against purely private seed companies.

In Kenya, five government institutions are involved in the sale of certified seed to farmers. These include two seed companies, the Department at KALRO and Egerton University. Two universities, Maseno University and the University of Nairobi, are only involved in the breeding of varieties and production of basic seed. As shown in Figure 5, the government – although the government entities' market shares for all crops declined between 2019 and 2021, the five entities controlled a substantial share of the maize and cowpea seed market, in 2021. However, the government entities' market shares for all four crops declined between 2019 and 2021.

Using maize seed as an example, Kenya stands out as the country with the highest market share of state-owned seed companies when compared to other countries studied by TASAI between 2020 and 2022. It is followed by Ethiopia at 41%, Zimbabwe and Tanzania at 4% each and Uganda with 3%.

Figure 5: Market share of government entities

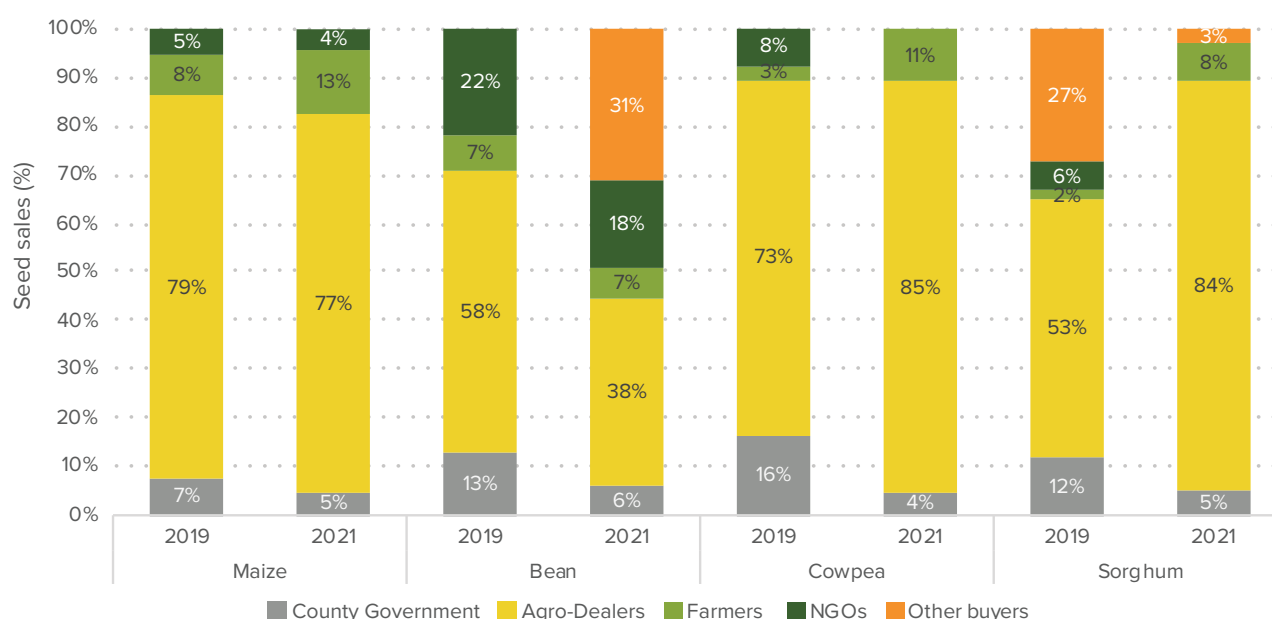


SEED SALES TO DIFFERENT CATEGORIES OF BUYERS

TASAI tracked five different categories of seed buyers in Kenya in 2021, namely, county governments, NGOs, agro-dealers, farmers, and other seed companies as illustrated in Figure 6. Out of the five categories, agro-dealers are the most common sales channel. In 2021, there was a slight

increase on seed sold directly to farmers for maize, cowpea and sorghum as many individuals ventured into farming during the COVID-19 pandemic in 2020/21. The new farmers tended to directly buy seed from the seed companies at their headquarters or distribution points and took the seed to their rural homes for planting. For all crops, the main buyers were agro-dealers. NGOs primarily buy bean seed since it is a key food and nutritional security crop. For bean, the second most common sales channel was other seed companies.

Figure 6: Seed sales by category of buyers



SEED IMPORT AND EXPORT PROCESS

Efficient seed import and export processes extend the seed market beyond national borders. While seed companies benefit from an expanded market, farmers can access a wider range of varieties from across the region. The length of the import process in days is measured as the sum of the number of days used to obtain import documentation (import permit, phytosanitary certificates, and an International Orange Certificate, if applicable) and the number of days needed to clear seed at the border. It excludes transportation time.

In Kenya, a seed importer must first register with KEPHIS as a seed merchant, after which the importer needs to obtain a Plant Import Permit (PIP) from KEPHIS. The seed must be accompanied by the International Seed Testing Association (ISTA) and the phytosanitary certificates. At the border entry point, KEPHIS verifies that the seed consignment conforms to the conditions stipulated in the plant import permit before it is allowed into the country.

According to Figure 7, the length of the import process was reduced by 10% between 2019 and 2021. Most of the respondents in the study indicated that the import process

was straightforward and predictable. The only challenge they experienced lay in getting clearance at the border points (average of 4 days), which tended to have long queues since importers must get clearance from several government agencies. However, according to KEPHIS, clearance of imported seed should not take more than three hours if the importer has the necessary documents. Seed companies' level of satisfaction with the length of the import process was 66% in both 2019 and 2021. This relatively low satisfaction level implies that the importation process can be improved. According to seed companies, the main challenge was not the number of days taken but rather the number of offices one had to clear at the border point even when the process was faster.

As shown in Figure 8, the length of the export process dropped from 12 days to 5 days from 2019 to 2021. Even though the duration of the export process was reduced in 2021, satisfaction ratings declined from 61% in 2019 to 59%. According to several seed companies, the main challenge was not the number of days taken but rather the number of offices one had to clear at the border point even when the process was faster. This is attributed to the challenge of obtaining export clearance from the government. This may also explain why export ratings have generally been lower than those of import since 2017.



