# Uganda Country Report 2022

## The African Seed Access Index

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TASAI
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**April 2023**

The findings in this report were presented to seed sector stakeholders in a TASAI dissemination meeting held in Kampala, Uganda on December 8, 2022. The current version incorporates feedback from the meeting.

**Cite as:** Mabaya, E., Ssebuliba, R., Kyotalimye, M., Waithaka, M., Mugoya, M., Damba, B., Camara, M., Tihanyi, K. 2023. Uganda Country Report 2022 - The African Seed Access Index (version April 2023)

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# LIST OF ACRONYMS

| | |
|---|---|
| **BugiZARDI** | Buginyanya Zonal Agricultural Research and Development Institute |
| **CIAT** | International Center for Tropical Agriculture |
| **CIMMYT** | International Maize and Wheat Improvement Center |
| **CGIAR** | Consultative Group on International Agricultural Research |
| **COMESA** | Common Market for Eastern and Southern Africa |
| **DUS** | Distinctiveness, Uniformity and Stability |
| **ICRISAT** | International Crops Research Institute for the Semi-Arid Tropics |
| **ISSD** | Integrated Seed Sector Development |
| **MAAIF** | Ministry of Agriculture, Animal Industry and Fisheries |
| **MaRCCI** | Makerere University Regional Centre for Crop Improvement |
| **NAADS** | National Agricultural Advisory Services |
| **NaCRRI** | National Crops Resources Research Institute |
| **NARO** | National Agricultural Research Organization |
| **NaSARRI** | National Semi-Arid Resources Research Institute |
| **NHL** | NARO Holdings Ltd |
| **NSCS** | National Seed Certification Services |
| **NVRC** | National Variety Release Committee |
| **OPV** | Open Pollinated Variety |
| **OWC** | Operation Wealth Creation |
| **PQIS** | Phytosanitary and Quarantine Inspection Service |
| **PVP** | Plant Variety Protection |
| **QDS** | Quality Declared Seed |
| **TASAI** | The African Seed Access Index |
| **UBOS** | Uganda Bureau of Statistics |
| **UNADA** | Uganda National Agro-Input Dealers Association |
| **USTA** | Uganda Seed Trade Association |
| **VCU** | Value for Cultivation and Use |

# INTRODUCTION

The increased use of productivity-enhancing technologies, including mechanization, irrigation, fertilizer and improved seed, are critical to improving food and nutritional security across Africa. For field crops, a competitive formal seed sector[1] is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. Improved seed 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 facilitate the delivery of these benefits to the farmers, 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 Uganda's formal seed sector. Previous TASAI studies for Uganda were conducted in 2014, 2016, 2018, and 2020. TASAI studies focus on the four grain and legume crops important to a country's food and nutritional security (the "four focus crops"). In Uganda, these crops are maize, bean, millet, and sorghum.

Taken together, these four crops accounted for 90% of the total area harvested to cereals and legumes in 2020 (FAOSTAT 2022). Furthermore, according to the 2018 annual agricultural survey conducted by the Uganda Bureau of Statistics (UBOS), 55% and 54% of all agricultural households in Uganda grew maize and bean, respectively (UBOS 2020). Sorghum and millet are important food security crops, especially for the drought-prone areas of Northern Uganda. In addition, some sorghum varieties command a niche market among breweries[2] and are also used in blended flours, confectionery, and animal feeds, including in silage production.

1 Seed "sector" may also be referred to as seed "sub-sector", that is, as a sub-sector of the overall agricultural sector.

2 "Sorghum Production Guide," National Agricultural Advisory Services (NAADS), accessed on January 30, 2023, https://naads.or.ug/wp-content/uploads/2020/10/SORGHUM-PRODUCTION-GUIDE.pdf

## OVERVIEW OF UGANDA'S FORMAL SEED INDUSTRY

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

**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 harvest and exchange it with neighbors, relatives, and through rural markets. Seed from this system is of variable varietal purity, physical and sanitary quality.[3] According to the latest available data recorded in 2014, the share of the informal sector, as measured by percentage of the national seed requirements, ranged from 46% for maize to 96% for bean in 2014 (MAAIF 2015).

**The formal system** is a structured and regulated value chain for the production of improved seed varieties. This process involves many actors and institutions, from breeding varieties to the multiplication, processing, and distribution of certified seed. The different stages of improved seed production are regulated by governments based on approved regulations and standards. The sale of seed from this system takes place through limited distribution channels such as registered seed growers/companies and agro-dealers.

In Uganda, the formal seed sector is governed by the Seed and Plant Act of 2007 and the Regulations of 2010. In both instruments, seed merchants make up the main private sector actor. In addition, farmer groups and individuals register with the National Seed Certification Service (NSCS) through district agricultural officers to produce and market quality declared seed (QDS). This seed is produced from basic seed, in line with the requirements set out in the Seed and Plant (Quality Declared Seed) Regulations of 2020 (GoU 2020). The QDS system is restricted to specific crops. The system is also certified under less stringent requirements and sold only in the geographical areas specified in the license. Producers registered under this system are slowly transitioning into fully-fledged seed merchants[4] or out-growers for more established seed companies.

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

4 The Seed and Plants Act (2006) defines a seed merchant as a person or an organization licensed to engage in the business of seed production, conditioning, and marketing. As the activities significantly overlap, both seed merchants and seed companies are referred to by the umbrella term of 'seed companies' in this report.

Table 1 lists the main agencies in charge of various aspects of Uganda's formal seed industry. Government agencies/departments include the NSCS and the Plant Quarantine Inspectorate Service (PQIS), the National Agricultural Research Organization (NARO) and its institutes, the National Crops Resources Research Institute (NaCRRI), the National Semi-Arid Resources Research Institute (NaSARRI), the Makerere University Regional Centre for Crop Improvement (MaRCCI), the National Agricultural Advisory Service (NAADS), and NARO Holdings Ltd. The private sector players include local and foreign-owned seed companies led by the Uganda Seed Trade Association (USTA) and agro-dealers under the umbrella of the Uganda National Agro-Input Dealers Association (UNADA).

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

| ROLE | KEY PLAYERS |
|---|---|
| **Research and breeding** | National Crops Resources Research Institute (NaCRRI), National Semi-Arid Resources Research Institute (NaSARRI), Makerere University Regional Centre for Crop Improvement (MaRCCI), Consultative Group on International Agricultural Research (CGIAR) centers, |
| **Variety release and regulation** | National Seed Certification Services (NSCS), National Variety Release Committee (NVRC) |
| **Seed production and processing** | Seed companies, private seed laboratories |
| **Education, training, and extension** | Seed companies, Uganda Seed Trade Association (USTA), Uganda National Agro-Input Dealers Association (UNADA), Non-Governmental Organizations (NGOs), Department of Agricultural Extension Services, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Makerere University Kampala |
| **Distribution and sales** | Seed companies, agro-dealers, National Agricultural Advisory Services (NAADS) |

# 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** (Table 2). In most TASAI studies, the bulk of the performance data reported comes from the year before 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 | **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 Uganda's formal seed sector, this Country Report draws comparisons with the findings of four previous studies conducted in 2014, 2016, 2018, and 2020.[5] In addition, since TASAI has conducted similar studies in 21 other African countries, this report also draws relevant cross-country comparisons. More detailed temporal (across 4 previous studies) and cross-sectional (across other African countries) comparisons are now available through an online dashboard available at https://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 the country'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 2022, Uganda had a total of 49 seed companies and 24 seed importers/distributors registered with the NSCS.[6] The study targeted registered companies or importers that produced and/or sold one or more of the four focus crops - maize, bean, millet, and sorghum - in 2021.[7] Of the total, 30 seed companies (including 3 importers that commercially marketed seed) met the selection criteria. Of these, 24 participated in the TASAI study. The remaining six seed companies were non-responsive during the entire survey period. These companies were mainly dealing in small volumes of seed. The remaining 43 seed companies and importers were not interviewed as they either were inactive, produced and marketed seed of other crops, sold seed for one of the surveyed companies, imported seed for their own use, or were newly registered and had not yet started commercial seed production.

In addition to the seed companies, the survey targeted the following government institutions: the NSCS, the PQIS, the Directorate of Agricultural Extension Services in the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), and the NAADS. In addition, the survey targeted breeders at the country's two public agricultural research institutions - NARO and the MaRCCI. Other institutions included USTA, UNADA, the International Centre for Tropical Agriculture (CIAT), and NARO Holdings Ltd (NHL). The survey reached several development partners and NGOs. Secondary data was sourced from key institutions such as the UBOS and the MAAIF.

5 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.

6 In 2021, NSCS disaggregated seed companies and seed importers.

7 Companies that bought from other seed companies for further processing and sale were excluded to avoid double counting.

**Table 3: Breakdown of respondents by crop (2022)**

| Crop | Number of registered and active seed companies and importers/distributors | Number of seed companies and importers/ distributors surveyed by TASAI |
|---|---|---|
| Maize | 24 | 21 |
| Bean | 24 | 19 |
| Millet | 4 | 2 |
| Sorghum | 13 | 10 |
| **Total** | **30** | **24**[a] |

a The total number of surveyed seed companies and importers/distributors is not equal to the sum across crops because some deal with multiple crops.

# 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.[8] In addition to tracking the number of breeders working on the four focus crops, the study also measured seed companies' level of satisfaction with the public breeding programs. The latter reflects the ability of active breeders in public institutions to produce new varieties.

In 2022, Uganda had 13 active breeders working on maize, bean, millet, and sorghum (Table 4). All were employed in the public sector and two were women. Five were maize breeders, four of whom were stationed at the NaCRRI and one at the Buginyanya Zonal Agricultural Research and Development Institute (BugiZARDI). There were two active bean breeders in 2022 (one man and one woman) and both were employed by NaSARRI. At the time of the previous study in 2019, the country also had a private bean breeder, but this breeder has since switched to sunflower and is therefore not included in the 2022 count. Three sorghum breeders work at NaSARRI, and one is employed by the MaRCCI. The program leader for sorghum noted that the relatively high number of breeders working on sorghum at NaSARRI can be attributed to its adoption of a product-based breeding strategy, where each breeder targets a particular niche market (e.g., brewing, food, or forage).

The number of active breeders increased since 2019, following the recruitment of the three aforementioned sorghum breeders and one millet breeder by the NaSARRI. In terms of actual breeders hired since 2019, the total number is three, as the millet breeder is also part of the sorghum breeding team. Despite this increase, some of the breeders interviewed noted that Uganda had a limited number of qualified professionals in seed science, and seed systems development.

Seed companies rated their satisfaction with the adequacy of active breeders as "good" for maize (77%), bean (67%), and millet (60%), and "fair" (59%) for sorghum (Table 4). The high ratings for maize and bean can be attributed to the availability of a wide range of varieties with good attributes. While some seed companies felt that the new varieties offered a wider range of products to seed companies and farmers, others were concerned that the breeders did not address the challenges related to the four crops. Compared with 2019, there has been an improvement in the ratings for maize (from 67% to 77%), bean (from 63% to 67%),[9] and millet (from 47% to 60%).

8 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.

9 Though the rating from bean increased slightly since 2019, it is important to note that the rating dropped significantly between 2017 and 2019 (from 80 to 63) and is yet to recover.

**Table 4: Number and adequacy of active breeders in Uganda**

| 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 | 5 | 5 | 0 | 0 | 7 | 5 | 5 | 72% | 67% | 77% |
| Bean | 2 | 2 | 1 | 0 | 4 | 3 | 2 | 80% | 63% | 67% |
| Millet | 1 | 2 | 0 | 0 | 2 | 1 | 2 | 40% | 47% | 60% |
| Sorghum | 2 | 4 | 0 | 0 | 2 | 3 | 4 | 55% | 60% | 59% |
| **Total[a]** | **10** | **13** | **1** | **0** | **15** | **11** | **13** | | | |

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.

