TASAI

THE AFRICAN SEED ACCESS INDEX

Uganda Brief 2018 - The African Seed Access Index

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INTRODUCTION

A competitive seed sector is key to ensuring timely availability of high-quality seeds of improved, appropriate varieties at affordable prices to smallholder farmers in Uganda. This country brief summarizes the key findings of The African Seed Access Index (TASAI) study conducted to appraise the structure and economic performance of Uganda's seed sector in 2017. With a focus on four grain and legume crops important to food security in Uganda — maize, beans, finger millet, and sorghum — the study evaluates the enabling environment for a vibrant formal seed sector. The four crops account for about 35% of arable land in Uganda (FAOSTAT, 2017). The study covers 20 indicators, divided into the five categories: Research and Development, Industry Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers. Appendix 1 summarizes the indicators and compares Uganda to 12 other countries where similar studies have been conducted. TASAI seeks to encourage public policymakers and development agencies to create and maintain enabling environments that will accelerate the development of competitive formal seed systems serving smallholder farmers.

Overview

Like most other African countries, the seed industry in Uganda consists of two systems: the informal sector and the formal sector. This policy brief focuses almost exclusively on the formal seed sector.

The informal sector broadly refers to the system where farmers produce, obtain, maintain, develop and distribute seed resources from one growing season to the next (FAO, 1998). Due to limited exposure, low availability of varieties, inability to purchase seeds, limited access to agro-dealers, or other reasons, most smallholder farmers in Uganda still rely at least in part on informal seed systems, particularly for crops other than maize. In the informal system, farmers generally acquire seeds from the local community, including markets and the farmers' social networks. Standards in the informal seed system are not monitored or controlled by government policies and regulations; rather, they are guided by indigenous knowledge and standards, and by social structures.

The formal sector focuses on breeding and evaluating improved varieties and producing and selling seed of these varieties that is certified by the National Seed Certification Service (NSCS). NSCS is the government entity under the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) responsible for regulating Uganda's seed industry. As shown in Table 1, Uganda's formal seed sector comprises many institutions including government (e.g. MAAIF_ DCIC housing NSCS and NARO, local government extension services, and private sector (MNCs and local seed companies), agro dealers, and development agents (NGOs and CBOs). The apex seed association, the Uganda Seed Trade Association (USTA) plays an important role in sharing information and advancing members' interests.

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

ROLE	KEY PLAYERS
Research and breeding	NARO, NaCRRI, NaSARRI, CGIAR, AATF
Variety release & regulation	NSCS, MAAIF, NSB
Breeder and foundation seed production	NARO, NaCRRI, NaSARRI; local seed companies, MNCs, AATF
Seed production	Seed companies, local seed businesses
Processing and packaging	Seed companies
Education, training, extension	Seed companies, extension agents, farmers' organizations, NGOs, agro-dealers, USTA
Distribution and sales	Seed companies, rural agro-dealers, NGOs

Key Acronyms: AATF – Africa Agricultural Technology Foundation, **CIMMYT** – International Maize and Wheat Improvement Center, **DCIC** – Department of Crop Inspection and Certification, **DUS** – Distinctness, Uniformity, and Stability, **ISTA** – International Seed Testing Association, **LSBs** – Local Seed Businesses, **MAAIF** – Ministry of Agriculture, Animal Industry and Fisheries, **MNCs** – Multinational Corporations, **NAADS** – National Agricultural Advisory Services, **NaCRRI** - National Crop Resources Research Institute, **NARO** – National Agricultural Research Organization, **NaSARRI** - National Semi-Arid Resources Research Institute, **NGOs** – Non-Governmental Organizations, **NSCS** – National Seed Certification Service, **NSB** – National Seed Board, **OWC** – Operation Wealth Creation, **OPVs** - Open Pollinated Varieties, **QDS** – Quality Declared Seed, **UPHIA** – Uganda Plant Health Inspectorate Agency, **USTA** – Uganda Seed Traders Association, **VCU** – Value for Cultivation and Use, **VRC** – Variety Release Committee.