Figure 7: Average length and satisfaction rating of import process

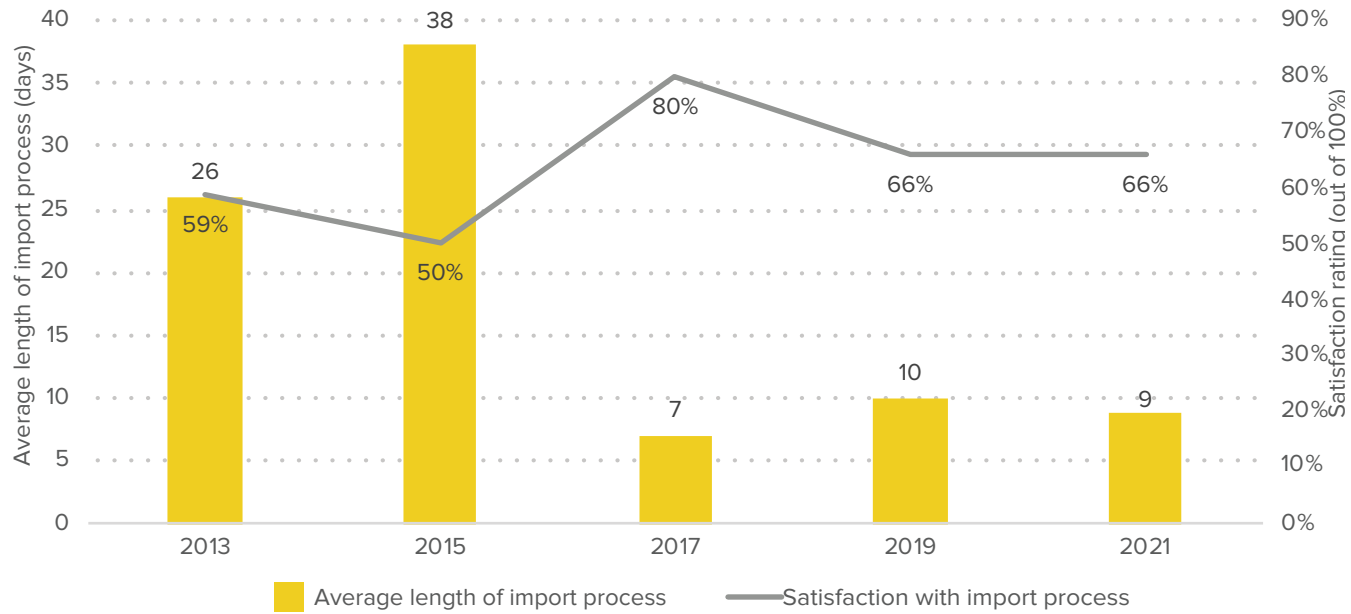


Figure 8: Average length and satisfaction rating of export process

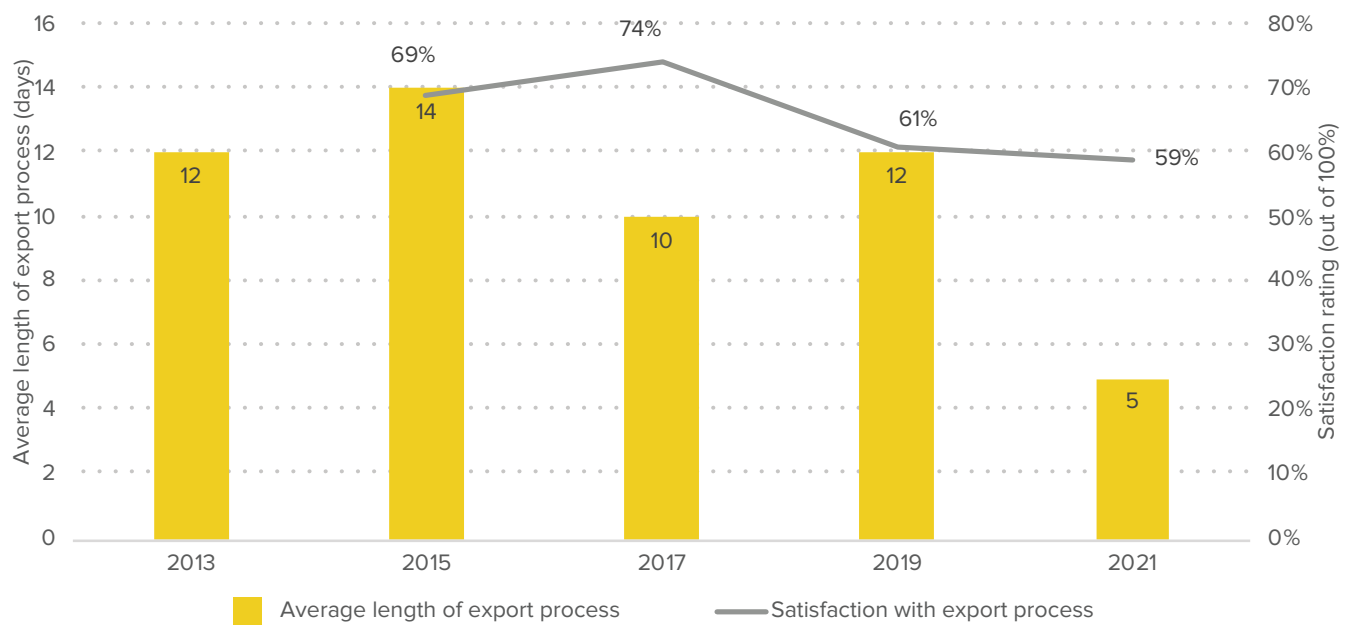


Table 16 shows the import and export volumes in 2021. The KEPHIS data shows that in 2021, Kenya only imported maize and sorghum seed. The import volume was 4,555 MT for maize seed and 212 MT for sorghum seed. Similarly, KEPHIS data indicated that only maize and sorghum seed were exported at 7,109 MT and 60 MT, respectively. In 2021, most seed imports to Kenya came from Southern Africa, while most exports went to East African neighbors. It was noted that there is a disparity between KEPHIS (government) and companies' data for both imports and exports.

Table 16: Exports and imports in MT (2021)

Crop	Seed imports		Seed exports	
	TASAI data	Government data	TASAI data	Government data
 Maize	6,725	4,555	3,871	7,109
 Sorghum	MD ^a	212	MD	60

a "MD" refers to missing data.

Although Kenya harmonized its seed regulations with the COMESA Seed Trade Harmonized Regulations in 2014 (COMESA 2014) only a few companies had started using COMESA labels at the time of the study. Table 17 and 18 show the trends in imports and exports with COMESA labels between 2019 and 2021. Adherence to the COMESA Seed Trade Harmonization Regulations was lower for seed exports than for seed imports. Specifically, two of the four seed companies that imported seed from a COMESA member state (Zambia) in 2021 used the COMESA seed labels. In terms of volume, slightly more than half (54%) of the volume of seed from COMESA countries carried the COMESA label. In contrast, only one out of the seven companies that exported seed to a COMESA country used the COMESA labels. This represented 21% of the total volume of exports to COMESA countries. According to KEPHIS, in 2021, border officials were not treating COMESA labels as a requirement for imports and exports within the trading block, but the labels are set to be mandatory for use by all seed companies from 2022 onwards.

Table 17: Imports from COMESA region and those with COMESA label

Crop	Imports in MT (2019)			Imports in MT (2021)		
	Total from COMESA	With COMESA label	%	Total from COMESA	With COMESA label	%
 Maize	6,700	2,400	36%	6,025	3,225	54%
 Sorghum	20	0	0%	0	N/A ^a	N/A

Table 18: Exports to COMESA region and those with COMESA label

Crop	Exports in MT (2019)			Exports in MT (2021)		
	Total to COMESA region	with label	%	To COMESA region	with label	%
 Maize	3,688	1,500	41%	3,381	700	21%
 Sorghum	5	0	0%	0	N/A	N/A
 Bean	150	0	0%	0	N/A	N/A

a "N/A" means that the information requested does not apply to the crop.



SEED POLICY AND REGULATIONS

LENGTH OF VARIETY RELEASE PROCESS

Plant variety release is the process during which new varieties undergo various tests for yield, Value for Cultivation and Use (VCU), and Distinctness, Uniformity, and Stability (DUS). Varieties that perform satisfactorily in these tests are approved for release by the National Variety Release Committee (NVRC). A vibrant seed sector has a functional variety release system that is well understood by the relevant actors and is followed diligently. Lengthy and/or costly variety release processes can limit the number of released varieties, which can adversely affect farmer choice. The length of the variety release process is calculated from the date the variety is submitted to the variety release committee to the date when the variety is approved for release. The calculation does not include the time the breeder spends in developing the variety.

The variety release process in Kenya starts when the breeder submits the required application to KEPHIS, accompanied by the requisite fee and a sample of the seed to be tested. The seed must reach KEPHIS before the planting season, which is either before the long rain season or the short rain season. For each variety, KEPHIS conducts the VCU and the DUS tests for two seasons. A breeder may choose to conduct one season of VCU tests and launch the DUS test to run concurrently with the second season of VCU tests or they may complete the full VCU test before embarking on DUS. The option selected mostly depends on the breeder's level of confidence in the performance of their varieties and the availability of funds to pay for both tests.

Once adequate data from the two tests is available, they are presented to the National Performance Trials Committee (NPTC). The NPTC is chaired by KEPHIS and includes representatives from STAK, KALRO, and the Plant Breeders Association of Kenya (PBAK). The applicant is invited to present the attributes of their variety. The meetings of the NPTC are mostly technical and review the data from the two field tests. Varieties recommended by the NPTC are submitted to the NVRC for approval. The NVRC is chaired by MoALD and includes representatives from STAK, Kenya National Farmers' Federation (KENAFF), PBAK and the Council of Governors. The goal of the NVRC meetings is to decide which varieties qualify for release. KEPHIS serves as the secretariat for this committee.