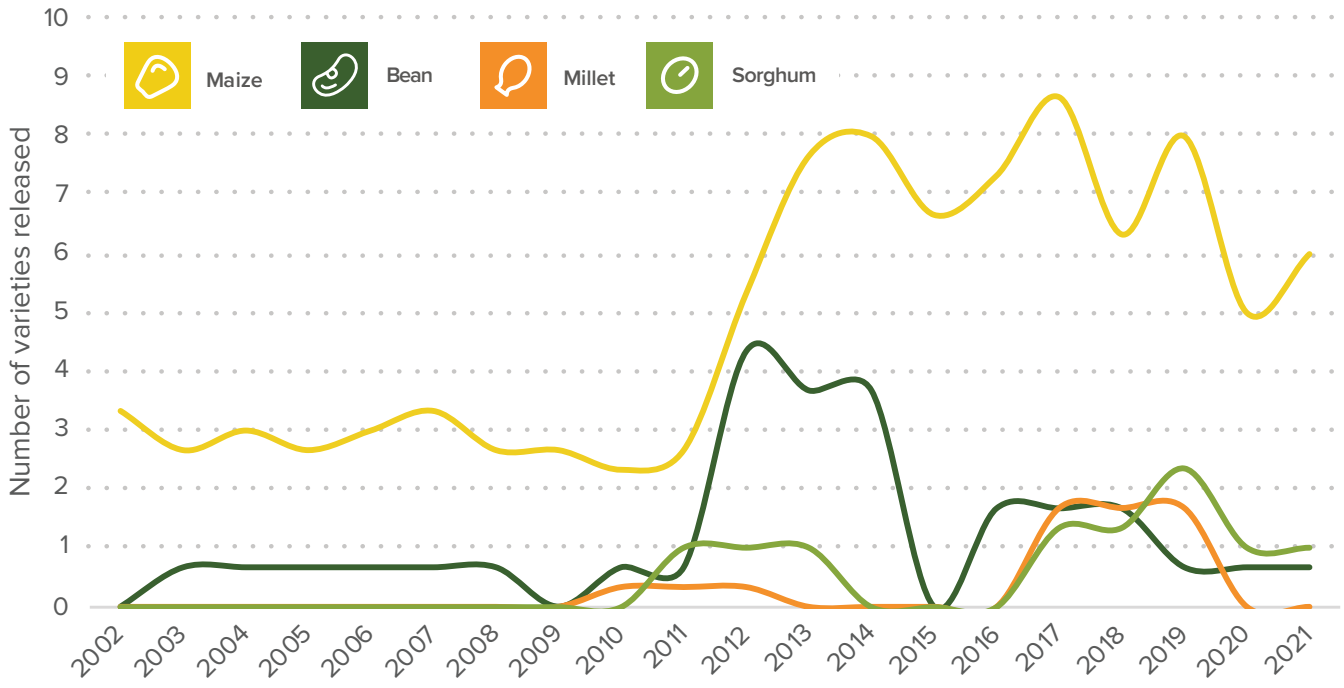
# VARIETIES RELEASED IN THE LAST THREE YEARS

The number of varieties released is a good measure of how well the variety development and release system function. In addition to higher yields, new varieties often carry desired traits such as climate smartness, disease/pest resistance, and nutrition-enhancements.

A total of 23 varieties were released for the four focus crops from 2019 to 2021.[10] Out of the 23 varieties released, 18 were maize varieties, 3 were sorghum varieties, and 2 were bean varieties (Table 5). No millet varieties were released. As shown in Figure 1, the number of varieties released has generally declined across the four crops. Maize registered an increase in 2021, while releases for the other three crops stagnated in the same year. Respondents cited limited funds and the COVID-19 pandemic as the main reasons for these trends. For example, the millet breeders said they were "stuck" with six good millet varieties that could not be released for lack of funding. Furthermore, the national performance trials for sorghum hybrids conducted by the MaRCCI were delayed when the university closed down for two years during the COVID-19 pandemic. For three consecutive seasons, the pandemic also postponed the variety release meetings, which are normally held every season. The variety release committee met in November 2022 for the first time since 2020. In this meeting, the committee released several rice and potato varieties. There were no variety releases for the four focus crops.

10 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 characteristics, for instance climate-smart, use-related (e.g., fast -cooking or nutrition-enhanced), or industry-demanded features (e.g., suitability for making starch, suitability for livestock feed, high-oil content). 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, such as droughts, floods and frost, that affect current farming practices. Examples of climate-smart features are drought tolerance, early maturity, or extra-early maturity.

Of the 23 varieties released from 2019 to 2021, 18 (78%) had at least one special feature (Table 5). Sixteen varieties were climate-smart: 11 maize, 3 sorghum, and 2 bean varieties. The bean varieties also had use-related (nutritional) features, namely, high iron and zinc content. Three varieties had industry-demanded attributes, including one sorghum variety with good malting qualities and two maize varieties with a good flour-to-bran ratio (60:40 as opposed to 52:48 for other varieties), a quality relevant to the maize milling industry.

**Table 5: Number of varieties released that have special features (2019 - 2021)**

| Feature | Description | Number of varieties released | | | | |
|---|---|---|---|---|---|---|
| | | Maize | Bean | Millet | Sorghum | Total |
| **All varieties released** | | 18 | 2 | 0 | 3 | **23** |
| **All varieties released with special features** | | 13 | 2 | 0 | 3 | **18** |
| **Climate-smart features** | All | 11 | 2 | 0 | 3 | **16** |
| | Drought tolerant | 8 | 2 | 0 | 3 | **13** |
| | Early / extra-early maturing | 3 | 0 | 0 | 0 | **3** |
| **Use-related features** | All | 0 | 2 | 0 | 0 | **2** |
| | Fast-cooking | 0 | 0 | 0 | 0 | **0** |
| | Nutrition-enhanced | 0 | 2 | 0 | 0 | **2** |
| **Industry-demanded features** | All | 2 | 0 | 0 | 1 | **3** |
| | Good flour-to-bran ratio | 2 | 0 | 0 | 0 | **2** |
| | Good malting | 0 | 0 | 0 | 1 | **1** |

# NUMBER AND AGE OF VARIETIES SOLD IN 2021

An increase in the number of varieties sold in a country often results in a wider range of choices available to farmers. Table 6 shows the number and average age of the varieties sold for the four focus crops. Maize has had the highest number of varieties on the market, followed by bean, sorghum, and millet. Since 2017, the number of varieties sold has seen a slight decline for maize and millet, and an increase for bean and sorghum.

In 2021, two maize varieties were sold by multiple seed companies. These were Longe 5 variety (a 21-year-old OPV sold by 65% of seed companies) and UH 5051 (a 9-year old hybrid variety sold by 29% of seed companies). The popularity of Longe 5 is attributed to its wide adaptation and high yield. In addition, being an open pollinated variety (OPV), it is cheaper than the hybrid varieties.

The number of bean varieties sold increased from 13 to 17 between 2017 and 2021. Newly sold varieties included K 131 (27 years old), NABE 5 (22 years old), NAROBEAN 6 (2 years old), and NAROBEAN 7 (2 years old). In 2021, NAROBEAN 1 and 2 were sold by 13 and 14 out of 19 seed companies selling beans, respectively. These two varieties are among the 2016 and 2019 releases being promoted as nutritious high-iron beans (Smith 2016; Lutaaya 2019).

Since 2017, the number of millet varieties sold by seed companies declined from 6 to 2. Seremi 1 and Seremi 2 (the only varieties marketed by seed companies in 2021) were both 22 years old.

In both 2019 and 2021, 10 sorghum varieties were sold to farmers, an increase from 8 varieties in 2017. The three most commonly sold varieties were SESO 3 and SESO 1 (both 10 years old) as well as NAROSORG (4 years old). They were marketed by 7 of the 10 companies that sold sorghum seed in 2021. As noted in the 2019 study, the popularity of the SESO varieties can be attributed to their good taste and brown color.

**Table 6: Number, name, age, and average 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 variety (average age of all varieties) (2021) |
|---|---|---|---|---|---|---|
| | 2017 | 2019 | 2021 | | | |
| Maize | 41 | 40 | 37 | Longe 5 | 21 | 13.8 (10.3) |
| | | | | UH 5051 | 9 | |
| | | | | MM3 | 11 | |
| | | | | Longe 5D | 9 | |
| | | | | Longe 7H | 19 | |
| Bean | 13 | 16 | 17 | NAROBEAN 1 | 5 | 7 (13.5) |
| | | | | NAROBEAN 2 | 5 | |
| | | | | NABE 17 | 9 | |
| | | | | NABE 15 | 11 | |
| | | | | NAROBEAN 3 | 5 | |
| Millet | 6 | 5 | 2 | Seremi 1 | 22 | 22 (22) |
| | | | | Seremi 2 | 22 | |
| Sorghum | 8 | 10 | 10 | SESO 3 | 10 | 8(8.8) |
| | | | | SESO 1 | 10 | |
| | | | | NAROSORG 2 | 4 | |

# SOURCES AND AVAILABILITY OF FOUNDATION (BASIC) SEED

Seed companies use basic seed to produce certified seed for sale to farmers. In many African countries, limited access to foundation seed from public research institutions tends to restrict a seed company's ability to scale up production. The general process to obtain the desired quantities of basic seed starts when the grower applies to the research institution that produces or supplies the particular basic seed, specifying the crop, variety, and quantity needed. The research institution invoices the grower for the basic seed, and, upon payment, the grower receives the seed.

In Uganda, the general process to obtain basic seed starts when a seed company submits a formal request for the seed at least one season (or six months) before the seed collection date. A letter addressed to the director of the relevant research institute provides details of the parental stock, the quantity requested, and the preferred date of collection. After receiving the letter, the director notifies the breeder, who then engages directly with the seed company to establish the specific details of the order. The seed company is advised about the costs and payment modalities, and signs a memorandum of understanding with the research institute. Seed companies are required to make a 50% down-payment of the value of the seed.

In September 2021, NARO began to issue license agreements authorizing seed companies to commercialize NARO varieties and pay royalties to plant breeders. Seed companies interested in participating in this arrangement

need to be registered with the MAAIF as a seed company. They also need to apply to the Intellectual Property Management Committee (IPMC) to indicate the crop varieties they plan to commercialize. The application process verifies that the company can produce and distribute the requested varieties and pay the requisite fees. If the application is successful, the seed company pays a commitment fee, after which it signs a license agreement and receives a license certificate. Thirteen seed companies have so far signed license agreements with NARO. Starting in December 2022, seed companies will be expected to declare how much they have sold and how much NARO is owed in royalties.

According to the Executive Secretary of USTA, at least 60% of USTA members welcome the idea of paying royalties, noting that it is the norm across the world. However, seed companies raised several concerns. First, the current pre-booking fee of 50% of the cost of the basic seed is expected to be paid for in advance. USTA is lobbying the Intellectual Property Office to allow NARO to enter into agreements with individual seed companies based on what they can afford. Second, given the prevelance of common seed production challenges (e.g., drought, floods, and pests/diseases) it is not guaranteed that seed companies will receive the requested quantities of basic seed on the dates agreed. Companies want NARO to develop a strategy that will guarantee that companies will receive what they pay for. USTA members also expressed that there is a need for NARO to develop a strategy to effectively engage with the NSCS for quality control. Finally, members stated that it is not clear whether varieties developed by entities like the International Maize and Wheat Improvement Center (CIMMYT) though availed to companies through NARO will also be subject to royalties.

**Sources of basic seed:** Table 7 shows the public and private sources of basic seed for the focus crops in 2021. The main public sources of basic seed transactions for seed companies in Uganda in 2021 were the two NARO research institutes: NaCCRI for maize (50%) and bean (81%) and NaSARRI for sorghum (89%) and millet (100%). NARO Holdings Limited (NHL), a commercial but independent arm of NARO established in 2016, constituted a second important source of basic seed for bean (14% of transactions). The Uganda Prisons Service Seed Project, which produces its own basic seed and sells the excess, supplied maize basic seed in 6% of the maize basic seed transactions.

The main source of basic seed from outside Uganda was CIMMYT for maize (22%), with a total of 7 transactions for maize (6 by CIMMYT-Kenya and 1 by CIMMYT-Zimbabwe). In addition, five companies used their own basic seed for maize (amounting to 16% of transactions). These are mainly private companies with subsidiaries in Uganda.

Apart from the QBS and NHL (which are recent entrants in the industry) each organization listed above also supplied basic seed in 2017.

**Seed companies' assessment of the availability of basic seed by organization:** Seed companies were asked to assess each source organization on three aspects related to the availability of basic seed: the quality of basic seed received, whether they received the quantity of basic seed that they requested, and the timeliness of delivery of the seed. Table 8 summarizes seed companies' assessments of the different aspects of the availability of basic seed for the four focus crops in 2021.

**Table 7: Source of basic seed by crop, number of transactions, and percentage of total transactions (2021)**

| | Maize | | Bean | | Millet | | Sorghum | |
|---|---|---|---|---|---|---|---|---|
| **Source of basic seed** | **No. of transactions** | **% of total** | **No. of transactions** | **% of total** | **No. of transactions** | **% of total** | **No. of transactions** | **% of total** |
| **CIMMYT** | 7 | 22% | N/A[a] | N/A | N/A | N/A | N/A | N/A |
| **NARO (NaCRRI and NaSARRI)** | 16 | 50% | 17 | 81% | 2 | 100% | 8 | 89% |
| **NARO Holdings Ltd** | 1 | 3% | 3 | 14% | N/A | N/A | N/A | N/A |
| **Quali Basic Seed** | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| **Uganda Prisons Ltd** | 2 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| **Own** | 5 | 16% | 1 | 5% | N/A | N/A | 1 | 11% |
| **Totals** | **32** | **100%** | **21** | **100%** | **2** | **100%** | **9** | **100%** |

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

**Table 8: Satisfaction rating of the quality, quantity, and timeliness of basic seed received by source organization (2021)**

| Crops | | NARO | CIMMYT | NHL | QBS | UGA Prisons | Own | Overall |
|---|---|---|---|---|---|---|---|---|
| Maize (n=32) | Quality | 79% | 82% | 70% | 80% | 100% | 88% | 82% |
| | Quantity | 81% | 90% | 70% | 80% | 100% | 80% | 84% |
| | Timeliness | 76% | 78% | 50% | 80% | 85% | 86% | 78% |
| Bean (n=21) | Quality | 81% | N/A[a] | 63% | N/A | N/A | 80% | 78% |
| | Quantity | 76% | N/A | 60% | N/A | N/A | 70% | 73% |
| | Timeliness | 76% | N/A | 60% | N/A | N/A | 70% | 74% |
| Millet (n=2) | Quality | 90% | N/A | N/A | N/A | N/A | N/A | 90% |
| | Quantity | 80% | N/A | N/A | N/A | N/A | N/A | 80% |
| | Timeliness | 85% | N/A | N/A | N/A | N/A | N/A | 85% |
| Sorghum (n=9) | Quality | 83% | N/A | N/A | N/A | N/A | 70% | 81% |
| | Quantity | 88% | N/A | N/A | N/A | N/A | 70% | 86% |
| | Timeliness[b] | 80% | N/A | N/A | N/A | N/A | 70% | 79% |

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.