RESEARCH AND DEVELOPMENT

Number of active breeders

For the four priority crops – maize, beans, finger millet[1], and sorghum – Uganda has 15 active breeders. Most of them (7 of 15) focus on maize, while four focus on beans, and two each on millet and sorghum. In addition, several foreign-owned companies rely on the breeding capacity of their regional headquarters, located outside Uganda. Of the 15 local breeders, two are employed by the private sector, while 13 are from the two National Agricultural Research Organization (NARO) institutes: the National Crop Resources Research Institute (NaCRRI), which has nine breeders focused on maize and beans, and the National Semi-Arid Resources Research Institute (NaSARRI), which has four breeders focused on sorghum and millet. NaCRRI has more breeders than NaSARRI in part because it has received technical and financial support from the Africa Agricultural Technology Foundation (AATF), Alliance for a Green Revolution in Africa (AGRA), the Pan-African Bean Research Alliance (PABRA), and CGIAR institutions, namely the International Institute of Tropical Agriculture (IITA), the International Centre for Tropical Agriculture (CIAT), and International Maize and Wheat Improvement Center (CIMMYT) under the Drought-Tolerant Maize for Africa project. In contrast, NaSARRI lacks the funds to maintain a comprehensive breeding program. On average, seed companies' rate their satisfaction with the number of active breeders as good (69%). The highest level is satisfaction was reported for beans (80%) and maize (72%), while the satisfaction with sorghum breeders is fair (55%). The lowest satisfaction is with millet breeders: 40%.[2]

Varieties released in the last three years

Between 2015 and 2017, a total of 40 varieties were released across the four crops. Of these, 26 were maize, five each were bean and millet, and four were sorghum varieties. Not surprisingly, the number of varieties released correlates with the number of active breeders. Figure 1 shows the trend for variety releases (using three-year moving averages) for the four crops between 2000 and 2017. An important finding is that variety releases for maize outnumber the combined releases for beans, millet, and sorghum. The number of maize variety releases

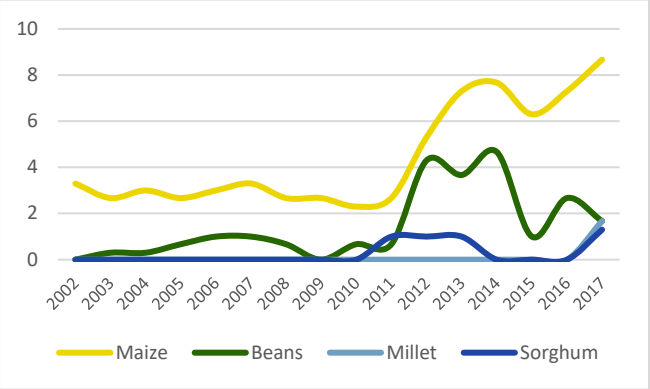

Figure 1: Trend in variety releases between 2002-2017 (three-year moving average)

has been on the rise since 2012, in part due to the entry of foreign companies and the development and release of Water Efficient Maize for Africa varieties by AATF. By contrast, no millet varieties were released between 2000 and 2016, and no sorghum varieties were released between 2000 and 2011. One reason for the low number of sorghum releases is because there is no hybrid sorghum breeding program in the country.

Availability of basic (foundation) seed

Most seed companies source their foundation seed from the NARO institutes: NaCRRI for maze and bean seed and NaSARRI for sorghum and millet. All the millet and bean seed-producing companies source foundation seed from these institutions. Three of the 18 maize seed-producing companies and two of the 11 sorghum seed-producing companies are foreign-owned and source their foundation seed from their regional/continental breeding programs. The main sources of maize foundation seed outside Uganda are Kenya (for five companies), Tanzania (for one company), and Zimbabwe (for four companies), while one company sources sorghum foundation seed from India and another from Zimbabwe[3]. All bean and millet foundation seed is sourced from within Uganda.

On average, seed companies rate the availability of basic seed for the four crops as good (62%). The companies are more satisfied with the availability of basic seed for maize (72%) than for the other three crops - beans (59%), millet (50%), and sorghum (55%). This makes sense given the greater investment in maize breeding programs by national and international agricultural research organizations.

[1] Herein referred to as millet

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

[3] Note that these country sources also apply for basic seed sourced from CGIAR centers based outside Uganda.

