Senegal Country Report 2023

The African Seed Access Index

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TASAI
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CONTENTS

LIST OF ACRONYMS

ASPRODEB	*Association Sénégalaise pour la Promotion du Développement à la Base*/ Senegalese Association for the Promotion of Development at the Base
CNCAS	*Caisse Nationale de Crédit Agricole / Agricultural Bank*
CNCSP	*Comité National Consultatif des Semences et Plants*/ Senegal Seed Board
CNRA-B	*Centre National de Recherche Agronomique de Bambey*/ Agricultural research center of Bambey
CRA-SL	*Centre de recherche agricole de Saint-Louis*/ Agricultural research center of Saint-Louis
CTS	*Centre de Triage des Semences/* Seed cleaning and processing center
DAPSA	*Direction de l'Analyse, de la Prévision et des Statistiques Agricoles* / Directorate of Analysis, Forecasting and Agricultural Statistics
DISEM	*Division des Semences* / National Seed Division
DRDR	*Direction Régionale du Développement Rural* / Directorate of Agricultural Rural Development
DUS	Distinctness, Uniformity, and Stability
FBO	*Organisation paysanne* / Farmer-based organization
GIE	*Groupement d'Intérêt Economique* / economic interest group
ISRA	*L'Institut Sénégalais de Recherches Agricoles* / Senegal Agricultural Research Institute
ISTA	International Seed Testing Association
ITA	*Institut de Technologie Alimentaire* / Food Technology Institute
MAERSA	*Ministère de l'Agriculture de l'Équipement Rural et de la Souveraineté Alimentaire*/ Ministry of Agriculture, Rural Equipment and Food Sovereignty
NQRP	Non-Quarantine Regulated Pests
OAPI	*Organisation Africaine de la Propriété Intellectuelle*/ African Intellectual Property Organization
OECD	Organization for Economic Cooperation and Development
PVP	Plant variety protection
SRV	Senegal River Valley
UNAOPSE	*Union nationale des operateurs prives semenciers* / National Union of Private Seed Operators
UNIS	*Union Nationale Interprofessionnelle des Semences*/ National Interprofessional Seed Union
UPOV	*Union Internationale pour la Protection des Obtentions Végétales*/ International Union for the Protection of New Varieties of Plants
VCUS	Value for cultivation, use, and sustainability

INTRODUCTION

The increased use of productivity-enhancing technologies, including mechanization, irrigation, fertilizer, and improved seed[1], are critical to improving food and nutritional security across Africa. For field crops, a competitive formal seed sector is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. Improved 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 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 2023 to appraise the structure and economic performance of Senegal's formal seed sector. TASAI studies focus on the four grain and legume crops important to a country's food and nutritional security (the "four focus crops"). In Senegal, these crops are groundnut, millet, rice, and maize. The corresponding hectarage under cultivation in 2022 were 1,225,172 ha under groundnut, 969,693 ha under millet, 372,413 ha under rice, and 277,243 ha under maize[2]. Combined, these crops account for approximately 85% of the area under rainfed agriculture in the country (Noba et al., 2014). Senegal has two main agro-ecological zones and corresponding cropping systems: the Senegal River Valley (SRV), which is the main rice-producing region, and the Senegal groundnut area, which is suitable for legumes, such as groundnut and cowpea, as well as cereals, such as millet, maize, and sorghum. The groundnut area covers the western and central parts of the country, and represents a third of Senegal's territory, and is home to about half of the Senegalese population.

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

2 Data sourced from presentation delivered by the Head of DISEM during ECOWAS Seed Committee meeting in May 2023.

OVERVIEW OF SENEGAL'S FORMAL SEED INDUSTRY

Like most other African countries, Senegal's seed industry consists of the informal and formal systems. While TASAI recognizes the presence and role of pluralistic seed systems, TASAI Country Reports focus primarily on the formal seed system due to the inherent difficulties of measuring – or finding existing data on – the informal 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]

The formal system is a structured and regulated value chain to produce improved seed varieties. This process involves many actors and institutions carrying out activities ranging 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 producers/companies and agro-dealers. Seed production in Senegal is carried out by seed enterprises that include seed companies, seed cooperatives, individual seed producers, *des Semences* (DISEM/ National Seed Division) under the MAERSA, which oversees the production seed associations, and *Groupements d'Intérêt Economique* (GIEs[4])/Economic Interest Groups. Important government stakeholders in the formal system are the *Ministère de l'Agriculture de l'Équipement Rural et de la Souveraineté Alimentaire* (MAERSA)/ Ministry of Agriculture, Rural Equipment, and Food Sovereignty, and the *Division* and sale of certified seed of improved varieties. Other key stakeholders are listed in Table 1.

3 See seed system definitions at https://www.agrilinks.org/post/seed-system-definitions

4 A GIE is a group of people (e.g., from the same family, district, or village) who agree to create a business to advance their economic interests. The registration process is easy.