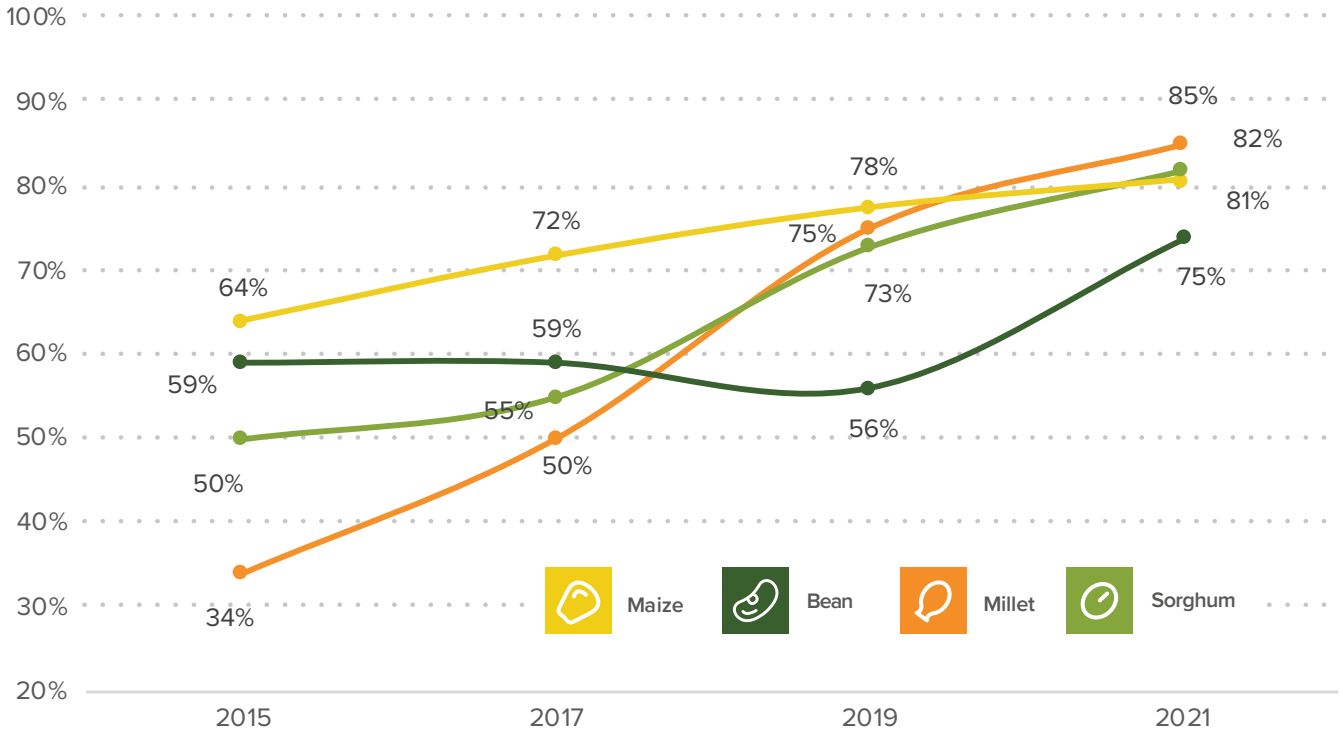
**Seed companies' assessment of the quality of basic seed:** Seed companies' satisfaction rating of the quality of maize seed supplied was "excellent" for all sources, except NARO, which was "good". The satisfaction rating of bean seed was "excellent" for NARO and own sources and "good" for NHL. The satisfaction rating for millet was "excellent" for NARO. For sorghum, it was "excellent" for NARO and "good" for own sources.

**Seed companies' assessment of the quantity of basic seed:** Seed companies' satisfaction rating of the quantity of seed supplied was "excellent" for maize from all sources except NHL, which was rated "good". The rating for the quantity of bean basic seed was "good" for all sources. Despite the relatively high ratings, some respondents expressed dissatisfaction with the inadequate quantities of bean and maize basic seed available, adding that the demand for basic seed is high. They also expressed that placing an order one or two seasons in advance did not guarantee that they would receive the basic seed requested. Some respondents noted that for bean basic seed, the breeders referred them to NARO's registered farmers or community-based organizations that produce QDS, as NHL was not yet able to produce large quantities of basic seed. One respondent reported that, due to limited quantities of bean basic seed, they recycled the certified seed to produce a second generation of certified seed. Other respondents blamed adverse weather conditions and COVID-19 for the limited quantities. In contrast, respondents indicated that they had no difficulties obtaining sorghum and millet seed, since there was little competition. The rating for sorghum basic seed was "excellent" for all sources.

**Seed companies' assessment of timeliness of delivery of basic seed:** Overall, the timeliness of maize basic seed was rated "excellent" for all sources except NARO and NHL which were rated "good". Bean basic seed was rated "good" for all sources. Millet basic seed was rated "excellent" for all sources. Sorghum basic seed was rated "excellent" for NARO and "good" for own seed.

**Seed companies' overall assessment of the availability of basic seed:** As shown in Figure 2 overall satisfaction ratings have steadily increased for the four focus crops. The availability of maize basic seed improved from "good" in 2015 to "excellent" in 2021. Over the years, the number of sources of basic seed has increased, easing the pressure on individual sources of maize basic seed. As noted by respondents, the demand for maize basic seed is high, which puts a lot of pressure on the sources, creating challenges with regard to quantity and timeliness of delivery. The rating for bean basic seed stagnated at "fair" from 2015 to 2019 but improved to "good" (75%) in 2021. This improvement could be partly attributed to the contribution of NHL to the bean basic seed supply. In 2021, one company reported having used its own bean basic seed, further reducing competition at NaCRRI and NHL. The availability of alternative sources of bean basic seed could have played a role in improving the ratings for the overall availability of the seed in 2021. The ratings for millet showed the most significant increase, from "poor" in 2015 to "excellent" in 2021. This improvement could be partly attributed to the limited seed quantities required as a result of the limited number of companies sourcing millet basic seed and its low seeding rate, which eases pressure on NaSARRI. Sorghum ratings improved from "fair" in 2015 to "excellent" in 2021.

**Figure 2: Overall satisfaction rating of the availability of basic seed**



# INDUSTRY COMPETITIVENESS

## NUMBER OF ACTIVE SEED COMPANIES

Competition breeds excellence: the presence of more active seed companies[11] increases competition and creates incentives for companies to innovate and improve. A vibrant seed sector depends on a robust private sector in which seed companies invest to develop, produce, process, and market 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.

A total of 30 registered seed companies were actively involved in producing and /or marketing at least one of the four crops in 2021 (Table 9), and this was an increase from 24 in 2019. The number of active seed companies for maize and bean increased, and decreased slightly for millet and sorghum. The number of active companies working with millet declined due to low demand. In 2019, 52% of millet seed was sold as grain, making this crop less-than-profitable to work with.

11 TASAI defines an "active seed company" as a company that produces and/or markets seed of one or more of the four focus crops in the TASAI study year.

## GENDER IN MANAGEMENT OF SEED BUSINESSES

TASAI also tracks the number of women in management and ownership positions in seed companies. The main positions held by women in management include Chief Executive Officer/ Managing Director, Manager, Secretary, and Finance Officer/Accountant. In 2021, 38% of the managers in the surveyed seed companies were women (Table 10). Importantly, all companies surveyed had at least one woman in a management position. This was an increase from 75% in 2019 despite the decrease in the sample size. However, in 2021, two seed companies had a woman either as owner or top manager.

Figure 3 shows the comparison of women in seed company management across African countries studied by TASAI between 2020 and 2022. After Mozambique, Uganda has the second highest percentage of women in management positions. In terms of the percentage of companies with a woman top manager, Uganda falls behind most countries surveyed by TASAI.

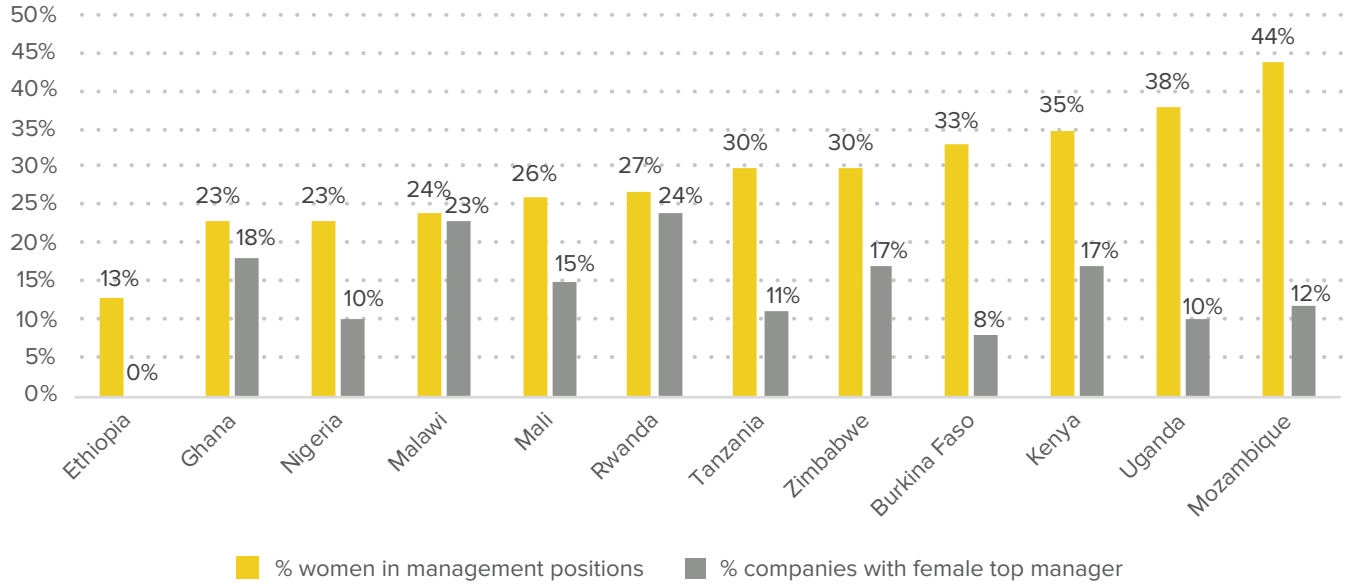
**Table 9: Breakdown of surveyed seed companies**

| Crop | Number of active seed companies (2019) | Number of active seed companies (2021) |
|---|---|---|
| Maize | 23 | 24 |
| Bean | 17 | 24 |
| Millet | 5 | 4 |
| Sorghum | 14 | 13 |
| **Total** | **24** | **30** |

**Table 10: Gender in management in seed businesses**

| Gender indicator | Number | | % | |
|---|---|---|---|---|
| | 2019 (n) | 2021 (n) | 2019 | 2021 |
| Women in management positions | 31 (100) | 63 (164) | 31% | 38% |
| Companies with at least one woman in management positions | 18(24) | 21 (21) | 75% | 100% |
| Companies with a woman top manager | 3 (24) | 2(21) | 13% | 10% |
| Companies with a woman owner | 4 (24) | 2 (12) | 17% | 17% |

**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 are presented as aggregate quantities in metric tons (MT) of certified seed sold in the data collection year, as reported by active seed companies.

Table 11 shows seed production and sales in 2021. Compared to 2019, seed companies reported a decline in aggregate seed production and seed sales for maize, millet, and sorghum seed. However, aggregate production and sales of bean seed over the same period increased (Table 11). The government was not able to provide seed production data for 2021 for millet because NSCS field staff were unable to undertake their routine field activities during the COVID-19 pandemic and the government did not collect production data. The government did have production data for maize, bean and sorghum seed; the amounts reported (12,906 MT, 3,220 MT, and 2,543 MT) were significantly lower than the production data collected from seed companies (16,582 MT, 5,369 MT, and 4,353 MT) by TASAI. The difference is likely the result of the lower number of field inspections during the pandemic.

**Table 11: Seed production and sales**

| Crop | Seed production in MT | | | | | | Seed sales in MT (TASAI data) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Government data | | | TASAI data | | | | | |
| | 2017 | 2019 | 2021 | 2017 | 2019 | 2021 | 2017 | 2019 | 2021 |
| Maize | MD[a] | 20,633 | 12,906 | 21,959 | 23,165 | 16,582 | 17,013 | 18,633 | 16,898 |
| Bean | MD | 1,362 | 3,220 | 3,794 | 4,498 | 5,369 | 2,957 | 3,971 | 4,451 |
| Millet | MD | 1.5 | MD | 19 | 168 | 16 | 12 | 154 | 22 |
| Sorghum | MD | 5,684 | 2,543 | 2,302 | 10,605 | 4,353 | 1,857 | 8,240 | 3,937 |

a "MD" refers to missing data.