The names of the released varieties are then forwarded to the government printer for gazetting. Once gazetted, the variety is available for commercialization in Kenya and is also entered in the National Crop Variety List by KEPHIS. The Cabinet Secretary provides public mention of the released varieties usually during a field day. However, this does not affect the actual gazettement since the Cabinet Secretary's pronouncement is ceremonial.

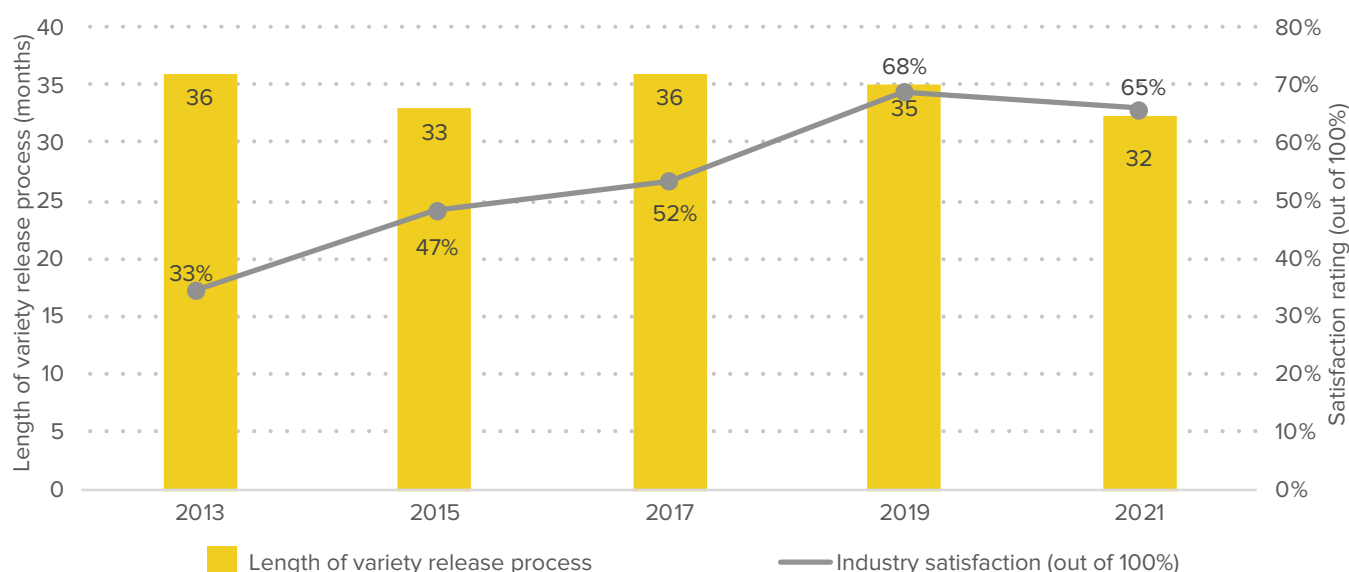
If a breeder opts to complete VCU tests before starting the DUS tests, the process takes about 48 months. If run concurrently, the trials take a total of 24 months. However, most breeders prefer to use the first season's VCU data and choose the most promising varieties of the ones they have submitted to send on for DUS testing. Staggering the two tests this way shortens the length to about 36 months. However, the process may be delayed due to poor weather, causing poor or no crop growth as well as unreliable testing data. In addition, breeders may not have sufficient funds to conduct DUS concurrently or immediately after VCU tests.

Figure 9 shows that, in 2021, the variety release process took an average of 32 months, which falls within the 24–36-month range indicated earlier. The level of satisfaction with the process has improved steadily since the first study in 2013. This may be due to improvements in the process used by KEPHIS as well as a better understanding of the same on the part of seed companies.

The COMESA Seed Trade Harmonization Regulations and the Seeds and Plant Varieties (Variety Evaluation and Release) Regulations 2016 allow a variety released in two COMESA countries of similar agroecological environments to be registered in Kenya without going through the VCU and DUS. The breeder is required to submit data obtained from the two countries to KEPHIS for review. If the variety is deemed suitable for Kenya, KEPHIS enters the variety into the National Crop Variety List. At the time of the TASAI study, no variety had been released in Kenya under the COMESA harmonization regulations. According to KEPHIS, the reason is that standards for varietal release in other countries are not yet high enough to meet Kenya's national requirements.

Although the length of the variety release process in Kenya was relatively short in 2021 (32 months), it was significantly longer than in some countries surveyed by TASAI, such as 18 months in Uganda, 13 months in Zimbabwe, and 11 months in Ghana in the same period.

Figure 9: Length and satisfaction rating of variety release process



COST OF VARIETY RELEASE PROCESS

In well-functioning seed systems, the costs of releasing a variety should not be so high as to disincentivize variety releases altogether. In Kenya, the official costs per variety and season are KES 120,000 (US\$ 1,043)¹¹ for the DUS test. The cost is US\$ 600 (KES 69,024) for the two seasons of testing.¹² The total cost for the two seasons amounts to KES 345,120 (US\$ 3,000) per variety. If a season fails (i.e., from a lack of rain or devastation by pests) and the tests must be repeated, the cost is borne by the breeder.

In 2021, most seed companies incurred a total cost of US\$ 7,302 required by KEPHIS. Thus, there was no difference between the cost of variety release for seed companies and public breeders. However, companies also incurred additional costs for engaging with KEPHIS and attending meetings. These costs averaged between US\$ 2,710 for maize to US\$ 1,000 for bean, cowpea, and sorghum.

Although most regional and multinational companies find the costs to be reasonable, smaller domestic companies find the costs to be prohibitively high. Typically, only large companies can run VCU and DUS tests concurrently. In some cases, smaller companies fail to pay for DUS tests for varieties that have successfully gone through VCU tests.

¹¹ Exchange 1US\$ = KES 115.04 during the study period

¹² These costs are set by the NVRC and are published by KEPHIS. Although delays occur in the publication, the information is shared with seed companies and breeders.

STATUS AND IMPLEMENTATION OF NATIONAL SEED POLICY FRAMEWORK

Well-functioning formal seed systems have effective coordinating institutions that work well together, following rules and procedures stipulated in clearly defined and regularly updated legal instruments. Kenya's seed regulatory framework comprises the national seed policy, a seed law, and the seed regulations guiding the seed law's implementation. A policy is a broad statement of intent or course of action adopted by a government to achieve long-term goals. Laws provide regulatory frameworks for policies. Regulations provide the procedures and modalities for the implementation of laws. Table 18 lists the key seed policy instruments in Kenya.

The **National Seed Policy** of 2010 (Republic of Kenya, Ministry of Agriculture 2010) provides the overall framework for seed industry development in Kenya. The policy gives guidance on research, seed sector financing, regional harmonization, eradication of counterfeit seed, and capacity building, among other important matters.



Table 18: Key seed policy instruments in Kenya

Instrument	Description
National Seed Policy	Formulated in 2010, this policy provides overall guidance to the seed sector.
Seed Law (Seeds and Plant Varieties Act Cap 326)	As the main national seed law, this law regulates most seed sector activities, including variety testing and release, plant breeder's rights, seed certification, as well as import and export of seed.
Seed and Plant Varieties (Seeds) Regulations, 2016	The purpose of these regulations is to operationalize the law and to guide the production, processing, testing, certification, and marketing of seeds in Kenya.
Seeds and Plant Varieties (Plant Breeders Rights) Regulations, 1994	The purpose of these regulations is to protect breeders' intellectual property by securing and conferring such rights under applicable laws.
Seeds and Plant Varieties (Variety Evaluation and Release) Regulations, 2016	These regulations provide guidelines for conducting National Performance Trials (NPTs).