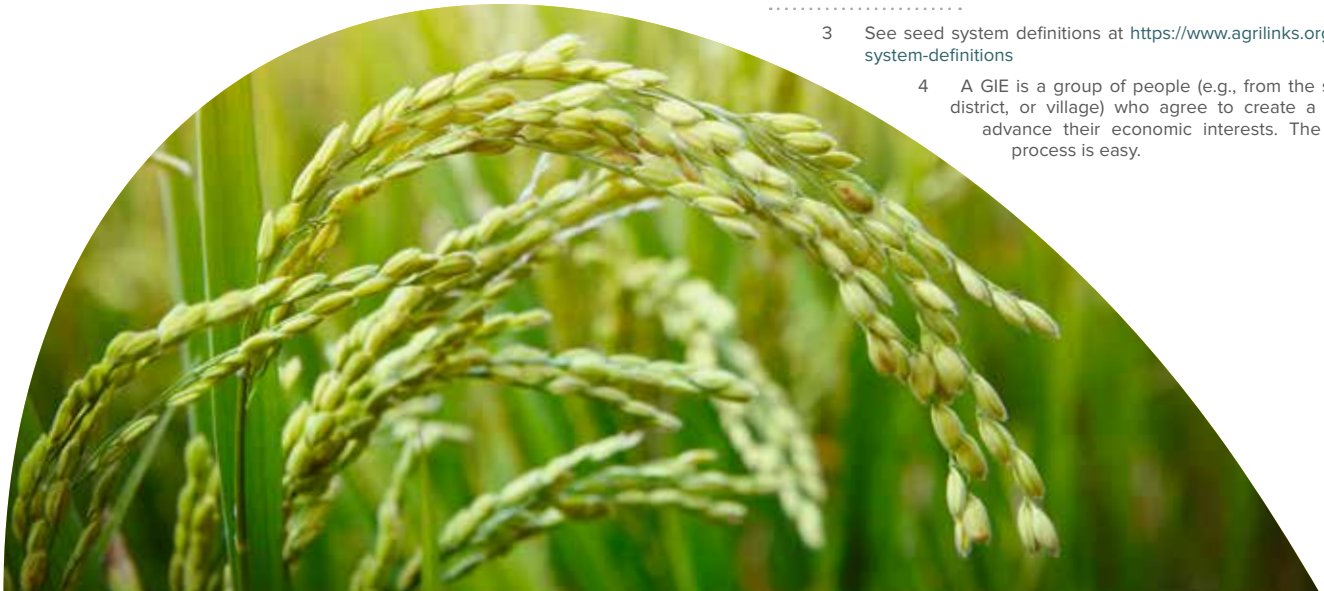


Table 1: Role of key players in Senegal's formal seed sector

ROLE	KEY PLAYERS
Research and breeding	*L'Institut Sénégalais de Recherches Agricoles* (ISRA), Africa Rice, *Université Cheikh Anta Diop/Département de Biologie Végétale* (UCAD/DBV)
Variety release and regulation	*Division des Semences* (DISEM), *Direction de l'Agriculture* (DA), *Ministère de l'Agriculture de l'Équipement Rural et de la Souveraineté Alimentaire* (MAERSA)
Seed production and processing	Seed cooperatives, seed companies, individuals and GIEs, *Centres de triage et conditionnement des semences* (CTS)/Seed Processing Centers.
Education, training, and extension	*Université Cheikh Anta Diop/Département de Biologie Végétale* (UCAD/DBV), *Université Iba Der THIAM/École Nationale Supérieure d'Agriculture* (UIDT/ENSA), *Université Gaston Berger/Productions Végétales et Agronomiques* (UGB/PVA), *École Nationale des Cadres Ruraux* (ENCR), *Agence Nationale de Conseil Agricole et Rural* (ANCAR)[5]; Institut de Technologie Alimentaire (ITA).
Distribution and sales	*Union Nationale Interprofessionnelle des Semences* (UNIS), *Association Sénégalaise pour la Promotion du Développement à la Base* (ASPRODEB), *Union nationale des operateurs prives semenciers* (UNAOPSE), seed coopératives, seed companies, individual seed producers, and GIEs.

5 https://www.inter-reseaux.org/wp-content/uploads/Senegal_Fiche_Presentation__ANCAR_2007.pdf

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**[6]) (Table 2). In most TASAI studies, the bulk of the performance data reported comes from the year prior to the one in which the study is conducted ("the study year"), because, for most indicators, the most recent data available are for the prior year. Accordingly, the data reported in this Country Report pertains primarily to 2022; however, whenever 2023 data are 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' attributes/ features	**Yes**	+
A4	Availability of basic seed	**Yes**	+
B	**INDUSTRY COMPETITIVENESS**		
B1	Number of active seed companies/producers	**Yes**	+
B2	Quantity of seed produced and sold	**Yes**	+
B3	Number of varieties sold and dropped	**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 price at planting time	**Yes**	-

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

6 The list of indicators and recent TASAI data are available of https://tasai.org/wp-content/uploads/TASAI-Appendix_CURRENT.pdf

Since TASAI has conducted similar studies in 22 other African countries, this report also draws relevant cross-country comparisons. More detailed cross-sectional (across other African countries) comparisons are available through an online dashboard at https://www.tasai.org/en/dashboard/country-overview/.

Using TASAI survey tools, data collection focused on three key seed industry players: seed producers[7], plant breeders, and government entities active in the country's seed sector. Of these, seed producers were the study's primary source of information. For several indicators, TASAI supplemented quantitative data with self-reported satisfaction ratings by industry stakeholders 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.**

According to the government registrar, in 2022 Senegal had a total of 894 registered seed producers, including 40 seed companies, 53 seed cooperatives, 467 individual seed producers, and 334 GIEs. Of these, 660 seed producers met the criteria to participate in the TASAI survey, namely, they were (1) registered to produce and/or market seed (2) for one or more of the four focus crops, and 3), in the case of individual producers and GIEs, cultivated a minimum of 10 hectares per crop (and not operate as out growers. Table 3 shows the breakdown of producers by category.

7 In this report, the term "seed producers" is used to refer generally to seed companies, seed cooperatives, individual seed producers, seed associations, and GIEs. The different producer types are distinguished, if needed.