It appears that, apart from bean seed, seed sales were also negatively affected by the COVID-19 pandemic. Companies reported that since access to agro-dealer sales points was restricted, they were unable to market their seed to a large group of buyers. They could not monitor nor collect seed from out-growers' fields. In many cases employees could not work, and the importation of packaging materials from Kenya (Uganda's key supplier) was restricted. Due to these factors, seed companies lost substantial amounts of their seed inventory. Seed companies expressed that their cashflow was significantly affected to the extent that some companies were forced to reduce their staff size while others were unable to pay their bank loans and creditors.

Despite the challenges, COVID-19 also presented opportunities for the seed sector in 2021. Some humanitarian organizations purchased large volumes of seed for farmers, an opportunity that some seed companies took advantage of. Seed procurement was also scaled up through government subsidy programs.

# MARKET CONCENTRATION

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), as well as the Herfindahl-Hirschman Index (HHI).[12]

The trends in market shares of the top four companies for the four focus crops from 2013 to 2021 are illustrated in Figure 4. In 2021, the market share of the top four companies was 100% for millet, 83% for sorghum, 53% for bean, and 50% for maize. The CR4 for millet and sorghum has been consistently high due to the low number of active seed companies working with these crops. The CR4 for maize and bean declined over the years as a result of increasing competition in the market caused by the entry of new players. Between 2015 and 2021, maize seed companies increased from 12 to 23, while bean seed companies increased from 13 to 19 over the same period.

The HHI scores for the four crops in 2021 were: 910 for maize, 1,092 for bean, 5,354 for millet, and 3,059 for sorghum (Table 12). These scores, together with the CR4 percentages, indicate extremely high levels of market concentration and low levels of competition in the millet and sorghum seed markets. Even though there are 10 active sorghum seed companies, a few of these companies dominate the market. The maize and bean seed markets were competitive, with no single company dominating the market. These markets had consistently been competitive since 2015.

12 See below Table 12

**Figure 4: Trends in market shares of top four seed companies (CR4)**

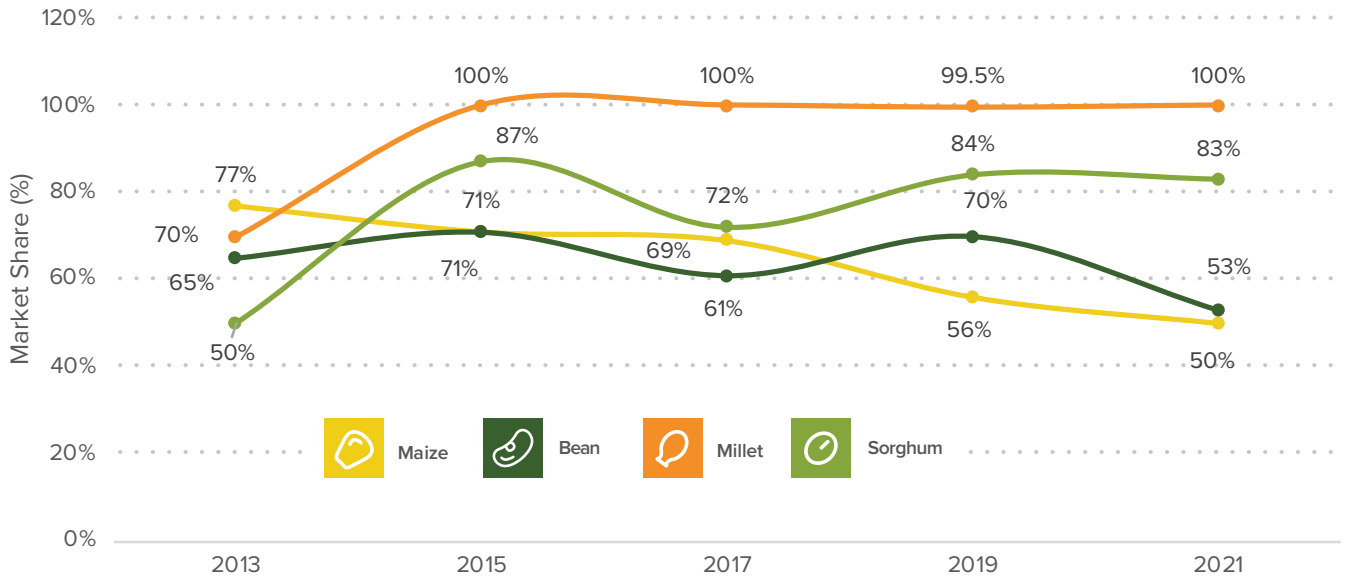



**Table 12: Market Concentration (HHI)[a]**

| Crop | HHI (2015) | HHI (2017) | HHI (2019) | HHI (2021) |
|---|---|---|---|---|
| Maize | 1,317 | 1,425 | 1,248 | 910 |
| Bean | 1,269 | 1,214 | 1,471 | 1,092 |
| Millet | 6,401 | 5,139 | 3,473 | 5,354 |
| Sorghum | 2,483 | 1,703 | 2,290 | 3,059 |

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

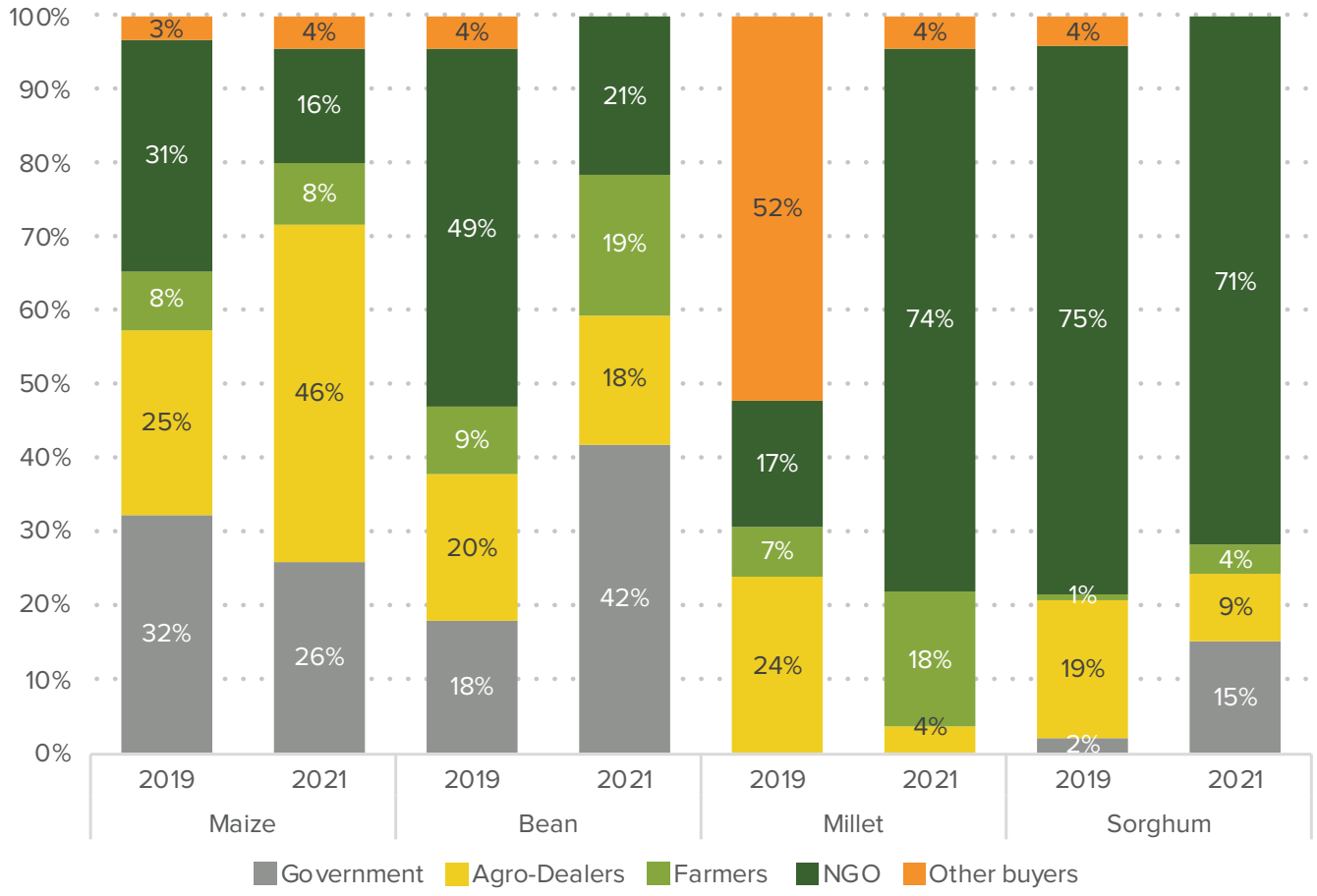
In some countries, public entities are still active players in the marketing and sale of certified seed. Public seed companies can play a critical role in meeting farmer demand for varieties that private seed companies deem less profitable. In addition to seed production, public companies may support 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 can result in unfair competition against purely private seed companies.

In 2021, the Uganda Prisons Service Seed Project was the only government parastatal involved in the production and sale of certified seed in Uganda. In 2021, the project produced certified seed of maize and its sales accounted for 3% of the overall certified maize seed market, a slight increase from the 2% in 2019. This market share of government parastatal is trivial.

# SEED SALES TO DIFFERENT CATEGORIES OF BUYERS

TASAI tracked five different categories of seed buyers in Uganda in 2021, namely, the government (mainly through the NAADS program), agro-dealers, farmers, NGOs, and other buyers (Figure 5). In the case of maize, agro-dealers accounted for 46% of seed sales, an increase from 25% in 2019. This increase was likely catalyzed by the reduction in the amount of maize seed purchased by the government and NGOs. In the case of bean, the government was the main buyer of certified bean seed in 2021, accounting for 42% of all sales, an increase from 18% in 2019. This demonstrates the government's efforts to support food security and improve livelihoods. NGOs were the main buyers of millet seed (74% of all sales) and sorghum seed (71% of all sales). In 2019, NGOs were also major buyers of sorghum seed, accounting for 75% of sorghum seed sales. Most of the sorghum seed was exported to South Sudan for relief purposes.

**Figure 5: 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,[13] if applicable) and the number of days needed to clear seed at the border. It excludes transportation time.

In 2021, four companies imported a total of 3,512 MT of maize from Kenya and South Africa (Table 13). This was a significant increase from the 967 MT imported in 2017 and 1,111 MT imported in 2019. Of the 3,512 MT imported, 3,500 MT came from Kenya, of which 2,100 MT (60%) carried Common Market for Eastern and Southern Africa (COMESA) labels. One company imported 300 MT of sorghum seed from Kenya, and the consignment carried COMESA labels. In comparison, sorghum seed imports from the COMESA region in 2019 did not carry the COMESA seed label. The increased use of COMESA labels in 2021 compared with 2019 indicated increased compliance with the COMESA Seed Trade Harmonization Regulations. No imports were recorded for bean or millet seed in 2021.

Seed companies reported that, on average, the duration of the import process in 2021 was 14 days, a slight decrease from the 17 days reported in 2019. Seed company satisfaction ratings notably increased over this period, from 38% in 2019 to 50% in 2021 (Figure 6). The increase in ratings was likely due to the fact that, after successful lobbying by USTA, the Uganda National Bureau of Standards suspended the requirement for the Pre-Import Verification of Conformity (PVoC) for two seasons. Importantly, seed companies were expecting that the requirement would be permanently removed. However, at the time of data collection, the process was ongoing.

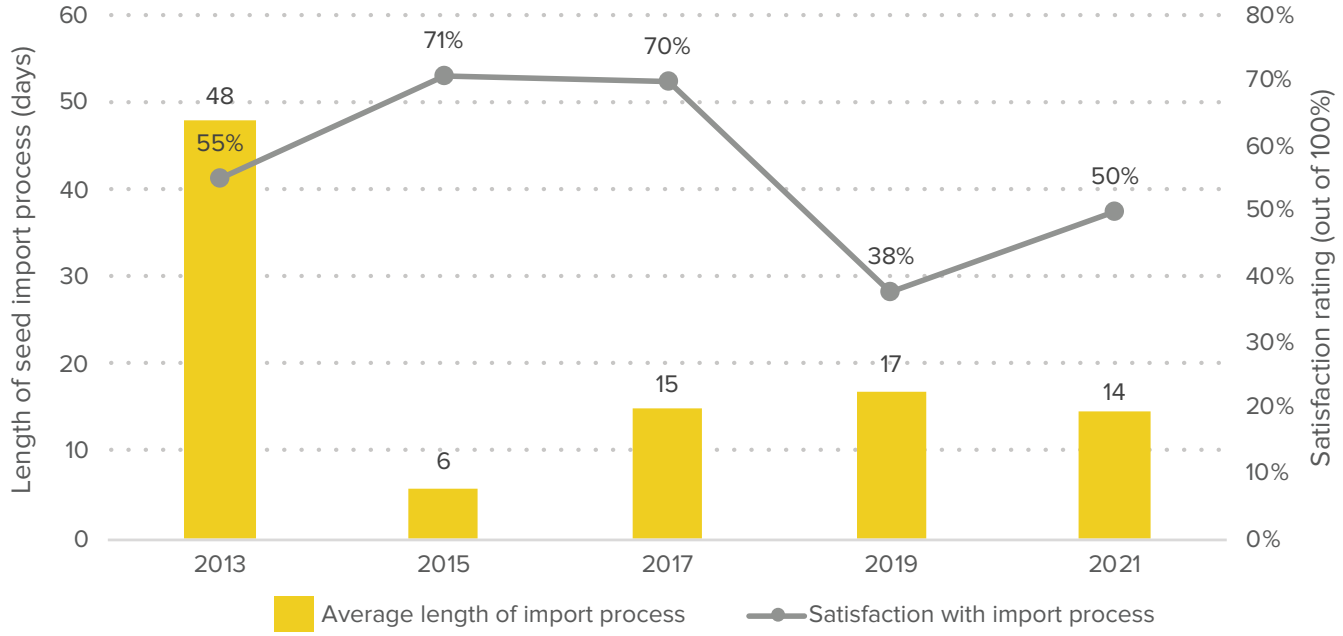
13 The International Orange Certificate is issued by a laboratory accredited by the International Seed Testing Association (ISTA) when both sampling from the seed lot and testing of the sample are carried out by the same laboratory.