The **Seeds and Plant Varieties Act**, Cap 326 (ROK 2012) is the main law governing the seed sector. It has three sets of regulations. The first is the **Seeds and Plant Varieties (Seeds) Regulations** (2016) (ROK, 2016a), which establish the Seed Regulations Committee that advises the MoALD on matters related to policy, regulations, and industry performance. In addition, the Seeds Regulations outline the registration requirements for all seed sector players and the scope, requirements, and standards for seed inspection and certification. The Act was reviewed in 2012 to incorporate new developments in the seed sector, regionally, and internationally and then amended in 2016 to align with the constitutional requirement for protection of indigenous varieties.

The second set of regulations are the **Seeds and Plant Varieties (Variety Evaluation and Release) Regulations** (MALFC, 2016b). These regulations describe the procedures and requirements for variety evaluation, release, and registration. They establish the National Performance Trials Committee (NPTC) and the National Variety Release Committee (NVRC), and outline their functions, structures, and modes of operation.

The third set of regulations, the **Seeds and Plant Varieties (Plant Breeder's Rights) Regulations** 1994, establish the Plant Breeders' Rights Committee (MALFC 2019). The functions of this committee include developing the plant breeders' rights policy, reviewing and recommending appropriate plant breeders' rights, and recommending the registration of owners of plant varieties.

The **Seeds and Plant Varieties (Variety Evaluation and Release) Regulations** 2009 (ROK 2016a), which predates the seed law of 2012, established the National Performance Trails Committee (NPTC) and the National Variety Release Committee (NVRC). In addition, the regulations provide guidance on the application for and supervision of the

performance trials, and for the approval and release by the National Variety Release Committee as well as appeals.

In addition, three draft regulations are at various stages of development: the draft Seeds and Plant Varieties Regulations (Conservation, Access, and Benefits Sharing of Plant Genetic Resources for Food and Agriculture) focus on access to plant genetic resources; the draft Forestry Seeds Regulations cover forest seeds, and the draft Vegetative Propagating Seeds Regulations cover vegetatively propagated crops (roots and tubers).

QUALITY AND ENFORCEMENT OF SEED REGULATIONS

Seed regulations give structure to the formal seed sector. The TASAI study assesses stakeholder perspectives on various aspects of seed regulations, including whether they are supportive of the growth of the seed sector, the role stakeholders play in their design and implementation, stakeholders' awareness of the laws and regulations, the presence of an enforcement agency, the costs of regulation, and the effectiveness of punitive measures.

The National Seed Policy was passed in 2010. Since then, the agriculture sector has undergone several notable changes. For example, the devolution of agriculture to the county governments following the promulgation of a new constitution in 2010 necessitates a review of the policy to accommodate the new players and changing roles of the MoALD. In addition, the COMESA Seed Trade Harmonization Regulations that came into effect in 2014 required the alignment of national seed policy instruments. While the seed law and regulations have been aligned, the seed policy has not.

Implementation of the Kenyan Seed Regulations/Decrees: Kenya's seed law is fully operational and is implemented by KEPHIS in collaboration with the relevant departments in the MoALD and other stakeholders. According to the policy officers in the MoALD, Kenya has no active ministerial decree on seed production and marketing, so the flow of seeds is primarily governed through the seed law and related regulations. KEPHIS has issued orders (similar to informal decrees from the MoALD) to seed companies in implementation of its mandate as the National Plant Protection Organization (NPPO). For instance, seed companies are required to test their seeds for MLND and get KEPHIS' confirmation that they can be offered for sale. The **Seeds and Plant Varieties (Plant Breeder's Rights) Regulations 1994** is currently under review.

Implementation of the COMESA Seed Trade Harmonization Regulations: Kenya has fully harmonized its regulations

with the COMESA regional seed regulations. The use of COMESA seed labels for seed exports and imports started in late 2021 and will become mandatory by the end of 2022. Implementation of the use of labels has been delayed by logistical challenges in the production and supply of the labels to the different COMESA states.

Seed companies' satisfaction with the degree of enforcement of these regulations: Table 19 shows seed company satisfaction with the enforcement of the seed regulations, which dropped from 'excellent' (83%) in 2019 to 'good' (74%) in 2021. Seed companies reported the following complaints with the implementation of the regulations: delayed implementation of the COMESA regulations; stringent KEPHIS rules on MLND testing for maize seed imports; and inadequate autonomy of the private seed inspectors to operate independently from their employers.

Table 19: Seed company satisfaction rating of the enforcement of seed regulations

Indicator	2013	2015	2017	2019	2021
Satisfaction with the enforcement of seed regulations (out of 100%)	53%	61%	73%	83%	74%
Interpretation of score	fair	good	good	excellent	good

EFFORTS TO ERADICATE COUNTERFEIT SEED

Counterfeit seed (also known as fake seed) threatens the seed sector in two important ways: first, it reduces farmers' confidence in the certified seed when farmers unknowingly plant inferior quality grain falsely labeled as certified seed. Second, it threatens the success of efforts to increase the adoption of improved varieties because farmers are not sure which seed is genuine. TASAI tracks the number of cases of counterfeit seeds reported by seed companies, and if available, by the government in the data collection year. The figure is likely to be an underestimate, as most cases of counterfeit seed sales are not officially reported since the trade is illegal. In addition, seed companies report their

level of satisfaction with government efforts to eliminate counterfeit seed.

Table 20 shows the cases of counterfeit seed across the five TASAI studies to date and the seed industry's satisfaction rating with how government addresses the issue. The number of cases of counterfeit seed has been declining since 2017. This decline is associated with three main initiatives: the certification labels, commonly referred to as the "seed sticker labels" or the "KEPHIS labels"; enhanced fines; and efforts to raise farmers' awareness, by STAK and other partners, on buying seed from suspicious sellers. To address the problem of counterfeit seed, KEPHIS sends field surveillance staff to spot-check seed sellers. In addition, KEPHIS encourages farmers and members of the public to report any case of suspected counterfeit.

Table 20: Seed companies' satisfaction with government efforts to address counterfeit seed

Indicators	2013	2015	2017	2019	2021
Number of cases of counterfeit seed (seed companies)	MD ^a	MD	13	6	5
Number of cases of counterfeit seed (government)	36	6	17	12	1
Seed industry satisfaction with government effort to address counterfeit seed (out of 100%)	39%	50%	72%	70%	63%

extremely poor poor fair good excellent

^a "MD" refers to missing data.

In Kenya, cases of counterfeit seed mostly pertain to maize seed due to its high demand. According to seed companies, the main source of counterfeit seed in the country is agro-dealers. During times when the improved seed is scarce, some agro-dealers collect untampered packages that have their sticker labels intact and fill them with seed that is not certified. According to seed companies, the high cost of improved seed contributes to the cases of counterfeit seed.

Before 2017, the counterfeit seed was prevalent in Kenya and seed companies scored government efforts to address counterfeit seed low (39% and 50%). The certification labels, introduced in 2017, have been hailed as a breakthrough: it is nearly 100% effective in establishing whether seed in a particular package has been certified (Agile Consulting, 2020). The Seeds and Plant Varieties (Seeds) Regulations (National Council for Law Reporting 2016a) make it mandatory for all certified seeds sold in packets of 5 kgs and less to carry this label. While the label seems to have brought the cases of counterfeit seeds to virtually nil, seed company satisfaction ratings, though higher than before, are still relatively low, ranging between 60 and 70%.

USE OF GOVERNMENT SUBSIDIES

Seed subsidies are intended as a short or medium-term measure to encourage farmers to adopt improved crop varieties or address shortfalls in seed supply. The design and execution of subsidy programs, in terms of the scale, targeting, distribution arrangements, and payment systems, may contribute to the development of the seed market in positive ways if executed well and in collaboration with relevant partners, or it may be disruptive to market forces.

There is no national seed subsidy program in Kenya. Instead, the government makes sporadic efforts to boost farmers' access to seed. These programs are similar to subsidy programs and are mostly run by country governments. For instance, county governments often buy seed directly from seed companies and distribute it to farmers mostly as free relief seed in the arid and semi-arid lands (ASALs) as a way of supporting farmers after prolonged droughts or floods. In other cases, county governments buy seed (particularly maize and bean) and sell it to targeted farmers at subsidized prices. County governments do this to reduce food insecurity and to increase their political mileage. There is no clear policy on how county governments target beneficiaries of the subsidy programs.