Number of varieties sold in 2017

In 2017, seed companies sold 68 varieties of the four crops. Of these, 41 were maize varieties, 13 were bean varieties, 6 were millet varieties and 8 were sorghum varieties. The most popular maize varieties were Longe4, Longe5, Longe5D, and MM3. Longe4 and Longe5 are open-pollinated varieties (OPVs) that were released in 2000 and are popular for their early maturing and nutritional characteristics. Longe4 is also popular for its resistance to maize streak virus. MM3 is a derivative of Longe4 and is early-maturing. Longe 7H, a hybrid sold by all seed companies, was also reported as popular.

The most popular bean varieties in 2017 were recent releases of NABE 15 and NABE 17 and an older variety, NABE4, released in 1999. Other varieties such as K132, K131 and NABE1 have been left in the market as landraces and are classified as standard seed. The most popular millet varieties in 2017 were PESE1 and PESE2, released in 1989 and 1995, respectively, and Seremi 2, while the most popular sorghum varieties were Seso1, 2, and 3. These varieties are classified as standard seed and are sold primarily to relief agencies.

Number of varieties dropped over the last 10 years

Seed companies were asked if they had dropping varieties between 2008 and 2017: 50% reported dropping maize varieties, 59% reported dropping bean companies, 50% reported dropping millet varieties, and 33% reported dropping sorghum. Across the four crops, companies reported dropping 25 varieties in all – nine maize, seven bean, three millet, and six sorghum varieties.

Dropped varieties included (for maize) SC407, Longe4, Longe5, Longe10H, YARA41, Victoria2, ZM652, and Ssalongo, (for beans) NABE4, NABE5, NABE11, NABE17, K131, and K132, (for millet) PESE1, PESE2, and Seremi1, and (for sorghum) Sekedo, Epuripuri, Seso1, and Seredo. The reasons cited for dropping these varieties were the need to replace with superior varieties, low tolerance to drought, high level of adulteration (especially with maize OPVs), lack of foundation seed (especially for bean varieties), degeneration of the variety (for the K132 bean variety), and low yields. These facts notwithstanding, some companies continue to produce and market some of the varieties dropped by others.

Average age of varieties sold in 2017

The average age of varieties sold in 2017 was 6 years for maize, 11 years for beans, 16 years for millet, and 12 years for sorghum. The youngest varieties for three of the four crops (maize, bean, and millet) are all one-year old. Four sorghum varieties released in 2017 had not yet been commercialized by the end of the year. The youngest sorghum variety on the market in 2017 had been released in 2011. The age of the oldest varieties was 17 years for maize, 23 years for beans, 28 years for millet, and 22 years for sorghum.

The fact that all four crops have old varieties on the market suggests a reluctance on the part of some farmers to switch to new varieties. Although 37 varieties of beans, millet, and sorghum have been released since 2002, the oldest varieties on the market were more than 20 years old.

Varieties with climate-smart features

To be classified as climate-smart, a crop variety must meet at least one of two criteria: early maturity and/or tolerance to extreme weather conditions such as drought, flooding, or frost. For maize, 8 of 26 varieties released between 2015 and 2017 were climate-smart, with drought tolerance being the dominant trait (for 6 of the 8 varieties). Only three of the five released bean varieties were climate smart – all early-maturing. All three climate smart sorghum varieties (of the four released) were drought-tolerant.

INDUSTRY COMPETITIVENESS

Number of active seed companies

In 2017, Uganda had 34 registered seed companies, 20 of which produced and marketed certified seed of at least one of the four focus crops. Of these 20, 19 produced maize seed, 17 produced bean seed, 6 produced millet seed, and 12 produced sorghum seed. Five of the 20 seed companies were foreign-owned.

In the aggregate, in 2017 the seed companies produced 21,959 MT of maize seed, 3,794 MT of bean seed, 19 Mt of millet seed, and 2,302 MT of sorghum seed. Also in 2017, total sales of maize seed, aggregated from individual company sales, were 17,013 MT. IN comparison, the 2015 sales figures were: 9,500 MT for maize seed, 2,957 MT (beans), 12 MT (millet), and 1,857 MT (sorghum).