**Table 13: Overview of seed imports (2021)**

| Crops | Number of importing companies | Main country sources of imports | Seed imports (MT) | | |
|---|---|---|---|---|---|
| | | | Total | From COMESA countries | From COMESA and w/ COMESA label |
| Maize | 4 | Kenya, South Africa | 3,512 | 3,500 | 2,100 |
| Bean | 0 | N/A[a] | N/A | N/A | N/A |
| Millet | 0 | N/A | N/A | N/A | N/A |
| Sorghum | 2 | Kenya, Sudan | 350 | 305 | 305 |

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

**Figure 6: Average length and satisfaction rating of import process**



Seed companies exported maize, bean, and sorghum seed in 2021 (Table 14). All exports went to COMESA countries. Seed companies exported a total of 6,915 MT of maize seed to South Sudan, Burundi, the Democratic Republic of Congo, and Kenya. This was a slight increase from the 5,888 MT of maize seed exported by nine companies in 2019. Companies exported 39 MT of bean seed to South Sudan and the Democratic Republic of Congo, a decrease from 182 MT in 2019 and 56 MT in 2017. There were no millet seed exports recorded in 2021 and 2019, while 4 MT of millet seed (33% of sales) was exported in 2017. In 2019, seed companies exported 6,402 MT of sorghum seed to South Sudan, a significantly higher volume than the 2,550 MT exported in 2021.

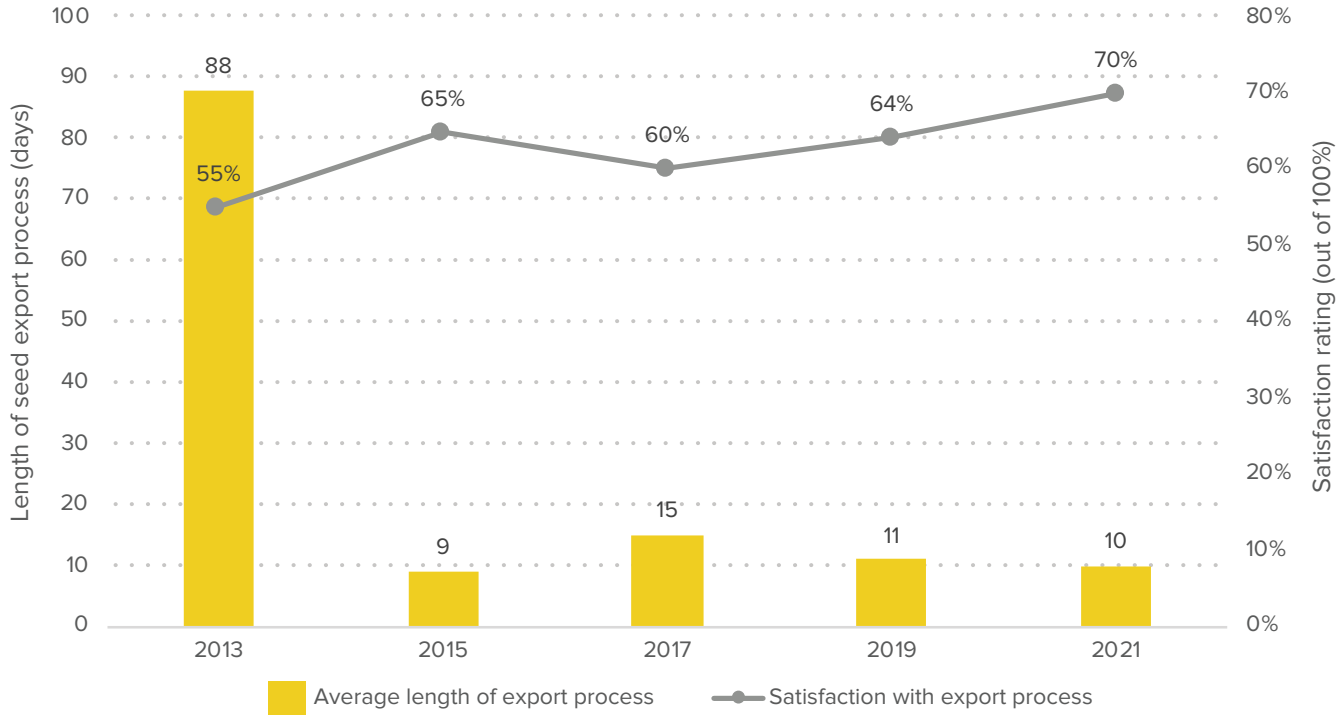
Seed companies' satisfaction rating of the export process in 2021 was "good" at 70%. The companies' satisfaction has been consistently "good" since 2015 (Figure 7). Over the years, the length of the export process has decreased from 15 days in 2017, to 11 days in 2019, and 10 in 2021. According to a Senior Inspector at NSCS, this improvement is attributed to continued training for seed traders (exporters and importers) by NSCS on the documentation required for the process.

**Table 14: Overview of seed exports (2021)**

| Crop | Number of exporting companies in 2021 | Main country destinations of exports | Total volume of exports (MT) to all COMESA countries |
|---|---|---|---|
| **Maize** | 5 | South Sudan, Burundi, DRC, Kenya | 6,915 |
| **Bean** | 3 | South Sudan, DRC | 39 |
| **Millet** | 0 | N/A[a] | 0 |
| **Sorghum** | 5 | South Sudan | 2,550 |

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

**Figure 7: Average length and satisfaction rating of export process**



# 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 developing the variety.

To release a new variety in Uganda, the variety owner/breeder applies to the National Seed Board, providing information on the variety's performance. The VCU and DUS tests are conducted by NARO, on behalf of NSCS. For a new variety not yet tested elsewhere, VCU tests are run for two seasons and the DUS test is run for one season. Evaluations are conducted by the DUS/VCU officer, accompanied by at least one breeder, a seed pathologist, and a USTA executive member. The results are compiled in a technical report, which the NSCS submits to the NVRC, which comprises 12 specialists who represent relevant fields in the seed value chain.

Once a variety is approved, it is published in the official gazette, after which it may be commercialized in Uganda. At that time, the owner/breeder of the variety applies to have the variety registered in the national variety list and pays the applicable registration fee (UGX 100,000; US$ 28 in 2021) as stipulated in the Seeds and Plant Regulations of 2010. While the above steps are followed, they do not happen frequently enough, making the variety release process longer than it should be. A case in point is the NVRC, which is supposed to meet twice a year to deliberate on applications for release. However, due to COVID-19, the NVRC met only once in 2021, and the meeting before that was in 2019.

In 2021, three seed companies submitted applications to release a total of 9 maize varieties; one of these companies also submitted a request to release a sorghum variety. No submissions were made to release bean or millet varieties. Two of the three companies used the national variety release process, while one company released a variety that was already listed in the COMESA catalogue. The national process was much longer than the COMESA process. It took 36 and 50 months to release one and 5 maize varieties, respectively, and 39 months to release a sorghum variety. In contrast, the variety release process took two months when using the COMESA system.

## STATUS AND IMPLEMENTATION OF NATIONAL SEED POLICY FRAMEWORK

Well-functioning formal seed sectors have effective coordinating institutions that work well together, following rules and procedures stipulated in clearly defined and regularly updated legal instruments.

The National Seed Policy was approved in 2018 (The Republic of Uganda 2018). A key component of the National Seed Policy of 2018 is the planned transformation of the NSCS into the Uganda Plant Health and Inspectorate Agency (UPHIA). However, this institutional

arrangement is not defined in any of the legal or regulatory instruments. The National Seed Policy is complemented by the Seeds and Plants Act of 2006, the Seed and Plant Regulations of 2010, the Plant the Seed and Plant (Quality Declared Seed) Regulations of 2019, and the National Seed Strategy of 2018 (The Republic of Uganda 2007; MAAIF 2018). The Directorate of Crop Resources is responsible for the implementation of the National Seed Policy. The National Seed Certification Service (NSCS) is under the Directorate and is in charge of all aspects related to seed quality assurance.

The Plant Variety Protection (PVP) Act of 2014 (The Republic of Uganda 2014)[14] promotes the development and protection of new plant varieties as a means of enhancing breeders' innovations and rewards through granting of plant breeders' rights.

# 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. These aspects include their level of support in 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 establishes a National Seed Board to oversee the work of the NSCS. Although the board was inaugurated in 2019, it is not yet functional. The Board has met only once yet is required to meet multiple times a year. The Boards term expired in 2022. The NSCS is awaiting direction from the Ministry of Agriculture on whether the term of the Board members should be renewed or a new Board should be appointed. According to the Seed Policy, the Board is supposed to advise the Minister on matters related to seed policy, to monitor progress in the seed sector and provide overall coordination of seed sector activities.

The Seeds and Plant Act of 2007 is implemented through two regulatory instruments: The Seed and Plant Regulations of 2010 and the Plant the Seed and Plant (Quality Declared Seed) Regulations of 2019. In addition, the Ministry developed the National Seed Strategy (2018/19 to 2022/23), describing specific interventions to advance the seed sector. These instruments are complemented by the Plant Protection and Health Act of 2015 which is implemented through the Plant Protection and Health (import and export) Regulations of 2020.

Several policy instruments are either under revision or are expected to be revised to ensure more effective implementation. For example, the implementation period for the national seed strategy is ending in 2023 and a revised strategy for the next five years was under development in 2022. The regulations for the Plant Protection and Health (import and export) Regulations (2020) are being reviewed after demands by stakeholders to reinstate the old fee schedule. The inspection fees had increased tenfold from UGX 5,000 (US$ 1.38) to UGX 50,000 (US$ 13.87). In addition, MAAIF intends to update the Seeds and Plant Act of 2007, specifically the penalty for misconduct, such as tampering with seed samples and labels currently UGX 1,920,000 (S$ 533) or 2 years in jail.

Regulations guiding the implementation of the PVP Act 2014 are not in place. This means that plant breeders cannot earn royalties from the varieties they develop. However, the draft regulations have been developed and are awaiting approval and gazetting by the Minister of Agriculture Animal Industry and Fisheries. In addition, a National Intellectual Property Policy has also been developed (Ministry of Justice and Constitutional Affairs 2019). This policy provides a framework for guiding the effective management of intellectual property, stimulating creativity and innovation, and rewarding the creators for their intellectual input. To operationalize its Intellectual Property Policy, NARO has developed guidelines for intellectual property management (NARO 2018). In addition, an Intellectual Property Management Committee (IPMC) was created, and an Intellectual Property Officer was appointed.

Uganda is a member of COMESA. COMESA has developed the COMESA Seed Trade Harmonized Regulations (COMESA 2014) to facilitate easier trade across borders among member countries. The regulations address three aspects of the seed system: (1) the variety release system; (2) the seed certification system; and (3) phytosanitary measures. The Seed and Plant Regulations were developed in 2010 and have not been amended to conform to the COMESA regulations. However, the Regulations allow for the importation of varieties that are registered on a common catalogue, that is, a catalogue that contains varieties that have been tested and released in more than one country. Further, the Seed Policy of 2018 highlights the importance of regional seed agreement harmonization to boost regional trade as a priority for seed sector development.

In practice, Uganda's seed certification system is closely aligned with the COMESA seed certification system with regard to the field and laboratory certification standards, seed labeling, the issuing of certificates, and seed classification. The sanitary and phytosanitary measures for seed are guided by the Plant Protection and Health Act of 2015 (The Republic of Uganda 2015a). However, Uganda's quarantine pest list has not been harmonized with the corresponding COMESA list.

Seed companies' satisfaction with government enforcement of seed regulations declined slightly from "good" (60%) in 2019 to "fair" (52%) in 2021. Most seed companies believed that while the seed regulatory framework was very clear, its implementation was not robust enough because it lacked the requisite financial and human resources.

14 As of April 2022, the NSCS had a planned meeting with the Solicitor General to address and agree on a change made to the regulations prior to approval for publication in the gazette.