The number of companies involved in the county governments' subsidy programs did not change much between 2019 and 2021 (Table 21). However, the proportion of seed sold through the subsidy program increased in 2021 for maize and sorghum. This increase may be due to purchases of seed for these crops by counties through the initiatives such as the Kenya Climate Smart Agricultural Project (KCSAP)¹³ and Kenya Cereals Enhancement Programme (KCEP).¹⁴

¹³ "Project Components," Kenya Climate Smart Agricultural Project (KCSAP), Republic of Kenya, accessed on December 6, 2022, <https://www.kcsap.go.ke/>

¹⁴ "Kenya Cereal Enhancement Programme Climate Resilient Agricultural Livelihoods Window," IFAD, accessed on December 6, 2022, <https://www.ifad.org/en/web/operations/-/project/1100001651>

Table 21: Seed company participation in county government subsidy programs

Crop	Number of seed companies selling to county subsidy programs		% of seed sold to county government programs	
	2019	2021	2019	2021
 Maize	7	8	7%	18%
 Bean	4	4	13%	6%
 Cowpea	3	2	16%	4%
 Sorghum	4	2	12%	13%

The TASAI study assesses seed companies' level of satisfaction with the implementation of the subsidy program. Although Kenya does not have a national subsidy program, seed companies were asked to rate the county governments' performance on different aspects of the implementation of the input assistance programs/seed subsidy program. The data shows that ratings declined significantly between 2019 and 2021 (Table 22). Companies that sold to county governments reported payment delays in 2019, which had persisted into 2021, and caused companies to avoid selling seed to county governments unless the seed had been paid for in advance.

Table 22: Seed companies' satisfaction rating of the implementation of the government subsidy program

Aspect of the government seed subsidy program	Rating (out of 100%)	
	2019	2021
Openness and transparency of the seed procurement process	73	56
Predictability of the seed procurement process	55	46
Efficiency of payments	30	24

extremely poor poor fair good excellent

Most seed companies reported that seed subsidies had a negative net effect on the seed sector in the country. They felt that seed subsidies distorted the seed market by creating arbitrary outlets that ignored the forces of demand and supply and farmer preference.

INSTITUTIONAL SUPPORT

QUALITY OF THE NATIONAL SEED TRADE ASSOCIATION

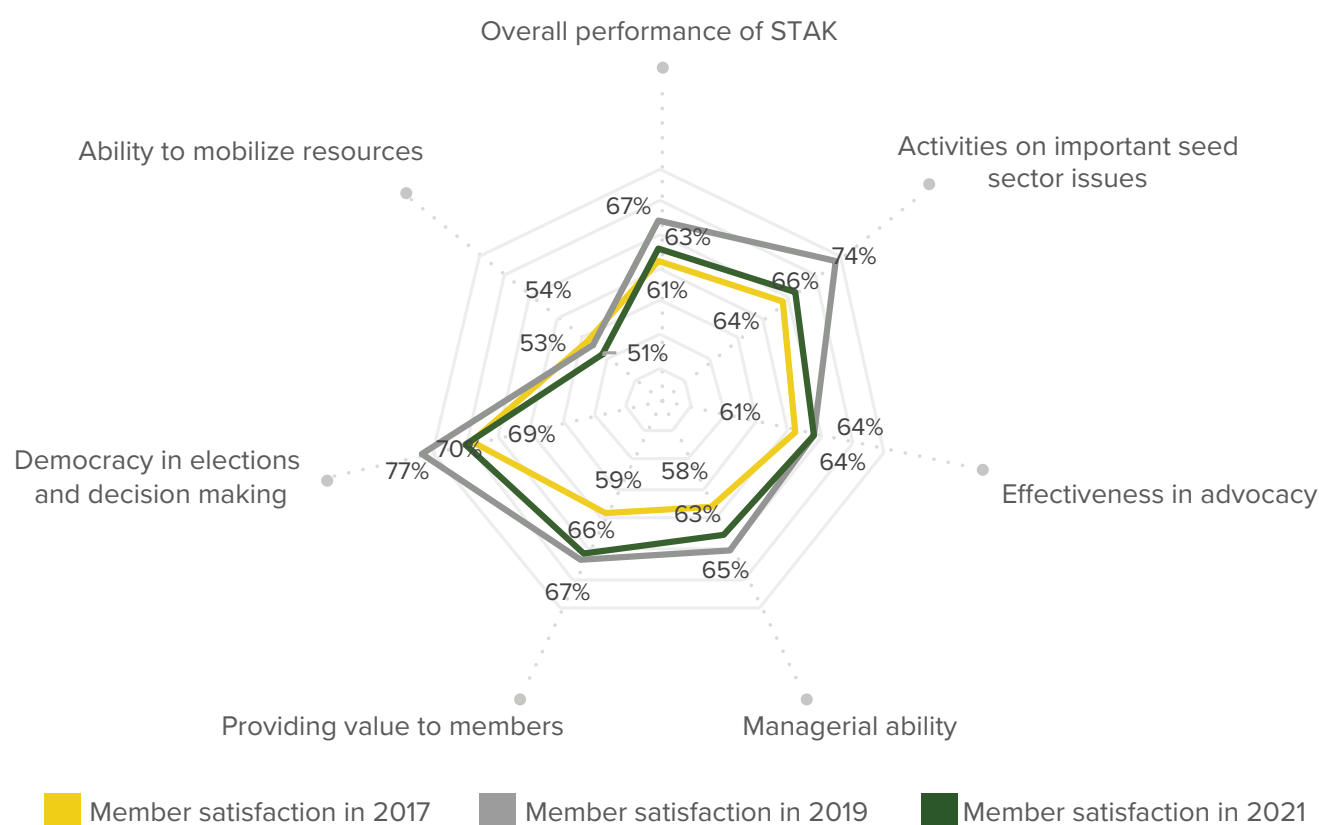
Well-functioning national seed trade associations play a key role in representing the interests of the industry and engaging with the government. Members of the national seed associations include seed companies and at times agro-dealers.

The Seed Trade Association of Kenya (STAK) is the main association for the seed industry in Kenya. STAK was established in 1982 under the Societies Act. The purpose of the association is to represent the interests of its members and to promote the development and growth of the formal seed sector in Kenya. STAK upholds this mandate through four pillars: advocacy/license to operate; knowledge management; services and institutional development.

In 2021, STAK had 43 members – 28 ordinary members (primarily seed companies), 9 associate members, 2 associate institutions, 3 other associations focused on formal seed trade, and 1 breeder. Associate members are not involved directly in seed production and marketing but have interests in seed trade in the country. Since 2019, one member has dropped out. In terms of governance, STAK's board has twelve members consisting of two women and ten men. Most of the board members represent the seed companies. One associate member represents farmers.

Figure 10 shows the members' opinion ratings on the performance of STAK. In 2021, the overall performance rating was "good" at 63% but was lower than the 67% rating in 2019. Moreover, satisfaction levels decreased slightly in all categories except for "effectiveness in advocacy", which remained constant. However, while STAK has had challenges in the mobilization of funds, there are years when the association has recorded a surplus. The STAK Board has set up a Finance and Resource Mobilization Committee to assist the secretariat to mobilize resources. STAK produces a quarterly newsletter which is shared publicly to members and other actors in the seed industry.

Figure 10: Members' opinion of STAK



ADEQUACY OF SEED INSPECTORS

Seed inspection services ensure that certified commercial seed meets the regulatory quality standards. To provide adequate inspection services requires sufficient numbers of well-resourced inspectors. TASAI studies track the number of inspectors and other information pertinent to their effectiveness, such as the availability of resources and the use of (new) digital tools.