Table 3: Breakdown of respondents by category (2022)

Category of seed producers	Number of registered seed producers	Number of seed producers eligible to participate in study	Number of targeted seed producers	Number of seed producers surveyed
Seed cooperatives/ unions/associations	53	53	53	61
Seed companies (also called seed enterprises or seed establishments)	40	37	37	22
Individual seed producers	467	261	13	7
GIEs	334	309	15	15
Total	**884**	**660**	**118**	**105**

In contrast to most countries where TASAI has surveyed the seed sector, Senegal has more categories of seed producers and more registered producers overall. Time and resource limitations made it impossible to survey all 660 entities. Instead, the study targeted all seed companies and cooperatives, who are the main seed producers in Senegal, and a minimum of 5% of individual seed producers and GIEs, who tend to work on a smaller scale, mostly locally.[8]

Applying these criteria resulted in a total of 118 targeted respondents. The final number of producers surveyed was 105: 61 seed cooperatives, 22 seed companies, 7 individual seed producers, and 15 GIEs. Compared to the sampling plan, the number of cooperatives exceeded the target by 8, because during data collection we found registered cooperatives not included in the government records.[9] This was also later acknowledged by the registrar who confirmed being aware that sometimes producers registered under multiple categories. In contrast, the number of seed companies and individual seed producers reached was below the target, as some entities did not respond to multiple attempts to reach them. This is partly because the study coincided with the onset of the first rainy season, and many of the selected seed producers were too busy to participate.

Besides seed producers, the study surveyed public institutions, namely *L'Institut Sénégalais de Recherches Agricoles* (ISRA)/ Senegal Agricultural Research Institute, which runs regional centers[10] in the country's six agroecological zones, as well as national laboratories and other research facilities. Along with AfricaRice, ISRA is one of two producers of breeder seed in Senegal. It also operates as a regional technical examination center for the Distinctness, Uniformity, and Stability (DUS) tests.

The survey also included DISEM, a division of the *Direction de l'Agriculture* (DA)/ Directorate of Agriculture that oversees the registration of seed producers, production, collection, packaging, conservation, and sale of all seed and seedlings produced in Senegal. DISEM also serves as the permanent secretary of the *Office National des Semences* (ONS)/National Seed Board and coordinates the development of seed regulations and the implementation of variety release and import/export regulations. DISEM's other responsibilities include managing the ISTA-accredited national seed laboratory, ensuring compliance with the accreditation by the Organization for Economic Cooperation and Development (OECD), and undertaking quality control and certification of breeder seed.

Finally, three national platforms, *Union Nationale Interprofessionnelle des Semences* (UNIS)/ National Interprofessional Seed Union, *Association Sénégalaise pour la Promotion du Développement à la Base* (ASPRODEB)/ Senegalese Association for the Promotion of Development at the Base, and *Union Nationale des Operateurs Prives Semenciers* (UNAOPSE) /National Union of Private Seed Operators were also interviewed.

8 It is important to acknowledge that limiting the number of individual producers and GIEs to 5% meant that, for some findings, the data may not be representative of the national seed sector. Throughout the study, we will highlight areas where the limited sample needs to be considered when interpreting results.

9 This finding was communicated to DISEM, which acknowledges the need to update the database of active seed cooperatives.

10 Senegal is divided into administrative 14 regions.

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 public breeders is indicative of the level of investment in research and development.[11] In addition to tracking the number of breeders working on the four focus crops, the study also measured the level of satisfaction reported by seed producers with the public breeding programs. The latter reflects the ability of active breeders in public institutions[12] to produce new varieties.

11 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.

12 The intention of this indicator is to assess the vibrancy of public breeding programs. TASAI does not assess the adequacy of breeders from the CGIAR centers since their mandates cover multiple countries and regions.

In 2022, Senegal had two active breeders for the four crops: one groundnut breeder and one rice breeder. The rice breeder was based at the *Centre de Recherche Agricole de Saint-Louis* (CRA-SL)/ Agricultural Research Center of Saint-Louis in the SRV, while the groundnut breeder worked at the *Centre National de Recherche Agronomique de Bambey* (CNRA-B)/National Agricultural Research Center of Bambey.

On paper, ISRA's goal is to employ one plant breeder for each of the four focus crops and recruit new breeders as needed. This was not the case in 2022, as the previous millet and maize breeders retired and moved to a university, respectively, leaving two openings (Table 4), which, at the time of data collection, were yet to be filled. The continuity for rice breeding programs is more secure as ISRA is supported by breeders from AfricaRice. Seed producers' rating of their satisfaction with the adequacy of active breeders is "poor" for groundnut and rice, reflecting the small number of breeders, and "extremely poor" for maize and millet, reflecting the lack of breeders.