# EFFORTS TO ERADICATE COUNTERFEIT SEED

Counterfeit seed threatens the seed sector in two important ways. First, it reduces farmers' confidence in certified seed after farmers unknowingly plant inferior quality grain labeled as certified seed. Second, it threatens the success of efforts to increase the adoption of improved varieties. TASAI tracks the number of cases of counterfeit seed reported by seed companies and 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.

Suspected cases of counterfeit seed are reported to the relevant District Agricultural Officer (DAO), who turns the case over to the police for investigation. The police report is forwarded to the Permanent Secretary in the Ministry of Agriculture, who forwards the report to the commissioner of Crop Inspection and Certification or to the head of the NSCS. A seed inspector is then assigned to the investigation. Most reports to the Ministry have been related to the seed distributed under the Operation Wealth Creation (OWC) program implemented by the NAADS. In 2021, 65 suspected cases of counterfeit seed were reported by surveyed seed companies, an increase from 48 suspected cases reported in 2019. This increase indicates that the counterfeit seed problem may be growing. In contrast, only 3 cases each were reported to the government in both 2019 and 2021 through the official channel described above (Table 15). According to the NSCS, farmers and seed companies are discouraged by the long process required to report suspected cases.

**Table 15: Industry satisfaction with government efforts to address counterfeit seed**

| Indicators | 2013 | 2015 | 2017 | 2019 | 2021 |
|---|---|---|---|---|---|
| **Number of suspected cases of counterfeit seed (seed companies)** | MD | MD | 14 | 48 | 65 |
| **Number of cases of counterfeit seed (government)** | MD | MD | MD | 3 | 3 |
| **Seed industry satisfaction with government effort to address counterfeit seed (out of 100%)** | 41% | 37% | 53% | 57% | 51% |

a "MD" refers to missing data.

Both the government and the private sector have instituted measures to address counterfeit seed. The MAAIF has set up a clear legal framework for the seed industry and has worked to raise farmers' awareness of seed quality issues through radio and TV broadcasts, as well as by publishing and distributing easy-to-read versions of seed regulatory documents. The MAAIF's agricultural police undertake routine checks and impound counterfeit seed. The initiative called the Seed Tracking and Traceability System (STTS) was deployed in the second season (season B) of 2021. Through USTA, the private sector is a partner in this initiative. Other government efforts include requiring the NSCS to participate in the NAADS seed subsidy contract award process to ensure that only companies that have certified seed are considered. Efforts also include working through NHL to ensure a reliable source of basic seed. Through the MAAIF, the government has also increased its efforts to train and register all seed agro-dealers.

Moving forward, the Directorate of Public Prosecution is discussing with the MAAIF how to strengthen the agricultural police's capacity to prosecute offenders. Furthermore, the NSCS is upgrading to an electronic seed inspection management system that will handle traceability and tracking and institute tamper-proof seed labels. The government is also partnering with the Integrated Seed Sector Development (ISSD) program and AGRA to train and authorize 104 public agricultural extension workers as para inspectors to decentralize and increase the outreach of seed inspection services.

Despite the changes implemented by government to date and those in the works, seed industry satisfaction with the government's efforts to address counterfeit seed has declined slightly from 57% in 2019 to 51% in 2021 (Table 15). Seed companies acknowledged that the government had increased the number of MAAIF agricultural police officers, leading to more agro-dealer spot-checks and the impounding of counterfeit seed. Unfortunately, the police are not effective because they rely on seed companies' surveillance rather than their own, and they are all stationed in Entebbe, while most businesses are domiciled in Kampala. Further, a mechanism for the disposal of impounded seed has not been devised. Further, the reach of government inspection services is low (one company noted that its seed processing factory had never been inspected), and the perception is that the legal penalties for malpractice are not punitive enough. In some cases, seed companies have abused the system by making false accusations against competitors, leading to losses for the targeted companies. Overall, seed companies suggest that the government needs to combine efforts with the private sector in order to effectively deal with counterfeit seed.

# USE OF GOVERNMENT SUBSIDIES

Seed subsidies are intended as a short or medium-term measure to encourage farmers to adopt improved crop varieties. 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 or it may be disruptive to market forces.

Uganda's seed subsidy program - Operation Wealth Creation (OWC) – commenced in July 2014 and is implemented by the NAADS. In the financial year 2020/21, the program received UGX 104 billion (US$ 28.8 million). The OWC activities included providing seed and planting materials[15] for food security crops, including maize, bean, and sorghum.

In 2021, some 780,000 maize-growing households received seed. A total of 3,900 MT of maize was procured and distributed and each household received 5 kg for ½ acre production. For bean seed, the program reached 66,640 households. In total, 833 MT of bean seed was distributed with each household receiving 12.5 kg for ½ acre. The varieties of seed to be distributed were pre-determined during the procurement process, according to priorities identified by District Local Governments (DLG) as well as adaptation to designated areas.

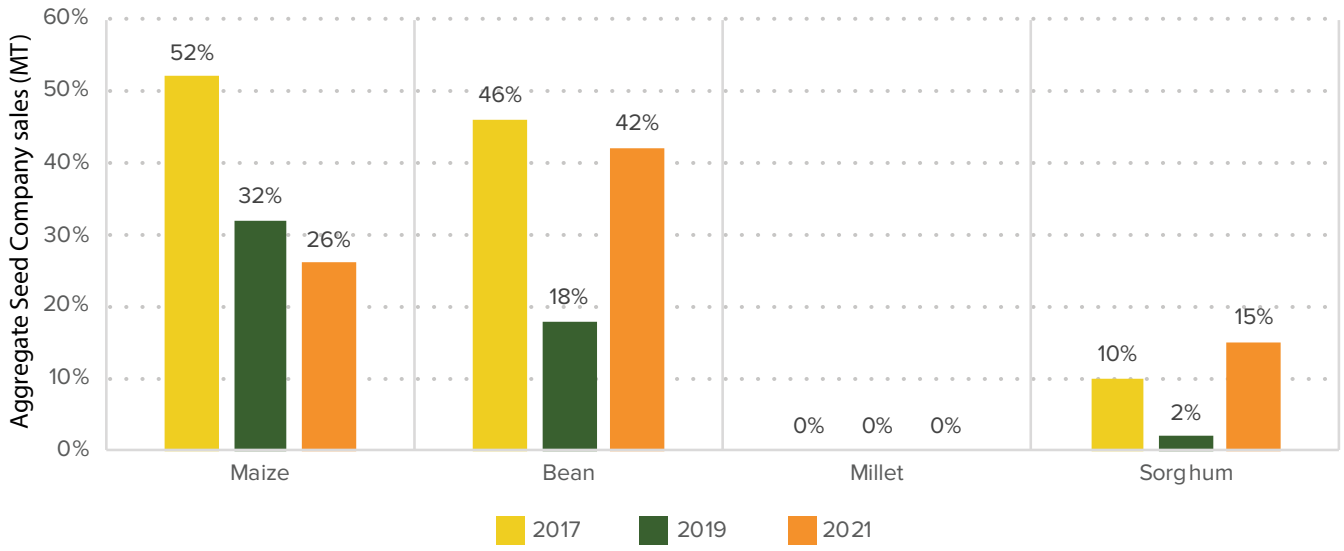
The application and contracts are managed by the Procurement and Disposal Unit of the NAADS. There are two types of contracts: the framework contract, valid for three years, and the one-off contract, which covers a single season and is an emergency response measure to address crops not covered in the framework contracts.

Regardless of the type of contract, the NSCS shortlists a group of registered seed companies to apply and submit a quote for the cost of the seed. The list is submitted to the NAADS. Under the framework arrangement, selected companies receive a call to supply seed once the NAADS verifies that their seed is certified by the MAAIF. In 2021, the NAADS also provided a framework price offer – UGX 6,000 (US$ 1.70) for bean, UGX 4,000 (US$ 1.10) for lowland/mid-altitude hybrid maize and UGX 6,500 (US$ 1.80) for highland hybrid maize varieties. Up until 2022, the subsidy was administered as a 100% price subsidy. However, starting in 2023 the farmer beneficiaries will be expected to pay 30% of the seed price. The selected seed companies deliver the seed directly to the DLGs. The DLG issues a delivery note verifying receipt of the seed, based on which payments are made by the NAADS Secretariat. According to the NAADS secretariat, the seed distributed to farmers is expected to be of high quality. This seed is first delivered to the District Local Government officer where the District Agriculture Officer conducts germination tests. Seed companies are not paid unless the seed passes the germination test and meets quality standards.

Figure 8 shows the aggregate seed company sales to the OWC input subsidy program in 2017, 2019, and 2021. Seed company sales to the OWC have declined over time, especially for maize. The NAADS has procured more bean and sorghum seed as part of its interventions to help farmers overcome the economic slump caused by the COVID-19 pandemic.

15 The OWC also includes activities related to agribusiness development and value addition (which now accounts for more than 50% of its budget). It also includes investments in agribusiness incubation in partnership with the Consortium for Enhancing University Responsiveness to Agribusiness Development Ltd (CURAD) of Makerere University as well as investments in farm inputs and machinery.

**Figure 8: Aggregate seed company sales to the OWC**




Seed company satisfaction with the transparency of the procurement process increased significantly, rising from "poor" at 35% in 2019 to "good" at 60% in 2021 (Table 16). This was attributed to the NAADS' efforts to attain greater equity in tender awards, where all eligible applicants receive a share of the procurement order. USTA's involvement has been reduced to eliminate a perceived conflict of interest, as the newer and smaller companies tended to accuse the secretariat of lobbying for tender awards for its older and more influential members.

Satisfaction with the predictability of the procurement process for the seed subsidy program rose from "very poor" at 23% in 2019 to "fair" at 51% in 2021. Seed companies interviewed in 2022 felt that the framework contracts made it easier to plan; however, the NAADS is often subjected to unplanned budget cuts, leading to delayed payments to seed companies.

Seed company satisfaction with the efficiency of payments also improved, from a rating of "very poor" at 24% in 2019 to "fair" at 48% in 2021. The increase is likely due to improvement in the promptness of payments, as long as all the documentation is submitted on time. However, seed companies complained that compiling documentation can take up to 4 months, as the documents must be collected from multiple institutions and individuals, including a member of parliament. Seed companies also reported that the claims process is marred by corruption, including requests for kickbacks or shares in their companies. They also reported that documents submitted may be 'lost' when these demands are not met. Payments may also be delayed due to errors in payment processing.

**Table 16: Industry satisfaction rating of the implementation of the government subsidy program**

| Aspect of the government seed subsidy program | Opinion rating (out of 100%) | | |
|---|---|---|---|
| | 2017 | 2019 | 2021 |
| Openness and transparency of the seed procurement process | 59% | 35% | 60% |
| Predictability of the seed procurement process | 57% | 23% | 51% |
| Efficiency of payments | 48% | 24% | 48% |

extremely poor | poor | fair | good | excellent

# 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. The membership of the national seed associations includes seed companies, seed growers, seed cooperatives, seed associations, individual seed producers, and, at times, agro-dealers.

The Uganda Seed Trade Association (USTA) is a member-based organization for seed merchants in Uganda. USTA was incorporated in 1999, with a mission of "enhancing the availability of quality-assured seed through the building, coordinating and spearheading the development of the seed industry in Uganda".[16] In 2021, USTA's membership comprised 35 seed companies and 3 associate members, an increase from 14 members in 2016. Of the 24 seed companies that participated in the TASAI survey, 19 were ordinary USTA members. USTA is a member of the African Seed Trade Association (AFSTA) and an observer member of the International Seed Federation (ISF).

USTA's governance structure consists of a general assembly, comprising all members, which meets once a year, and an executive committee. This committee consists of seven elected members, including a chairperson, vice-chairperson, general secretary, treasurer, and three committee members. Committee members serve for three-year terms and no member may serve for more than two consecutive terms. In 2022, three of the seven executive committee members were women. The executive committee works through three sub-committees - member service, lobbying and advocacy, and finance. The Chairman and the Executive Secretary are ex-officials on each of the three sub-committees, and USTA staff serve as the secretariat. According to the Executive Secretary, the sub-committees relieve the secretariat of certain duties, some of which are too technical for the secretariat.

The USTA secretariat is headed by the Executive Secretary, who administers the day-to-day affairs of the association on behalf of the Executive Committee. In 2022, the secretariat had four employees: two men - an executive secretary and a quality controller - and two women – a finance and administration officer and a data clerk. The number of employees had slightly increased in 2019. According to the Executive Secretary, the current number of employees is sufficient, although the association plans to provide additional training to its employees.