Market share of top seed companies

Market concentration is calculated in two ways. First, by calculating the sales of the top four companies as a percentage of total industry output for each commodity. Using this method, the volume-weighted market share for the top four companies by crop was 69% for maize, 61% for beans, 100% for millet, and 72% for sorghum. Figure 2 illustrates the market shares.

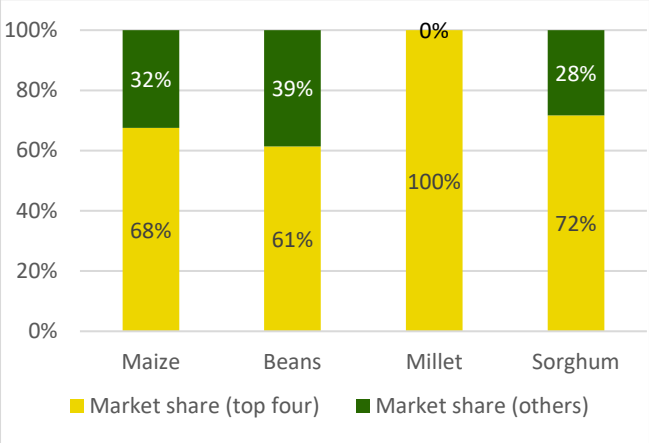

Figure 2: Market Share (%) of Top Four Companies

Market concentration was also analyzed using the Herfindal-Hershman Index (HHI). The HHI measures market concentration by squaring the market share of each firm competing in a market and then summing the resulting numbers. HHI can range from close to zero (perfect competition) to 10,000 (monopoly). HHI was calculated for each of the four crops. The HHI for three crops - maize (1,425), beans (1,214), and sorghum (1,703) - is good. Due to the low number of active companies producing millet seed, the HHI score for millet is extremely poor (5,139). The market shares of the top four companies and the HHI results both indicate that the seed market for maize, beans, and sorghum is competitive, with many active seed companies, none of which is dominant. The millet seed market is less competitive due to the low number of active seed companies.

Market share of government parastatal

Uganda has no active government parastatal engaged in the production and marketing of certified seed.

Length of import/export process for seed

The length of the import/export process is calculated as the number of days from of the date of application for an import/export permit to the date when the consignment reaches the border point of entry/exit. NSCS only issues import and export permits to entities registered as seed merchants.

Of the 20 seed companies, four (all foreign-owned) imported seed into Uganda in 2017. Maize seed was imported in the largest quantity (967 MT, from Kenya and Zimbabwe), followed by sorghum (200 MT. The main border point of entry was Malaba, on the Uganda-Kenya border. Seed companies reported that it took an average of 14.5 days to import seed into Uganda. Obtaining the relevant documentation, including the import permit and phytosanitary certificate, took over half the time (8 days), while clearing the seed at the border point of entry took about 4 days. The main causes of delay had to do with obtaining documentation and heavy cargo traffic at the border. Despite the delayed, seed companies rate the import process as “good” (70%).

Five of the 20 active seed companies exported seed in 2017. A total volume of 2,207 MT of seed was exported, equal to 10% of total sales in 2017. Companies exported 1,305 MT of maize seed (8% of total maize seed sales), 56 MT of beans (2% of total bean seed sales), 4 MT of millet seed (33% of total millet seed sales), and 842 MT of sorghum seed (45% of total sorghum seed sales). The main export destination was South Sudan (1,937 MT or 88% of total exports), where the buyers were primarily emergency relief agencies. Other destinations included Burundi (100 MT), Tanzania (80 MT), the Democratic Republic of Congo (45 MT), and Kenya (45 MT). The main border points of exit were Nimule (to South Sudan), Malaba (to Kenya), Bunagana (to the DRC) and Port Bell (to Tanzania). Seed companies reported that it took 15 days to export seed and rated the exportation process as “good” (60%).