Both public and private seed inspectors are involved in seed inspection in Kenya. Seed inspectors are trained by KEPHIS and then gazetted. In 2021, there were 68 seed inspectors, of which 33 were private/authorized and 35 were public (Figure 11), as well as 10 authorized seed analysts and 5 authorized entities. The figure illustrates that the number of public inspectors reduced by 29 since 2013. Due to funding constraints, KEPHIS has not employed new inspectors after retirements and other forms of attrition.

The private inspectors conduct seed inspections under the guidance and supervision of KEPHIS. Private inspectors can only work under an authorized entity. Some companies have trained inspectors but have not established inspection entities, therefore the inspectors cannot be engaged. According to STAK, the authorized inspectors are performing well. However, seed companies have noted two main concerns. One, they would like KEPHIS to recognize private inspectors who have been trained and are authorized in Zambia, as the training and authorization is similar. Two, authorized seed inspectors should be allowed to inspect a larger percentage of the seed fields.

According to Figure 11, the seed industry rating was “fair” (59%) in 2021 compared to “good” (79%) in 2019. One

potential reason is that companies do not get the required services because there is a shortage of public inspectors. In addition, KEPHIS has been receiving inadequate financial resources from the exchequer. Nevertheless, negotiations are ongoing to address the lack of funds as well as the recruitment of new public inspectors.

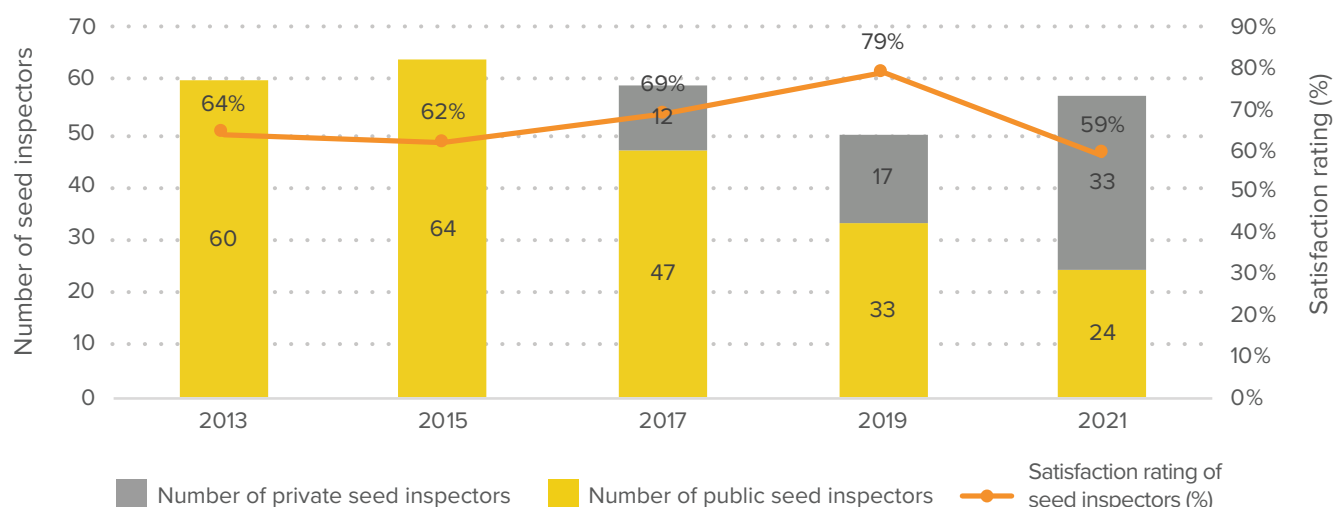
Among the countries studied by TASAI between 2020 and 2022, Zimbabwe leads with 77 private inspectors. It is followed by Kenya with 33 private inspectors, and Mozambique with 20 private inspectors.

One of KEPHIS’s core mandates is seed certification and registration. KEPHIS uses various ICT applications to fulfill its mandate through four important systems:

1. The Seed Certification and Plant Variety Protection (SC & PVP) system supports online applications for seed certification and plant variety protection services.
2. The Seed Label Processing system (seed card processing system) is used by registered seed merchants to activate seed labels.
3. The Electronic Certification System (ECS) is used to process export documents.
4. The online Pest Management System enables the public to share information on emerging pests and to receive KEPHIS’ advice on how to manage them.

Interviews with seed companies revealed that they appreciated the role ICT applications played in enhancing the effectiveness and efficiency in the delivery of KEPHIS services. For one, agro-dealers registration applications can be completed at any time and from any part of the country through the SC & PVP platform.

Figure 11: Number and adequacy of seed inspectors



SERVICE TO SMALLHOLDER FARMERS

ADEQUACY OF EXTENSION SERVICES

Well-functioning agricultural extension services are critical to the successful adoption of improved seed by smallholder farmers. TASAI tracks the average number of agricultural households served by one extension officer. The lower this ratio, the better access farmers have to expert information and advice on how to access and use improved seed and other relevant agricultural technologies. This indicator tracks the number of extension officers by sector (public and private) and gender; it is not crop-specific.

Agriculture, along with public extension services, was devolved to the counties in Kenya after the promulgation of the Constitution in 2010. Each county government hires or deploys its extension staff, making it difficult to establish the exact number of extension agents at any given time. The Council of Governors' agricultural secretariat estimated that there are about 5,000 agricultural extension workers in the country (Table 23). This number includes a few individuals that may have been hired through projects as well as extension interns in counties such as Nyeri County. This number does not include the village-based extension advisors introduced by AGRA in Makueni and Kiambu counties.¹⁵ According to seed companies, the number and availability of county extension officers in seed activities were low. The few public extension officers rarely participate in seed promotion demonstrations and fairs. As a result, seed companies use their own employees to facilitate farmers' access to new varieties. To fill this gap, seed companies have been hiring their own extension staff and, as a result, the number of company field employees increased by 92%, from 190 to 365 between 2019 and 2021. While this resulted in a 3% increase on the overall total number of extension officers, it did not have much effect on the ratio of extension officers to

agricultural households. Furthermore, NGOs and other civil society organizations also provide project-based extension on specific value chains for short periods in Kenya.

Despite the additional extension agents from seed companies, Table 23 illustrates that the ratio of extension officers to farming households in the country has remained high over the last five years. Considering that the number of agricultural households increased from 5.6 million in 2019 to 6.4 million in 2020 (Kenya National Bureau of Statistics 2020), the ratio of extension officers to agricultural households in 2021 was 1:1,175. This implies that increased employment of private extension officers by seed companies did not contribute to the maintenance or lowering of the 2019 ratio. Recent studies show that this ratio is higher than 1:1,000 in most counties in Kenya (MALFC unpublished).

Given the unavailability of public extension officers in seed activities at the farm level in Kenya, the satisfaction rating by the seed companies continued to decline, to "poor" (32%) in 2021 (Table 23). According to seed companies, the government extension services did not meet their expectations.

To address the challenges in the provision of extension challenges, the government developed the Kenya Agricultural Sector Extension Policy (KASEP) 2022 (ROK 2022) in partnership with other stakeholders in KCSAP and KCEP to boost farmer education. Two objectives of the policy are to establish a framework for developing and managing human resources, infrastructure, and enhanced knowledge management for efficient provision of agricultural extension services.

The government is also using digital innovations to improve farmers' access to information on new varieties as well as input and output prices. However, there are no IT platforms targeting seed extension issues of the focus crops. Some counties such as Bomet are using WhatsApp as part of their extension advisory services. In addition, many private exists such as Mbegu Choice, KALRO selector and DigiFarm.

¹⁵ "Village-based Advisors assist farmers gain access to last-mile yield-enhancing inputs and extension services," AGRA, accessed on September 19, 2022, <https://agra.org/wp-content/uploads/2020/09/Village-based-Advisors-assist-farmers-gain-access-to-last-mile-yield-enhancing-inputs.pdf>



Table 23: Number and adequacy of agricultural extension services

Indicators	2017	2019	2021
Number of public extension officers employed by the government	5,000	5,000	5,000
Number of private extension officers employed by seed companies	MD ^a	190	446
Total number of extension officers	5,000	5,190	5,446
Number of agricultural households	4,750,000	5,594,820	6,400,445
Ratio of extension officers to agricultural households	1:950	1:1,078	1:1,175
Seed industry satisfaction with extension officers (out of 100%)	48%	47%	32%

extremely poor poor fair good excellent

a "MD" refers to missing data.