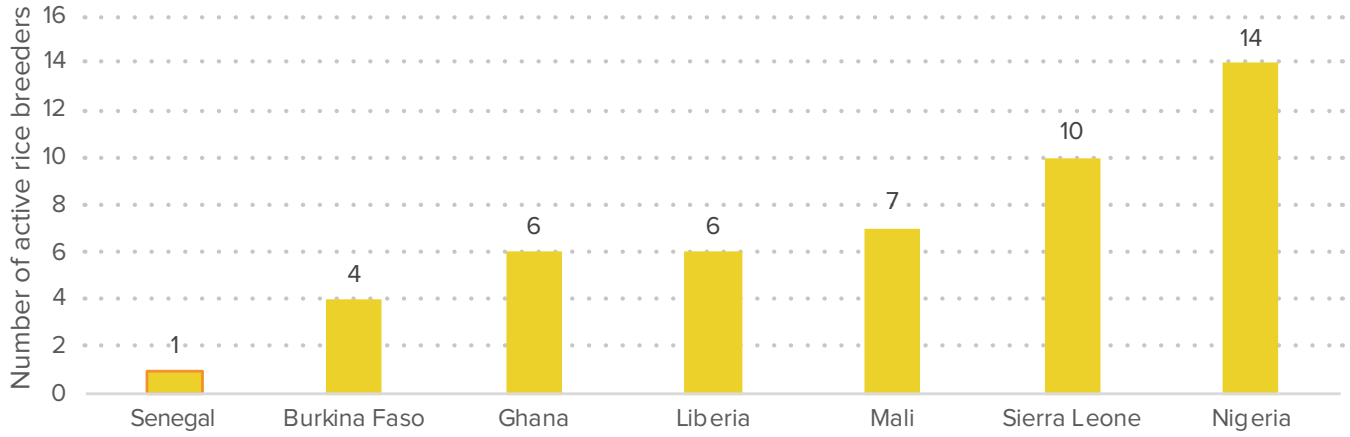
Table 4: Number and adequacy of active breeders in Senegal

Crop	Number of active breeders in 2022			Satisfaction rating (out of 100%)	Interpretation of satisfaction rating
	Public	Private	Total		
Maize	0	0	0	10%	Extremely poor
Millet	0	0	0	10%	Extremely poor
Groundnut	1	0	1	20%	Poor
Rice	1	0	1	20%	Poor
Total	**2**	**0**	**2**		

Since rice is a key food security crop in Senegal, it is worth comparing the number of breeders in the country to those in other countries where rice is a priority crop. Figure 1 shows the number of active rice breeders in countries surveyed by TASAI in the ECOWAS region between 2021 and 2023. Of the seven countries studied, Senegal has the least breeders, indicating a clear need for improvement in this area.

According to the surveyed seed producers, the main challenge facing ISRA is the inability of its Seed Unit to produce the requisite quantity and quality of breeder seed. This is due to a lack of funding and qualified staff to produce and maintain breeder seed. As a possible solution, seed producers expressed interest in receiving authorization to produce breeder seed under ISRA's supervision.

Figure 1: Number of active rice breeders in countries surveyed by TASAI in the ECOWAS region between 2021 and 2023



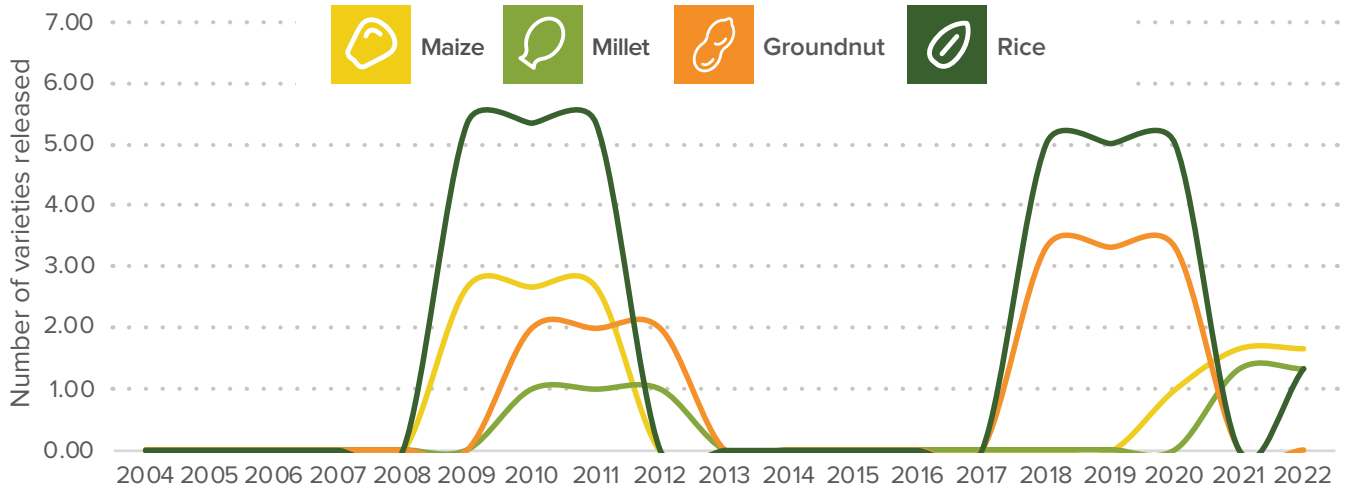
VARIETIES RELEASED IN THE LAST THREE YEARS

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

TASAI studies track variety releases for the past 20 years and calculate the 3-year moving average of the varieties released.[13] Accordingly, during the most recent 3-year period (2020-2022), a total of 13 varieties of the four focus crops were released in Senegal: 5 maize varieties, 4 millet varieties, and 4 rice varieties. (No new groundnut varieties were released during this period.) Looking back to 2002 (Figure 2), most new releases have been groundnut and rice varieties, the focus crops of the two most important breeding programs at ISRA. Figure 2 also shows that variety releases occurred in two spikes, with interim years when no new varieties of the four crops were released. During the first spike in 2008-2009, 8 maize and 16 rice varieties were released, and during the second spike in 2018, 10 groundnut and 15 rice varieties were released.

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

Figure 2: 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, high 100-kernel weight, fragrant aroma, aflatoxin resistance, etc.). 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.