SEED POLICY AND REGULATIONS

Length of variety release process

The length of the variety release is calculated as the number of days from the date when the application for variety release is submitted to the Variety Release Committee (VRC) to the date when the variety is approved for released by NSCS. Prior to the release of a crop variety, it is evaluated for distinctness, uniformity, and stability (DUS) and value for cultivation and use (VCU). According to the seed regulations, DUS tests should be performed for at least two seasons, while VCU tests should be conducted in at least four agro-ecological zones. The VRC meets, on average, twice a year. According to the responses

reported by seed companies and breeders, the average length of the variety release process is 28 months.

The official cost for DUS tests is UGX 350,000 (USD 100)[4] per variety, while VCU tests cost UGX 800,000 (USD 220) per variety. In addition, breeders pay UGX 100,000 (USD 30) to have a variety listed in the National Variety Catalogue. However, seed companies and breeders reported the cost of the variety release process to be higher costs (USD 1,200 to USD 5,000) because they also included expenses such as transport and living costs for staff who run the on-farm trials, site management, crop assessments, and evaluation. For similar reasons, research institutes reported paying USD 350 (UGX 1,225,000) for the DUS test, as opposed to the official rate of UGX 350,000. Despite the high costs, seed companies rate the variety release process as "good" (75%), while NSCS and NARO rated the process as "excellent" (80% and 90%, respectively).

Status of seed policy framework

Under the current institutional arrangement, the National Seed Certification Service is under the Department for Crop Inspection and Certification (DCIC). In addition, NSCS serves as the secretariat for the National Seed Board (NSB), which advises the Ministry on all seed-related issues. However, in 2016 Uganda updated its national seed policy, which included a change to the organizations in charge of seed regulations. Specifically, the new policy proposes that the DCIC turn into a semi-autonomous agency called the Uganda Plant Health and Inspectorate Agency (UPHIA), which will oversee all plant health services, seed regulatory services, and agricultural and plant-related chemical regulatory services (MAAIF, Uganda National Seed Policy - Draft 7, 2016). The updated seed policy is yet to be passed by the Cabinet.

The Seeds and Plant Act of 2006 is the main law governing Uganda's seed industry. The law established the NSB and NSCS. In turn, The Seeds and Plant Regulations of 2017 were developed as implementing instruments for the Act. The Regulations provide details related to plant breeding, variety release, seed multiplication, seed conditioning, seed marketing, seed importation and exportation, and quality assurance of seeds and other planting materials. MAAIF has also developed the National Seed Strategy (MAAIF, 2016)

Uganda is a member of both the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC). Uganda's seed regulations have been amended to conform to COMESA's harmonized seed regulations, which aim to facilitate the movement of certified seed within the region. However, as of yet no Ugandan seed company has listed varieties in the COMESA seed catalogue.

MAAIF plans to apply for accreditation of the national seed laboratory by the International Seed Testing Agency (ISTA) in 2018. However, prior to submitting this application, MAAIF needs to to hire additional laboratory staff to meet ISTA requirements.

Quality of seed regulations and enforcement

Seed companies rate the quality of the seed law and regulations in Uganda as "good" (60%). In contract, companies are less satisfied with the enforcement of these tools, rating them as "fair" (48%). The main reason for the relative low rating cited by seed companies was the need to recruit, train, and deploy more qualified seed inspectors, who would monitor seed companies' production and processing activities, thus ensuring seed quality throughout the value chain.

Adequacy of seed inspectors

Seed inspection is the mandate of NSCS. Unfortunately, NSCS has a significant shortage of inspectors, employing just seven in 2017. This shortage is due to lack of funding. In 2014, NSCS had a budget shortfall of 70% for staffing of inspectors (Naluwairo & Barungi, 2014). Seed companies rate their satisfaction with seed inspection services as "fair" (59%). In addition to the seven seed inspectors, MAAIF has trained phytosanitary inspectors who are stationed at the major border points. These inspectors handle both phytosanitary services and seed imports.

Several seed companies had supported a private initiative that would verify the seed quality at the production and processing stages. Known as Ag-Verify, the initiative was initially financed by USAID, and had two core services: (i) training and deployment of private seed inspectors and (ii) verifying the quality of seed produced by seed companies. For the latter, samples from the seed companies' fields would tested at an ISTA-accredited laboratory, managed by a private company called Chemiphar. These

[4] Exchange rate: USD 1 = UGX 3,500 (Oct 2018)

services were intended to complement the mandatory services of seed inspection and certification provided by NSCS. Unfortunately, lack of an agreement on the working and payment structure among Ag-Verify, NSCS, and seed companies led to the dissolution of Ag-Verify in 2018. By the time if closed, Ag-Verify had trained 32 agronomists in applying the COMESA Seed Harmonization standards. Of these, six were employed and supervised directly by Ag-Verify; the rest were from NSCS and seed companies.