CONCENTRATION OF THE AGRO-DEALER NETWORK

Agro-dealers play a key role in expanding the reach of Africa's seed distribution systems connecting seed companies to individual farmers, especially in hard-to-reach rural areas. They are often the main point of sale for certified seed. A higher concentration of agro-dealers means that smallholder farmers have greater access to improved seed. TASAI tracks the number of agro-dealers and, where possible, disaggregates registered from non-registered agro-dealers. This indicator is not crop-specific.

In Kenya, registration of agro-dealers starts when the applicant provides their details in KEPHIS' SC & PVP online platform. The requirements include having an adequate and well-maintained storage facility (shop) and a recommendation letter from an active seed company. A KEPHIS inspector visits and inspects the agro-dealer shop to assess whether the attendants have basic knowledge about seed and compiles a report on the suitability of the applicant to operate an agro-dealer outlet. Finally, KEPHIS approves or rejects the application for agro-dealer registration. Through KEPHIS, the Kenyan government trains agro-dealers on the appropriate

handling and storage of seed. The training is not gender-focused and does not provide any special modules for women.

Table 24 shows the numbers of agro-dealers' recorded between 2017 and 2021 and seed companies' satisfaction ratings with the overall agro-dealer network. According to KEPHIS, in 2021, there were 5,611 registered agro-dealers, a reduction of 2% between 2019 and 2021, mainly due to business closures during the COVID-19 pandemic. Approximately 10% of the seed companies had exclusive agro-dealers who stocked their products only. Notably, most of these exclusive agro-dealers were owned by seed companies. In 2021, the ratio of agro-dealers to agricultural households was 1:1,141. In 2021, the seed companies' satisfaction rating with the agro-dealer network was "good", at 69%. This was a slight decline from the rating at 73% in 2019. Seed companies reported that they did not experience major challenges with agro-dealers when expanding their market outreach. The Agrochemicals Association of Kenya convened a meeting in October 2022 which brought together the government entities and private sector association with a mandate in agricultural inputs. The objective of the meeting was to pursue a joint accreditation scheme for agro-input suppliers in Kenya.

Table 24: Number and satisfaction rating of agro-dealers network

Indicator	2017	2019	2021
Number of agro-dealers	5,500	5,726	5,611
Ratio of agro-dealers to agricultural households	1:910	1:978	1:1,141
% of companies with exclusive agro-dealers	MD ^a	MD	10%
Seed industry satisfaction with agro-dealer network (out of 100%)	65%	73%	69%

extremely poor poor fair good excellent

a "MD" refers to missing data.

AVAILABILITY OF SEED IN SMALL PACKAGES

Since most farmers in Sub-Saharan Africa operate on a small scale, making seed available in small, more affordable packages is a good way to increase adoption rates of improved seed. TASAI tracks the percentage of seed sold in different package sizes, i.e., 2 kg and below, 2-10 kg; 10-25 kg, and above 25 kg.

In 2021, 100% of cowpea seed, 99% of sorghum seed, 80% of maize seed, and 65% of bean seed were sold in packages of 2 kg or less (Figure 12). These percentages indicate that most seed of the four focus crops was purchased by smallholder farmers who cultivate small plots of land. According to seed companies, customer preference was the main reason why they sold seed in small packages.

Nevertheless, there are few cases when large-scale farmers also buy 2 kg packets, particularly when they are not sure of the actual volume needed for their farms. None of the seed companies reported selling seed in packages larger than 25 kg. Unlike results from the 2021 TASAI country studies, the percentage of maize seed sold in 2 kg packages or less was 53% in Uganda, 9% in Zimbabwe, and 55% in Ghana.

Figure 13 shows the trends of the percentage of seed sold in packages weighing 2kg or less between 2013 and 2021. Overall, the trend has been steady for maize and cowpea while there was a steep increase from 2019 for sorghum. The bean market has become more dynamic overtime and the proportion of seed sold in 2 kg packages has declined between 2013 and 2021. The main reason is that over this period, NGOs have increased their purchases of bean to distribute to smallholder farmers.

Figure 12: Percentage of seed sold in different package sizes (2021)

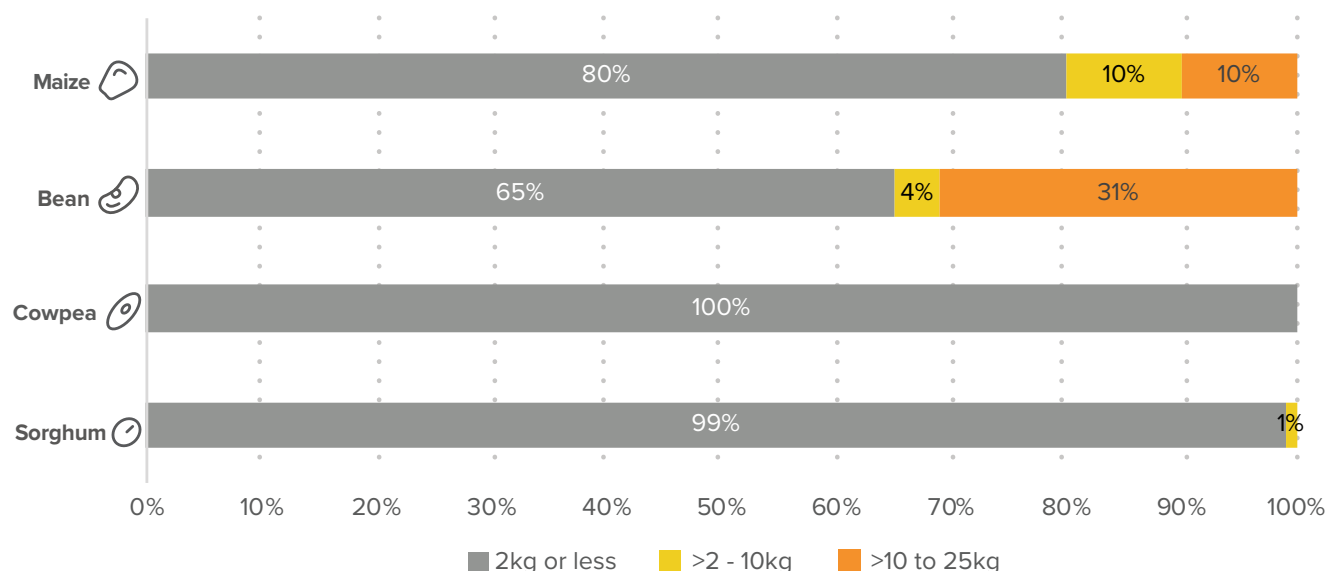
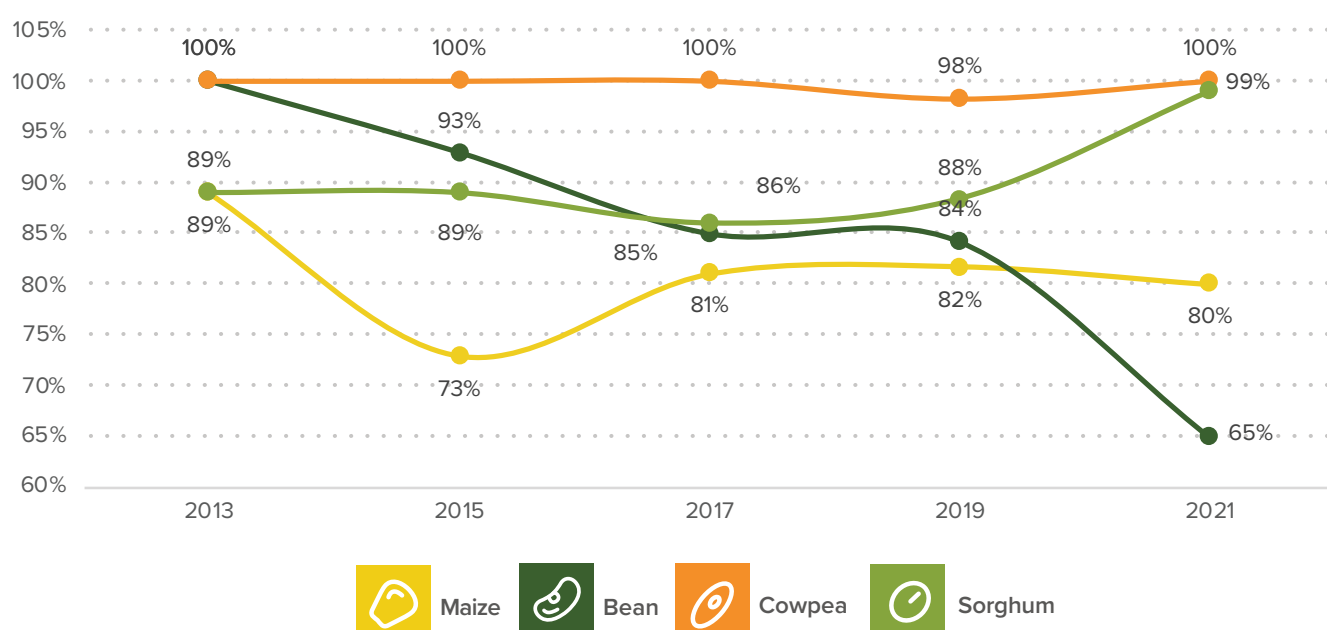