As mentioned above, the 2020-2022 period saw the release of a combined 13 new varieties of maize, millet, and rice (Table 5). Of these, 62% (8 out of 13) had at least one special feature. The new millet and rice varieties each had multiple special features, namely, all four millet varieties were drought-tolerant, fast-cooking, and nutrient-enhanced, and all four rice varieties were early-maturing, fast-cooking, and nutrient-enhanced. Notably, none of the 5 maize varieties had any special features.

Table 5: Number and percentage of varieties released that have special features

Feature	Description of feature	Number of varieties released 2020-2022				
		Maize	Millet	Groundnut	Rice	TOTAL
All varieties released		5	4	0	4	**13**
All varieties released with special features		0	4	0	4	**8**
Climate-smart features	All climate-smart features	0	4	0	4	**8**
	Drought tolerant	0	4	0	0	**4**
	Early/extra-early maturing	0	0	0	4	**4**
Use-related features	All use-related features	0	4	0	4	**8**
	Fast-cooking	0	4	0	4	**8**
	Nutrition-enhanced features	0	4	0	4	**8**
	Fragrant aroma	0	0	0	1	**1**
Industry-demanded features	All industry-demanded features	0	0	0	0	**0**
	High oil content	0	0	0	0	**0**
	Good oil quality	0	0	0	0	**0**
	High kernel weight	0	0	0	0	**0**

NUMBER AND AGE OF VARIETIES SOLD

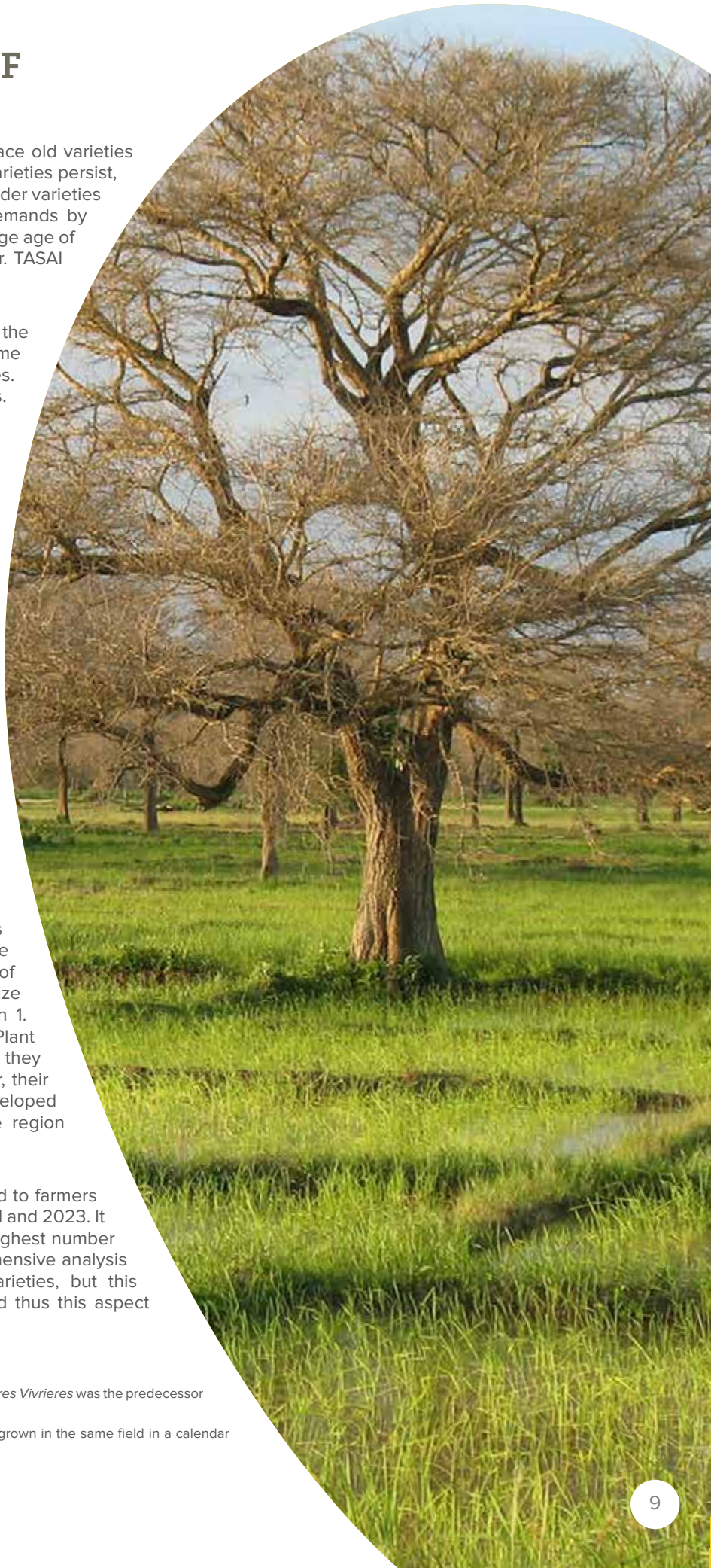
In vibrant seed systems, farmers regularly replace old varieties with new ones. In many African countries, old varieties persist, even though newer varieties often outperform older varieties as they are bred for traits that respond to demands by farmers, consumers, and industry. A lower average age of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

Table 6 shows the number of all varieties of the four focus crops marketed in 2022 and the name and age of the 22 most commonly sold varieties. For the latter, the ages range from 5 to 53 years. Notably, 17 are 10 years or older and 8 are 25 years or older, showing that older varieties clearly dominate the market.