Efforts to stamp out fake seed

Seed companies reported 14 cases of fake seeds in 2017. This is likely to be an under-estimate as most cases go unreported. Seed companies rate the government's efforts to stamp out fake seed as "fair" (53%). According to the seed companies, the main sources of fake seed are seed companies, seed distributors, and retailers (seed stockists). The problem of fake seed is partly fueled by the government seed distribution program Operation Wealth Creation (OWC), whose procurement system is unpredictable and which offers insufficient checks on seed quality and seed sources.

The industry, led by the Uganda Seed Trade Association (USTA), has been raising awareness about the problem of fake seed. The campaign recommends that seed companies use tamper-proof labels, provided by MAAIF, on their seed packages. In addition, companies are encouraged to appoint trusted agents who are licensed by the Ministry.

Use of smart subsidies

Operation Wealth Creation is a government initiative that procures agricultural inputs and distributes them to farmers through local governments. OWC officially launched in June 2014 as an intervention coordinated by the army, the Uganda People's Defense Forces. OWC is funded under the National Agricultural Advisory Services (NAADS) secretariat, an agency of MAAIF, and its operation aligns with the new mandate of providing agricultural inputs to farmers. Seed companies that sell seed to NAADS are required to show seed inventory reports, crop and factory inspection reports from NSCS, and tax clearance certificates from the Uganda Revenue Authority. In addition, NSCS advises NAADS on seed companies' capacity, based on their production returns and inspection reports. Seed companies that meet the criteria are then invited to respond to tenders from NAADS. NAADS provides information on the required seed types and seed volumes to local governments.

In 2017, NAADS purchased maize seed from nine companies, bean seed from seven companies, and sorghum seed from three companies. On aggregate, seed companies sold 8,856 MT of maize seed (52% of overall maize seed sales), 1,359 MT of bean seed (46% of overall bean seed sales), and 180 MT of sorghum seed (10% of overall sorghum seed sales) to NAADS. These volumes indicate that NAADS was a major buyer of seed in 2017.

Despite the high volumes of seed sales to NAADS and the explicit procurement procedures, seed companies are not very satisfied with the procurement arrangements. Seed companies rate as "fair" the transparency process in seed procurement (59%), the clarity in requirements and procedures (57%), and efficiency in government payments as fair (48%); predictability in the procurement process is rated "poor" (36%). Seed companies reported that the seed procurement process was marred by uncertainties and irregularities, and, as a result, several seed companies had opted not to sell to NAADS.

INSTITUTIONAL SUPPORT

Availability of extension services

In Uganda, NAADS oversees agricultural extension services. According to the National Agricultural Extension Strategy, in 2014 the ratio of agricultural extension staff to farmers was estimated to be over 1:5,000 (MAAIF, 2014). The low number of government extension officers is partly due to the restructuring process underway at NAADS. All extension staff who were recruited under NAADS have been discharged. In addition to the government extension services, the seed companies employ a total of 176 extension officers, of whom 49 are male and 127 are female. Seed companies rate their satisfaction with extension services as "fair" (59%).

Quality of national seed trade association

Formed in 1999, the Uganda Seed Traders Association (USTA) is a member-based association for all seed merchants in Uganda. In 2017 USTA had 27 members, of which 23 were seed companies and four were associate members. USTA plays a key role in liaising between private seed companies and the government on all seed industry matters.

Figure 3 illustrates seed companies' level of satisfaction with USTA's performance in seven service areas. The companies rate their satisfaction with the overall quality of USTA as "good" (65%). USTA's highest rating is in democracy and governance (71%), while the lowest ratings are in its ability to mobilize resources (51%) and facilitating business opportunities for members (59%). In all other areas – effectiveness in advocacy, activity on important seed sector issues, managerial ability, and providing value to members - USTA's members rate the association as "good" (64% to 66%).