Figure 13: Trend in percentage of seed sold small packages (2kg or less)





SEED AND GRAIN PRICES

Seed and grain prices at the time of planting are a good measure of the affordability of improved seed. These data points are important as many smallholder farmers end up choosing between purchasing seed from the formal sector or planting grain. The greater the price difference between the two, the less likely that resource-poor farmers will purchase certified seed. This indicator tracks the ratio of the retail price of seed (at the agro-dealer level) vis-à-vis the market price of grain at the time of planting.

The TASAI study used average grain prices registered in 2021 in key commodity markets including Nairobi, Kitui, Busia, Nakuru, and Kisumu. These prices were compared with the average agro-dealer seed prices in the same areas.

Table 25 shows seed and grain prices between 2017 and 2021. The seed price for both hybrid and open-pollinated variety (OPV) maize dropped marginally between 2019 and 2021. The decrease could have been attributed to greater competition in the maize seed market and reduced sales in the wake of the COVID-19 pandemic. In Kenya, government-owned companies usually determine market prices of seed, especially maize seed. For bean, cowpea, and sorghum, seed prices increased by between 9% and 20% over the same period.

At the beginning of each season, they start selling maize seed at low prices, sometimes almost 25% lower than the prices of private companies. This forces private companies to reduce their prices if they are selling in the same areas.

Table 25: Seed and grain prices

Crop	Average retail seed price (KSH/kg)			Average grain price (KSH/kg)		
	2017	2019	2021	2017	2019	2021
 Maize (hybrid)	201	210	210	35	38	70
 Maize (OPV)	181	192	188	35	38	70
 Bean	191	225	246	75	96	160
 Cowpea	161	168	202	80	66	85
 Sorghum	171	175	209	40	49	45

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CONCLUSION

The present study is the fifth to be conducted by TASAI in Kenya and highlights recent changes and trends since the first study was conducted in 2013. The conclusion from the study is that Kenya's formal seed system is in the growth stage of development (Ariga et al. 2019), characterized by well-established private companies that are supported by strong breeding programs. The policy environment is supportive of private-sector participation. The marketing environment is highly competitive, with multinational, regional, and local seed companies producing a wide range of high-quality seed.

Under the **research and development** category, the study noted that there has been a sharp decline from the 106 varieties released (73 maize, 7 bean, 4 cowpea, and 22 sorghum varieties) between 2016 and 2018 to the 41 varieties released (35 maize, 5 bean, and 1 sorghum variety) between 2019 and 2021. Fewer sorghum and cowpea varieties have been released over the years and the existing varieties are old. Considering the prevailing agronomic and consumer needs in Kenya, they are not suitable in Kenya's formal seed market.

In the **industry competitiveness** category, results found that small companies are not expanding due to limited capital and a lack of infrastructure for seed production. Thus, a large share of the seed market is dominated by a few larger players. In addition, government parastatals control large shares of the seed market for maize (55%) and cowpea (50%).

Kenya's **seed policy environment** has supported the evolution of a private sector-led seed sector. However, the industry satisfaction level for the enforcement of seed regulations declined from "excellent" in 2019 to "good" in 2021. This was attributed to the delayed implementation of some aspects of the COMESA Seed Trade Harmonization Regulations and the stringent enforcement of rules by KEPHIS. In addition, the National Seed Policy needs to be reviewed and updated (since it was approved in 2010). The 2010 constitution devolved agricultural services from the national government to county governments.

Supportive developments of the seed policy environment include the successful use of anti-counterfeiting verifiable sticker labels on seed packages. The number of cases of counterfeit seed as reported by seed companies and the government has declined since 2017. However, seed companies feel that the government can do more by educating farmers on how to use the sticker labels. In addition, there is need to review the Seeds and Plants Act of 2012 so that fines for offenders are more punitive.

Under **institutional support**, the Seed Trade Association of Kenya (STAK) has maintained a steadily good performance over the years. STAK has been actively involved in key seed sector activities. While STAK occasionally registers an annual revenue surplus, the secretariat acknowledges that there is a need to improve the association's capacity to mobilize resources. There has been a steady increase in the number of private seed inspectors. Regarding KEPHIS, the number of seed inspectors has declined due to retirements and a lack of funds for recruitment. This is partly reflected in the decline in the satisfaction ratings by seed companies.

In terms of service to smallholder farmers, Kenya's public extension was considered poor because there were few extension officers and they did not support the commercialization of new varieties. However, there was an increase in the number of extension agents employed by private seed companies. It is expected that the new extension policy will address the gaps in the provision of extension services and support emerging initiatives such as the Village Based Advisors being promoted by AGRA. Finally, the seed industry satisfaction rating of the agro-dealer network was "excellent" in 2021. This was an improvement from the "good" rating in 2019 and indicates that the country's agro-dealer network has become more effective.

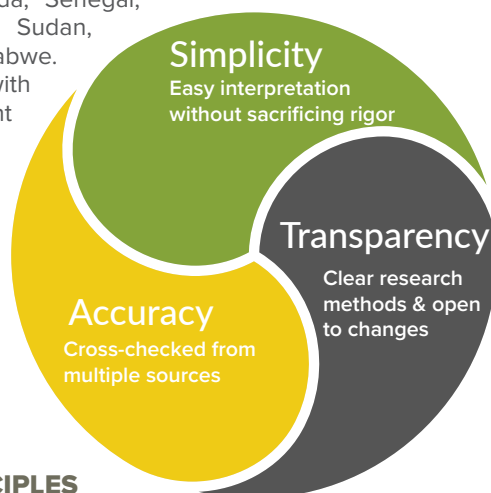
ABOUT TASAI



TASAI'S THEORY OF CHANGE

The African Seed Access Index (TASAI) is a seed industry research initiative that is coordinated by the nonprofit organization TASAI 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 African countries. The intended outcome of the index is improved access to locally adapted, affordable, and high-quality seed of improved varieties by smallholder farmers in Sub-Saharan Africa.

To assess the status of the seed industry value chain, TASAI tracks indicators in the following five categories: Research and Development, Industry Competitiveness, Policy and Regulations, Institutional Support and Service to Smallholder Farmers. By the end of 2022, TASAI studies will have been completed in 22 African countries: Burkina Faso, Burundi, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, South Sudan, 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. TASAI's approach is guided by the principles of Simplicity, Transparency, and Accuracy.



TASAI PRINCIPLES



FOR MORE INFORMATION:



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