Of the four focus crops, millet had the oldest variety on the market in 2022 - Souna3, a 53-year-old synthetic variety developed by the *Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres*[14]). Souna3 matures in 85-95 days, requires little fertilizer, does not lodge, and is easy to cook. Although sensitive to mildew, ergot, and striga, it remains popular. Other popular varieties are the newer Thialak 2 and Gawane, both released in 2010.

Groundnut varieties commonly sold are the 49-year-old 73-33, the 28-year-old 55-437, the 27-year-old Fluer 11, and the 12-year-old 55-33. Farmers buy them because they have high oil content and are well-adapted to the farming system of the groundnut area. Farmers also continue to buy the rice varieties Sahel 108 and Sahel 202, that are 28 and 15 years old, respectively, because they permit double cropping[15] and have higher yields than some of the newer varieties. Three commonly sold maize varieties are Obatanpa, Early Thai, and Suwan 1. They are all listed in the National Catalogue of Plant Species and Varieties as 13 years old, because they were added to the catalogue in 2012. However, their 'true' age is older, as these varieties were developed and commercialized in other countries in the region prior to 2009.

Figure 3 shows the number of rice varieties sold to farmers in 10 countries surveyed by TASAI between 2021 and 2023. It shows that Senegal leads the group with the highest number of rice varieties sold – 36. That said, a comprehensive analysis would also take into account the age of varieties, but this information is not available in all countries and thus this aspect cannot be compared.



14 *Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres* was the predecessor to ISRA.

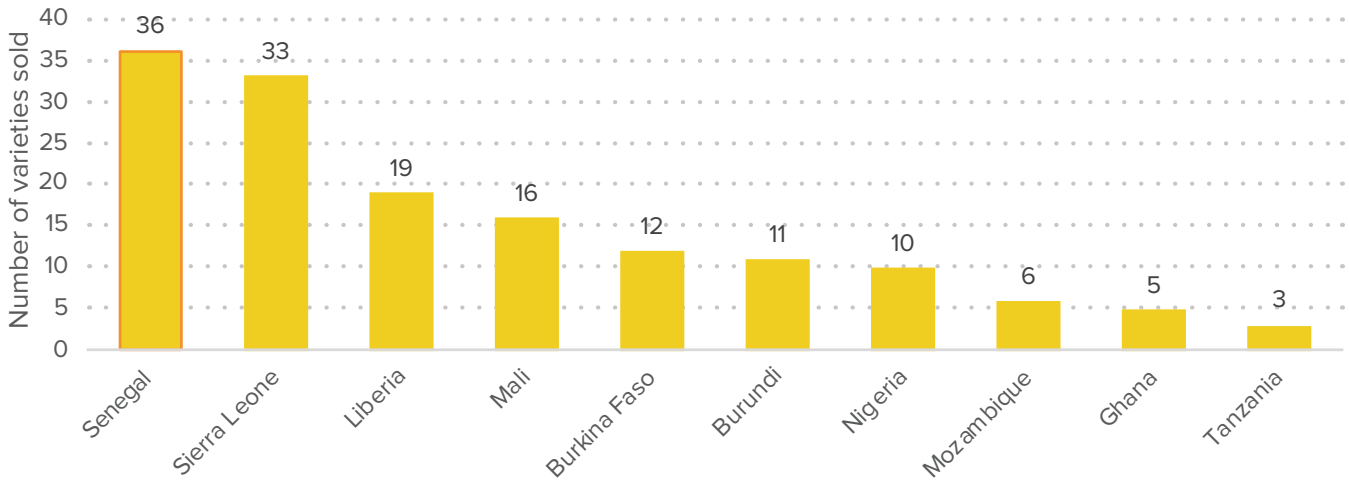
15 Double-cropping means that two crops or commodities are grown in the same field in a calendar year.

Table 6: Name and age of commonly sold varieties sold (2022)

Crop	Number of varieties sold	Name of commonly sold varieties	Age of commonly sold variety (years)
Maize	13	Early Thai	2009* (13)
		Obatanpa	2009* (13)
		SUWAN 1	2009* (13)
Millet	13	Gawane	2010 (12)
		SOUNA 3	1969 (53)
		THIALACK 2	2010 (12)
Groundnut	36	55-33	2010 (12)
		55-437	1994 (28)
		73-33	1973 (49)
		Fleur 11	1995 (27)
		Jambar	2017 (5)
		Sunu gaal	2016 (6)
Rice	36	BG 90.2	1997 (25)
		IR 1529-680-3	1994 (28)
		ISRIZ 10	2017 (5)
		ISRIZ 7	2017 (5)
		ISRIZ 15	2017 (5)
		NERICA 4	2009 (13)
		NERICA 6	2009 (13)
		Sahel 108	1994 (28)
		Sahel 134	2007 (15)

** Years in which the varieties were approved in the country*

Figure 3: Number of rice varieties sold in countries surveyed by TASAI between 2021 and 2023



SOURCES AND AVAILABILITY OF BREEDER SEED

Seed companies use basic (foundation) seed to produce certified seed for sale to farmers. In many African countries, limited access to foundation seed from public research institutions tends to constrict the ability of seed companies to scale up production. However, in Senegal, the arrangement is different: all basic seed is produced by the seed producers who source the breeder seed from ISRA.

Table 7 provides data on the sources and availability of breeder seed in the country. ISRA is the sole producer of breeder seed for maize, millet, and groundnut, while both ISRA and Africa Rice produce breeder seed for rice.