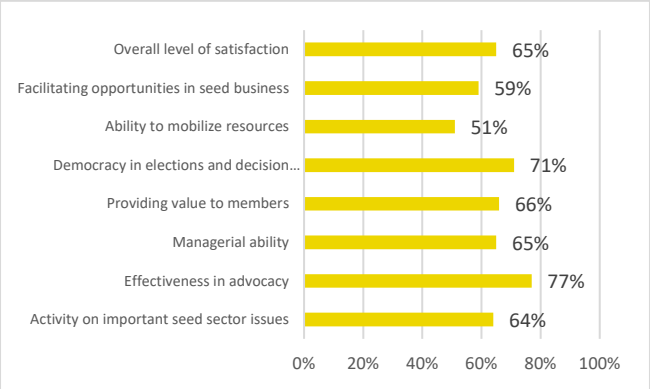

Figure 3: Members' satisfaction with USTA

SERVICE TO SMALLHOLDER FARMERS

Concentration of rural agro-dealer network

The most recent census for agro-input dealers was conducted in 2009 and it recorded 2,064 agro-dealers in the country. In contrast, the Uganda National Agro-Dealers Association puts the number higher, estimating the number of agro-input dealers to be between 2,500- 3,000. Whatever the total, MAAIF estimates that only 500 agro-dealers are trained and accredited. The Ministry plans to train over 1,000 agro-dealers in the next two years. Using the lower figure of 2,500 agro-dealers, the ratio of agro-dealers to agricultural households is 1:1,580. Seed companies rate their satisfaction with the rural agro-dealer network as "good" (61%).

Availability of seed in small packages[5]

Across the four crops, 25% of seed sold in 2017 was sold in (small) packages of 2 kg or less, though the percentages varied by crop. For example, all millet seed was sold in small packages, while, the corresponding figures were 25% for maize seed, 9% for bean seed, and 48% for sorghum seed. The bulk of maize seed (69%) and bean seed (72%) was sold in packages weighing between 2-10 kg.

Despite the low volumes sold in small packages, seed companies are satisfied with the availability of seed in small packages. The rating of satisfaction is "good" for beans (64%) and millet (72%) and "excellent" for maize (82%) and sorghum (80%), indicating that the current seed package sizes for the four crops are optimal. Figure 4 shows a breakdown of the percentage of seed sold in the different package sizes for each crop.

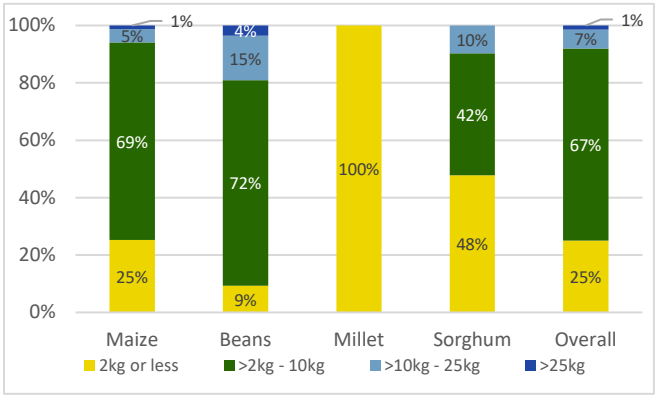

Figure 4. Percentage of seed sold in different package sizes

Seed-to-grain price ratio

Assuming stable prices at planting time, the seed-to-grain price ratio reflects the extent to which a variety is improved, as reflected in the cost of production, and the costs of transacting in the seed market (Nagarajan & Smale, 2005). Four the four crops, the highest ratio is for hybrid maize (6:1). This is understandable given that the costs of production and processing are higher for hybrid seeds. The second highest ratio is for OPV maize (3:1). This supports the early findings that some of the OPV maize varieties are the most popular maize varieties due to characteristics such as early-maturity, resistance to the maize streak virus, and nutritional benefits. The ratios for the other crops are 1.2:1 (bean), 1:1 (millet), and 1.2:1 (sorghum). From a seed company's perspective, the low seed-to-grain price ratios for these three crops reflect competition from farmer-recycled seed, as the prices are similar.