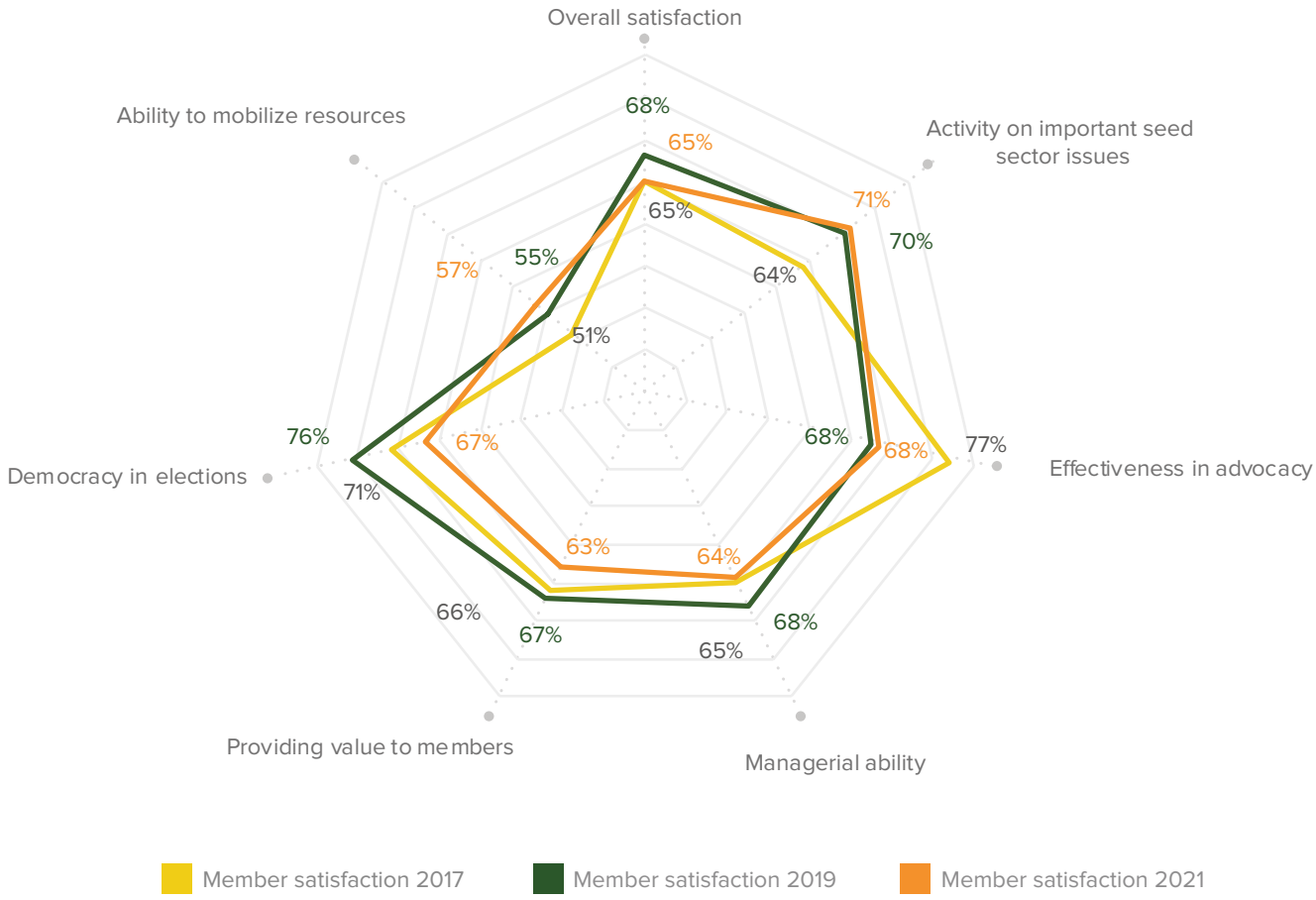
USTA's achievements in 2020 and 2021 include the following:

- The formation of an arbitration committee.
- Successful lobbying for a temporary waiver of the requirement for the Pre-Import Verification of Conformity (PVoC) certificate for importing seed companies. USTA convened a stakeholder meeting which was attended by the Minister (MAAIF), the Minister for Trade, the Uganda National Bureau of Standards (UNBS), clearing agents, the Uganda Revenue Authority, the police, and security personnel at borders, transporters, and agro-dealers. The outcome of the meeting was an agreement to waive the PVoC requirement for seed companies;
- The acquisition of 18.5 acres of land from the government in four districts (Bulambuli, Kasese, Kawanda, and Lira districts) for field demonstrations for varieties marketed by seed companies.
- Training of 350 agro-dealers and 180 extension workers on seed production techniques for hybrid and OPV maize, marketing and storage, quality assurance, and engagement in contracts with seed companies.
- Training of 11 public seed inspectors and 38 seed company staff as private seed inspectors. This was done in collaboration with other partners.

The performance rating of USTA by its members across seven dimensions in 2017, 2019, and 2021 is presented in Figure 9. In all three studies, members' overall rating of USTA was "good", with satisfaction increasing slightly from 65% in 2017 to 68% in 2019, then declining back to 65% in 2021. The lowest-rated area of service delivery was the "ability to mobilize resources" (57%). This area was also rated lowest in 2017 and 2019. The low rating across the performance areas could be as a result of reduced activities during the COVID-19 lockdown.

16 "Who we are," Uganda Seed Trade Association (USTA), accessed on January 30, 2023, https://www.usta.ug/who-we-are/

**Figure 9: Members' satisfaction with USTA**




# ADEQUACY OF SEED INSPECTORS

Seed inspection services ensure that certified commercial seed meets the regulatory quality standards. Providing 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.

Seed inspection in Uganda is undertaken by the NSCS. The NSCS designs, establishes, and enforces seed certification standards. In 2022, Uganda had 21 government seed inspectors. When interviewed, the NSCS said that this number was sufficient for the country; however, inspectors lack vehicles and fuel to carry out their work efficiently. In 2021, the NSCS obtained support from AGRA to train 104 extension workers as para seed inspectors, providing them with motorcycles and fuel. The para inspectors have been trained to conduct some of the field inspection tasks and are expected to start their work in the first season of 2023. The MAAIF approved an additional 150 agricultural inspectors in 2022. However, NSCS is to yet to ascertain how many of these would be seed inspectors, and how many would be assigned to other sub-sectors.

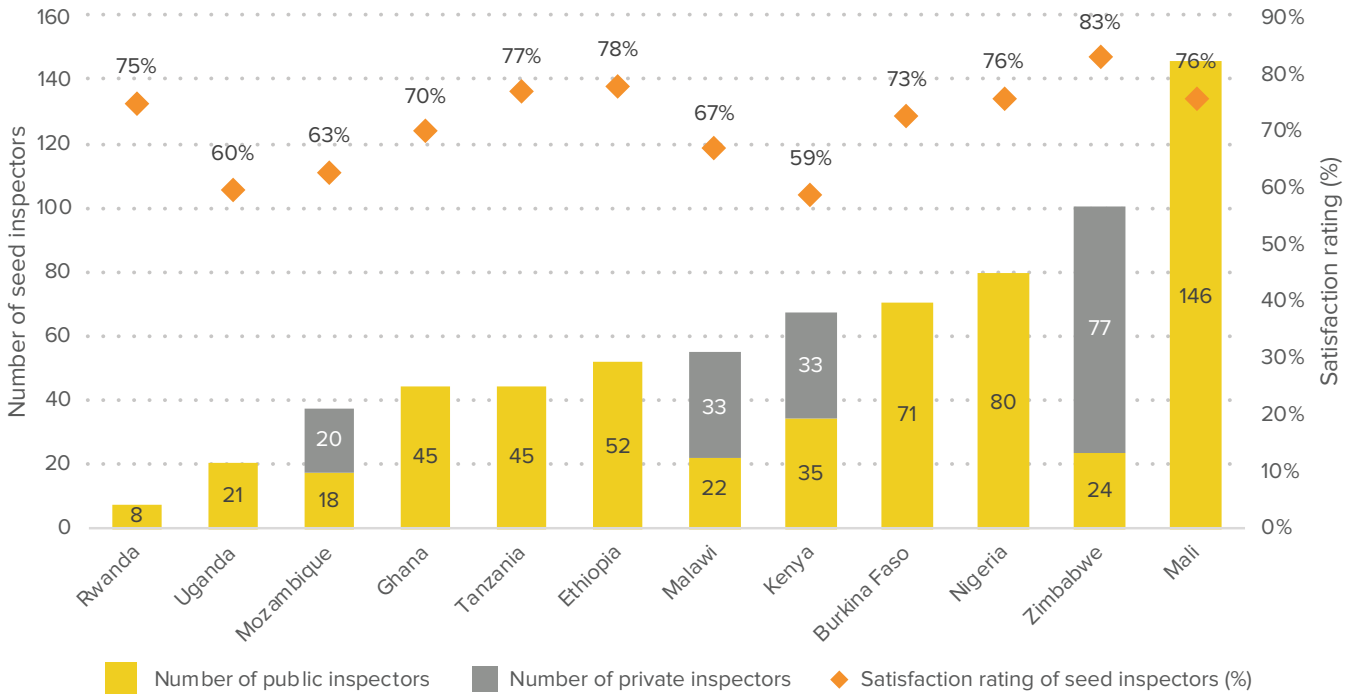
Seed industry satisfaction with seed inspectors has risen steadily over time, rising from "fair" (40%) in 2013 to "good" (60%) in 2021 (Figure 10). However, while the number of inspectors has increased since 2013, the level of satisfaction has increased relatively modestly from 40% to 60%, which signals that the current number of inspectors is still insufficient. Seed company opinions echoed the same sentiments, revealing that the low number of seed inspectors often leads to uninspected fields. Seed companies also expressed that newly recruited seed inspectors sometimes lack the necessary levels of skills and experience. In addition, companies lamented the delays in the authorization and deployment of private seed inspectors to complement the government officers, and in the decentralization of seed inspectors at the district level. Finally, they cited the inadequate collaboration between the government and private seed companies in the surveillance of counterfeit activities.

The MAAIF is in the process of rehabilitating the national seed laboratory which would also lead to its accreditation to the International Seed Testing Authority (ISTA). In addition, plans are under way to authorize private seed inspectors to work on behalf of the government with minimal auditing, as stipulated in the Seed Act.

In 2020, the ISSD supported the NSCS to develop a national seed tracking and tracing system used to monitor and oversee field inspections in real-time. Targeted users include the NSCS, breeders, seed companies, local seed businesses, and agro-dealers.[17] The system allows seed sales to be traced back to the breeders' seed production lots. The system has two main components: a mobile app and a dashboard. The NSCS is also developing a traceability system for agro-inputs.

17 Local seed businesses are the producers and sellers of QDS.

**Figure 10: Number and satisfaction rating of seed inspectors in Africa**



# 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 as well as 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.

Agricultural extension service delivery in Uganda is managed by the MAAIF's Directorate of Agricultural Extension Services (DAES) through the Production Department of each district's local government. With an estimated 7,413,883 agricultural households (UBOS 2020), the 3,790 government agricultural extension workers[18] and 538 private extension officers translate to a ratio of one agricultural extension worker to 1,713 agricultural households in 2021.[19, 20] The number of private extension workers employed by seed companies more than tripled over the last two years, from 162 in 2019 to 538 in 2021 (Table 17). Furthermore, 23 of the 24 (96%) seed companies employed their own extension workers in 2021, compared to 88% in 2019.

Growth in the private extension workforce is in line with the government's intent to establish a high-quality, well-coordinated agricultural extension delivery system. However, according to the MAAIF, the registration and licensing of private extension workers is awaiting approval of the Agricultural Extension Bill that is currently under consideration by the cabinet. The plan is to have at least three extension officers per sub-county, covering crops, livestock, and fisheries.

18 The government did not recruit any new extension workers over the study period, apart from refilling vacancies arising from staff attrition.

19 The 2022 figure is based on the report on the national budget framework paper for the financial year 2023/24 to that of 2027/28 that was presented to the entire House on Thursday January 25, 2023 for consideration and approval.

20 "Agricultural ministry needs 4,900 extension workkers - Report," NewVision, accessed on January 29, 2023, https://www.newvision.co.ug/articledetails/152519

**Table 17: Number and adequacy of agricultural extension services**

| Indicators | 2019 | 2021 |
|---|---|---|
| Number of public extension officers employed by the government | 4,110 | 3,790 |
| Number of private extension officers employed by seed companies | 162 | 538 |
| Total number of extension officers | 4,272 | 4,328 |
| Ratio of extension officers to agricultural households | 1:1,800 | 1:1,713 |
| Seed industry satisfaction with extension officers (out of 100%) | 47% | 47% |

extremely poor | poor | fair | good | excellent

In 2021, seed companies rated their satisfaction with agricultural extension services as "fair" (47%). Companies were dissatisfied due to the low number of extension officers at the sub-county level,[21] a focus on medium or large-scale farmers and/or quality-declared seed producers, and a lack of transportation for existing personnel. Finally, seed companies felt that the extension personnel had limited knowledge of seed systems and could not adequately support seed companies and their out-growers.

Aware of the shortage of extension agents, the government, with support from AGRA, has launched training for 104 extension workers to become para seed inspectors. The initiative aims to increase coverage by seed inspection services. It is unclear whether the added responsibility of inspections will exacerbate the level of inadequacy of extension workers. In addition, the government plans to use private extension service providers following their certification and accreditation, as soon as the law is approved. Recruitment of additional extension workers to improve access to extension services has been impeded by limited funds to cover the wage bill and significant cuts to the 2022/23 national budget across ministries and agencies. The government has, however, started to harness the power of ICT in service delivery. Through the DAES, the MAAIF has rolled out e-extension services in the form of a web and mobile phone-based systems to ease access to extension services.

21 The government intends to devolve service delivery to the parish level as part of the parish development model in the financial year 2022/23.