To assess the availability of breeder seed, seed producers were asked to evaluate the quality and quantity of the breeder seed they received as well as the timeliness of the delivery. Table 8 shows that the overall ratings by crop were 65% for maize, 67% for millet, 61% for groundnut, and 73% for rice. A closer look at the data shows that, while the quality of the breeder seed is rated quite highly, the deliveries are not always on time, and, importantly, there is a shortage of breeder seed, especially for maize, millet, and groundnut.

Table 7: Source of breeder seed by crop, number of transactions, and percentage of total transactions (2022)

Source of breeder seed	Maize		Millet		Groundnut		Rice	
	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total
AfricaRice	0	0%	0	0%	0	0%	40	63%
ISRA	54	100%	44	100%	62	100%	24	37%
Total	**54**	**100%**	**44**	**100%**	**62**	**100%**	**64**	**100%**

Table 8: Satisfaction rating of the quantity, quality, and timeliness of breeder seed received (2022)

Aspect of availability	Maize (n=59)	Millet (n=44)	Groundnut (n=68)	Rice (n=64)
Quantity of breeders' seed supplied (% yes)	53%	56%	45%	70%
Quality of breeder seed (out of 100%)	80%	81%	80%	79%
Timeliness of delivery of breeder seed (% yes)	63%	63%	60%	72%
Overall satisfaction with the availability of breeder seed (out of 100%)	65%	67%	61%	73%

The ratings for rice are the combined ratings for AfricaRice and ISRA; breeder seed from AfricaRice was rated somewhat higher than breeder seed from ISRA (Quantity: 72% - AfricaRice, 67% - ISRA, quality: 78% AfricaRice, 78% ISRA; timeliness: 78% -AfricaRice, 68% ISRA).

extremely poor | poor | fair | good | excellent

INDUSTRY COMPETITIVENESS

NUMBER OF ACTIVE SEED COMPANIES AND COOPERATIVES

Competition breeds excellence: the presence of more active seed companies increases competition and creates incentives for seed producers to innovate and improve. A vibrant formal seed sector depends on a robust private sector in which seed producers invest in developing, producing, processing, and marketing seed of improved varieties to farmers. In Senegal, seed companies and seed cooperatives are the two main private formal sector players. This survey reached 22 seed companies and 61 seed cooperatives (Table 9). Producers located in the SRV primarily produce rice seed, while producers in other regions produce seed for millet, maize, and groundnut. It is worth noting that the study missed 15 seed companies that were registered to produce one or more of the focus crops, and it is not possible to know whether any of these companies were 'active' in 2023.

Table 9: Number of active seed companies and seed cooperatives (2022)

Crop	Number of active seed producers	
	Seed companies	Seed cooperatives
Maize	9	44
Millet	11	27
Groundnut	13	41
Rice	13	21
Total*	22*	61*

* The totals by entity differ from those by crop because some entities produce more than one crop

GENDER IN MANAGEMENT OF SEED BUSINESSES

TASAI also tracks the number of women in management and ownership positions in seed companies. This indicator tracks the number of women working in management positions in seed companies that have clearly defined management structures and positions. The management positions include the following and their equivalents: managing director/ chief executive officer, distribution manager, operations manager, finance and administration manager, research and development manager, country lead, and sales and marketing manager. Note that this analysis was only carried out for companies and not for cooperatives, as the latter have a management structure that does not lend itself to easy analysis under this indicator.

Of the 22 seed companies surveyed, 73% (16 companies) had at least one woman in a management position (Table 10). However, only one of these women was a top manager (managing director). Moreover, despite efforts made by development projects, such as the West Africa Agricultural Productivity Program (WAAPP 2018) and the West Africa Seed Program (WASP 2017), to promote women's participation in seed businesses, their overall presence in the sector remains low. This is in line with the fact that, in Senegal, women tend to have less access to land and financial resources than men.

Table 10: Gender in management of seed businesses (2022)

Gender indicator	Number	%
Number of seed companies with at least one woman in a management position (n=22)	16	73%
Companies with female top manager (n=22)	1	5%
Companies with female owner (n=22)	1	5%

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 provides production data for the four crops as reported by the government, along with the production and sales data collected by TASAI. The data provided by DISEM for 2022 indicates seed production volumes of 68,266 MT for groundnut seed, 24,825 MT for maize seed, 2,823 MT for rice seed, and 1,626 MT for millet seed. It is worth noting that the crops with significantly higher production volumes – groundnut and maize – were part of the government's subsidy program, which serves as a major incentive for seed production. In contrast, millet and rice had much lower reported volumes. Millet was not part of the subsidy program, which may explain the reduced interest in growing this crop. Rice was included in the subsidy program, but, as we will see in the upcoming section on subsidies, a large segment of rice seed producers did not participate in the subsidy program.

Table 11 presents the available data from the government and the TASAI study. The two data sources have significant discrepancies. TASAI studies present production data collected from seed producers (primary data) and production data sourced from the government. Drawing comparisons between the two sources is difficult given that the TASAI sample is small and the discrepancies between government and TASAI data do not follow any recognizable pattern.

Table 11: Seed production and sales (2022)

Crop	Seed production (government data) (n= 660)	Seed production (TASAI data) (n =105 seed producers)	Seed sales (TASAI data) (n = 105 seed producers)
Maize	24,852	6,428	5,965
Millet	1,626	4,667	4,639
Groundnut	68,266	30,088	26,847
Rice	2,823	6,363	6,214

MARKET SHARE OF TOP SEED COMPANIES

Competition among seed producers 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 producers, 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).[16]

Using data from the 105 surveyed seed companies, cooperatives, and individual producers, the top four seed producers account for 64% of maize seed sales, 73% of millet seed sales, 64% of groundnut seed sales, and 58% of rice seed sales (Table 12). Most of these top producers are companies and cooperatives. An alternative assessment of market concentration is offered by the HHI, whose calculations show low-to-moderate concentrations in the market. Groundnut (1,529) and rice (1,561) seed markets have a low level of concentration, while the scores for maize (2,135) and millet seed (2,358) point to a moderate level of market concentration. The CR4 and HHI scores underline the fact that the seed sector in Senegal is characterized by the presence of many seed companies and cooperatives, none of whom dominates the seed market, and the presence of many small-scale seed producers, each accounting for a small portion of the market.