Status of Quality Declared Seed (QDS)

Quality Declared Seed (QDS) is a recognized seed class in Uganda's draft National Seed Policy of 2016. QDS requires

[5] Data on seed packages does not incorporate QDS

minimum field inspection and certification standards for variety, purity, and germination. To promote QDS, an organization called Integrated Seed Sector Development has organized and empowered seed producers, farmer organizations, and co-operatives into Local Seed Businesses (LSBs).

Of the four focus crops, in 2017 LSBs only produced beans. In 2017, a total of 107 LSBs were supported to grow 15 different varieties of bean seed. LSBs source foundation seed from NaCCRI and, in 2017, they produced the NABE variety series, NARO series, ROBA1, and K132. Since their inception, LSBs have dropped two bean varieties (NABE11 and NABE20); the latter was dropped due to its physical likeness to NABE 15, which is preferred in the market.

In 2017, LSBs produced 237.1 MT of bean seed, with most production in season B. They sold 160.5 MT of bean seed, of which 96.3MT was sold in season A. No bean seed was sold to the government under the OWC program, mainly because QDS seed can only be sold in the area where it is produced. QDS beans were sold in two different package sizes: most (60%) was sold in 25 kg packages, while the remaining 40% was sold in small packages of 2kg or less. NSCS intends to develop regulations specifically for QDS. In addition, there is a need to amend the Seeds and Plant Act 2006 to include QDS as a seed class.

CONCLUSION

Uganda's seed sector is at a critical stage in its growth. Several seed companies feel that local demand for certified seed is growing, as evidenced by the over 80% increase in aggregate seed sales between 2015 and 2017. However, this growth is largely driven by the government's OWC initiative. In addition, the country is a net seed exporter for the four crops, though these exports are largely driven by relief agency purchases in South Sudan. Given the significant presence of government and relief buyers, the growth in both the local and export markets should be viewed with caution, as the drivers are not sustainable in the long-term. Nevertheless, the progress made towards harmonization of seed regulations across the COMESA region offers the potential to widen the scope for regional trade. Further, the development of the QDS market bodes well for the overall demand for certified seed as it increases farmers' appreciation for quality seed.

Beyond the market growth prospects, there are several notable improvements and opportunities in the seed sector. The seed import and export processes are well-defined and efficient, though they could benefit from further reducing the time spent processing the import/export permits and phytosanitary certificates. The initiative to establish a private seed company, NARO Holdings, to specialize in the production of basic seed is very positive. If well managed, the company will be able to respond to existing lack of adequate amounts of foundation seed.

Effective and transparent inspection services are critical for seed quality assurance along the value chain. In line with the Seeds and Plant Regulations (MAAIF, 2010), and the Seeds and Plant Act 2006 (MAAIF, 2006) the Ministry should accredit qualified officials to conduct seed inspection and testing services, which would complement the existing NSCS seed inspection services. . However, the NSCS will need additional funding to carry out this expansion.

Further, on most fronts seed companies have expressed a high level of satisfaction with USTA, the national seed association. USTA is cementing its position as a relevant platform through which the private sector can engage with the government. The organization should be furthered strengthened to drive much-needed industry reforms, most notably in the private seed inspection services and combatting counterfeit seed. Lastly, MAAIF should close the remaining gaps in the seed policy environment by passing the National Seed Policy, which will lead to the establishment of UPHIA. The Ministry should also draft the Regulations for both the Plant Variety Protection Act and for QDS.

Despite these opportunities, Uganda's seed industry faces notable challenges. The first is the high incidence of fake seed. Government's efforts to involve the national police force is a step in the right direction, though NSCS will also need more financial and staff support to adequately ensure seed quality is maintained at the key stages of seed production, processing, and marketing. Another challenge pertains to the seed subsidy program under OWC, managed by NAADS. Seed companies are not satisfied with the lack of transparency, predictability, and clarity in the seed procurement process. If not well-managed, the program may be abused. More importantly, the subsidy program creates a sense of artificial demand for seed, which is unsustainable in the long-run.

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APPENDIX 1.

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

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