# 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.

According to the MAAIF, Uganda had 623 registered agro-dealers as of 17 May 2022 (MAAIF 2022). This is a decline from the 725 recorded in 2020. However, the difference is likely due to ongoing efforts to update the register, a process that should be completed by the end of 2022.[22]

As a prerequisite, anyone who plans to engage in agro-dealing in Uganda must complete training in the safe handling of pesticides, conducted by the Department of Agricultural Production in the School of Agricultural Sciences at the College of Agricultural and Environmental Sciences (CAES), Makerere University.

A total of 23 of the 24 surveyed seed companies sold through agro-dealers. On average, each company worked with 281 agro-dealers in 2021, an increase from 141 in 2019 (Table 18). The number of agro-dealers each seed company worked with ranged widely from 2 to over 3,000. Two of the seed companies worked with less than 10 agro-dealers while only two seed companies worked with 1,000 or more agro-dealers. Exclusive sales arrangements (where agro-dealers sell seed for only one company) are widespread, employed by 42% of seed companies. With an estimated 7,413,883 farming households, one agro-dealer serves 11,900 farming households, on average (UBOS 2020).

Seed industry satisfaction with the concentration of the rural agro-dealer network remained "fair" but declined from 56% in 2019 to 48% in 2021. The low satisfaction level is a reflection of the concentrated agro-dealer network in urban areas or, at most, around the rural trading centers.

22 The agro-dealer register was being updated at the time of the survey. Completion was slated for December 2022.

**Table 18: Number of agro-dealers and satisfaction rating of the agro-dealer network**

| Indicator | 2019 | 2021 |
|---|---|---|
| Number of agro-dealers | 725 | 623 |
| Average number of agro-dealers per seed company | 141 | 281 |
| % of companies with exclusive agro-dealers | -[a] | 42% |
| Seed industry satisfaction with agro-dealer network (out of 100%) | 56% | 48% |

extremely poor | poor | fair | good | excellent

a Data was not collected during the study period.

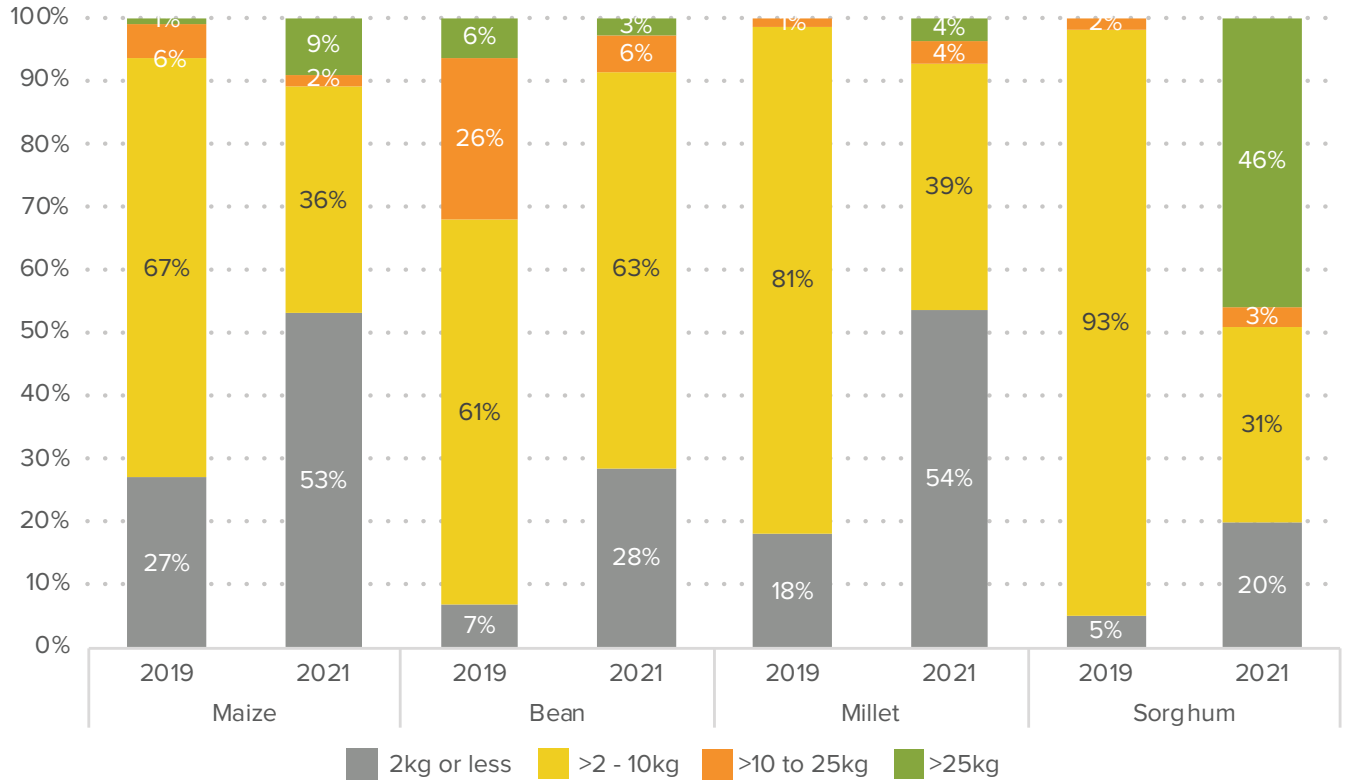
# AVAILABILITY OF SEED IN SMALL PACKAGES

Because 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 certified 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.

Across all four focus crops, the percentage of seed sold in small packages increased since 2019. In fact, the volume of maize seed sold in packages of 2 kg or less in 2021 was nearly double the corresponding figure in 2019 (53% vs. 27%) (Figure 11). Similarly, the percentage of bean seed sold in the smallest package category quadrupled from 7% in 2019 to 28% in 2021. The study has observed a similar trend for millet and sorghum seed: the percentage of millet seed sold in packages of 2 kg or less rose from 18% in 2019 to 54% in 2021, while the amount of sorghum seed sold in small packages increased from 5% in 2019 to 20%.

For maize, the increase can be explained by the substantial rise in sales through agro-dealers, who retail mostly 2 kg packages to walk-in customers. Between 2019 and 2021, the percentage of seed sold through agro-dealers increased from 25% to 45%. For bean seed, this was in line with the overall increase in direct sales to farmers, from 9% in 2019 to 19% in 2021. Since small scale farmers prefer small packages, an increase in their purchases corresponds to a higher percentage of the seed sold in small packages.

**Figure 11: Percentage of seed sold in different package sizes**




# 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 significant as many smallholder farmers end up making a choice 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 retail price of seed (at agro-dealer level) vis-à-vis the market price of grain at the time of planting.

Across all crops, the average price of seed as reported by seed companies was lower in 2021 than in 2019, in part due to the reduced purchasing power of farming households as a result of the COVID-19 pandemic (Table 19).

**Table 19: Seed and grain prices**

| Crop | Average seed prices (UGX/kg) | | Average grain prices (UGX/kg) | |
|---|---|---|---|---|
| | 2019 | 2021 | 2019 | 2021 |
| Maize (hybrid) | 6,020 | 5,883 | 1,620 | 1,435 |
| Maize (OPV) | 2,810 | 2,410 | 1,620 | 1,435 |
| Bean | 4,835 | 5,083 | 3,160 | 2,598 |
| Millet | 4,333 | 4,000 | 1,738 | 2,732 |
| Sorghum | 3,500 | 3,375 | 830 | 1,289 |

# CONCLUSION

Ariga et al. (2019) describe five stages of seed sector growth in sub-Saharan Africa, ranging from nascent to mature. Assigning a country to a category is not always straightforward, because parts of the seed sector may be ahead, while others may lag behind a particular stage. Uganda's formal seed sector most closely resembles the growth stage of development. This seed sector is characterized by well-established private companies that are supported by strong breeding programs, a policy environment that is supportive of private-sector participation, a highly competitive market with multinational and local seed companies producing a wide range of high-quality seed, and an agro-dealer network serving seed companies and farmers. The 2022 TASAI Uganda study has revealed several positive aspects of the seed industry, most of which are the result of recent improvements and programs initiated by the government. However, the industry still faces constraints that stifle continued growth.

Under the **research and development** category, the study noted a slight improvement in the number of active breeders for the four focus crops in Uganda, from 10 in 2019 to 13 in 2021. However, public breeding programs are constrained by insufficient funding from the government and donor projects. Several funded projects have either ended or will soon end. Also compounded by COVID-19-related challenges, the current situation is reflected in the number of varieties released, which declined from 38 between 2017 and 2019 to 23 between 2019 and 2021.

The steady improvement in the satisfaction ratings for the overall availability of basic seed over the years coincides with the entry of alternative basic seed producers, especially for maize and bean. It also signals a preference for easily accessible local sources of basic seed as a solution to COVID-19-related challenges at that time.

In the **industry competitiveness** category, the number of active seed companies for maize increased from 23 in 2019 to 24 in 2021 and for bean from 17 to 24 during the same period. The change reflects an increase in the production and/or marketing of certified seed for the two crops. Over the same period, the number of seed companies for millet and sorghum declined slightly. However, the volumes of certified seed produced and sold for maize, millet, and sorghum declined in 2021, mainly as a result of the COVID-19 lockdown which adversely affected the entire seed value chain.

The maize and bean seed market has been quite competitive since 2015. The millet and sorghum certified seed markets showed the lowest level of competition. There was an increase in the quantities of maize and sorghum certified seed imports, signifying an expanded market for the two commodities. Satisfaction with the import process improved from "poor" in 2019 to "fair" in 2021 as a result of the temporary waiver of the PVoC requirement. Further, the increased use of COMESA labels in 2021 compared with 2019 indicates a growing awareness of the benefits of COMESA labels in easing the import process.

Uganda's **seed policy environment** ushered a new era with the launch of the first client-managed NPT trial under the direct supervision of the NSCS. Unsurprisingly, breeders were highly satisfied with the COMESA variety release system given its shorter duration and lower cost. Seed companies' satisfaction with government enforcement of seed regulations declined slightly from "good" (60%) in 2019 to "fair" (52%) in 2021. Most seed companies felt that while the seed regulatory framework was very clear, its implementation lacked adequate checks and balances and the requisite human and financial capacity for it to be effective. Further, several policy instruments are awaiting approval or implementation.

Seed industry satisfaction with government efforts to address counterfeit seed declined slightly from 57% in 2019 to 51% in 2021. Although the government and the private sector have initiated several initiatives to combat counterfeit seed, seed companies want more punitive measures levied on perpetrators. Sales to the seed subsidy component of the OWC program have declined since 2017 due to declining budget allocations and re-prioritized funding to value addition, in line with Uganda's agro-industrialization strategy. However, satisfaction with the government seed subsidy program improved for the transparency of the award process, the predictability of the procurement process, and the efficiency of payments. This increase can be attributed the program's push to share the procurement order across all eligible applicants, the awarding of framework contracts, and prompt payments after the supporting documentation had been submitted.

Under **institutional support** for the seed sector in Uganda, our report found that, between 2019 and 2021, the USTA made gains in policy advocacy and the promotion of new varieties. The association was involved in the training of private seed inspectors, extension workers, and agro-dealers. Members' overall satisfaction with the performance of USTA continued to be rated 'good' in 2021, though it declined slightly since 2019. This could be attributed to COVID-19, which reduced activities in the seed sector. The number of government seed inspectors rose from 14 in 2019 to 21 in 2021. An additional 104 extension workers were trained as para seed inspectors. However, the NSCS feels that their effectiveness will depend on whether they will have sufficient resources (e.g., vehicles and fuel) to carry out their work. Seed companies would like to see the authorization of private seed inspectors, a decentralized inspection workforce, and greater use of ICT to ease service delivery.

Under the **service to smallholder farmers** category the government extension workforce did not change between 2019 and 2021. However, the number of private extension workers nearly tripled over the period. This trend is expected to improve when the agricultural extension bill (which will pave the way for the certification of private extension workers) is passed into law. The number of agro-dealers declined from 725 in 2019 to 623 in 2021. However, the average number of agro-dealers engaged by a seed company increased from 141 in 2019 to 281 in 2021. In 2021, seed companies packaged more of their seed in smaller-sized packages than in 2019. This was in line with the overall increase in direct sales to farmers and agro-dealers, who mostly purchase seed in 2 kg-sized packages.

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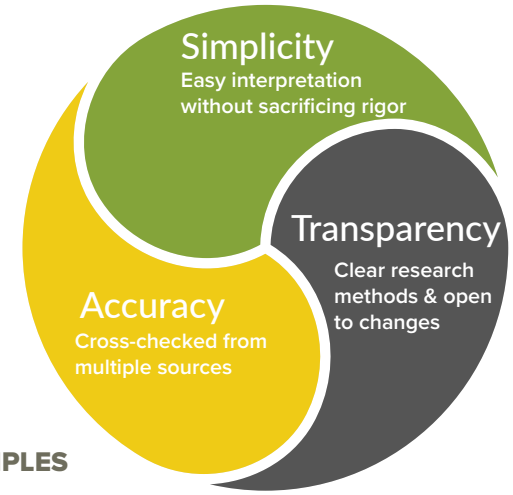
# ABOUT TASAI


**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.

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