16 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.

Table 12: Market share and market concentration (2022) for the seed producers in the TASAI survey

Crop	Market share (CR4 scores) n =105	Market concentration (HHI) n = 105	Interpretation of HHI scores (level of market concentration)
Maize	64%	2,135	Moderate
Millet	73%	2,358	Moderate
Groundnut	64%	1,529	Low
Rice	58%	1,561	Low

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.

Senegal has no government entity involved in the production and marketing of certified seed.

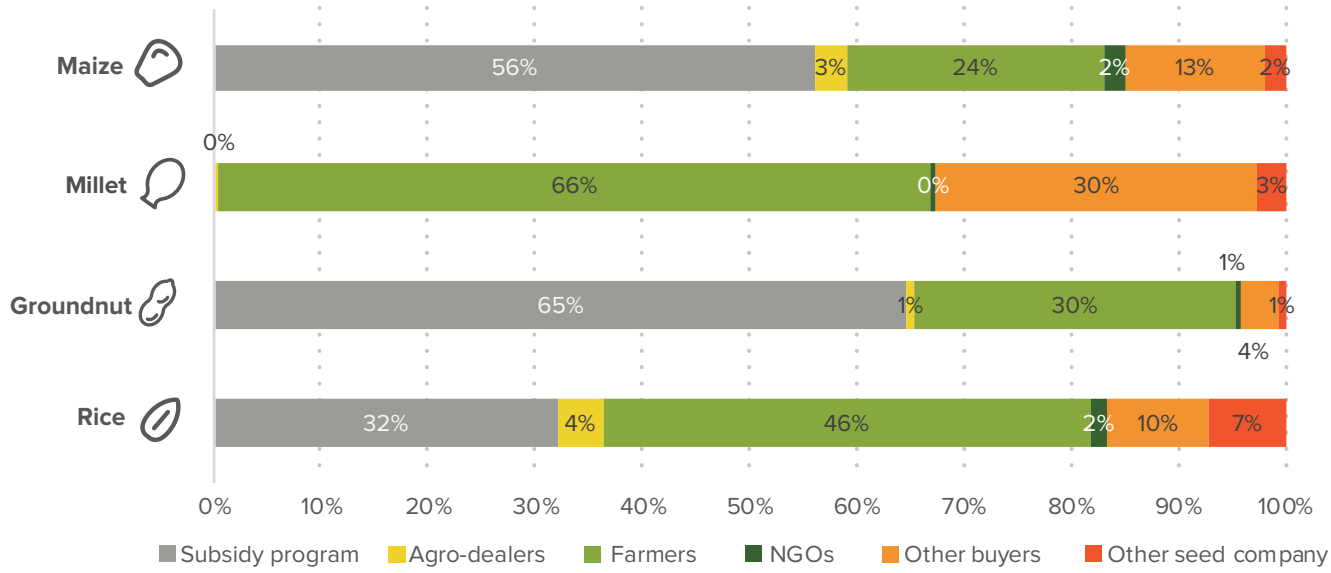
SEED SALES TO DIFFERENT CATEGORIES OF BUYERS

The TASAI study tracked seed sales to six different categories of buyers in 2022: the government subsidy program[17], agro-dealers, direct seed purchases by farmers, NGOs, other seed companies, and other buyers (Figure 4). Three of the four crops, maize, rice, and groundnut – were included in the national subsidy program. The impact of the subsidy program is evident for maize and groundnut, for which the subsidy program purchased 56% and 65% of seeds, respectively. The corresponding figure for rice is relatively lower, 32% because rice seed farmers in the Senegal River Valley opted out of the subsidy program because of its potential negative effects on the competitiveness of the seed market.

The next largest group of buyers was farmers, accounting for between 24% and 66% of seed sales across the four crops. Included in this category were sales by seed cooperatives, unions, and associations to their own members. For the three subsidized crops, farmers purchased certified seed from producers at the affordable – subsidized – prices set by the government. NGOs were not significant buyers for any of the four crops; seed purchased by NGOs is donated to farmers in need or to support out-growers in various crop production programs. "Other buyers," a relatively significant category for millet, maize, and rice seed, include seed cooperatives.

17 The government does not purchase physical quantities but offer subsidy price for specific crops.

Figure 4: Seed sales by category of buyers (2022)



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[18], if applicable) and the number of days needed to clear seed at the border. It excludes transportation time.

The import/export process in Senegal follows *Regulation C/Reg. 4/05/2008 On Harmonization of the Rules Governing Quality Control, Certification and Marketing of Plant Seeds and Seedlings in ECOWAS Region* (ECOWAS 2008). The ECOWAS Seed Regulation supersedes national regulations and Member States are expected to implement it. Import and export guidelines are outlined in the *Avant-Projet de Reglement D'execution Relatif Aux Modalites D'exercice du Controle et de la Certification Phytosanitaires des Semences Vegetales et Plants en Zone Afrique de L'ouest et Au Sahel* (executive regulation on the conduct of the phytosanitary control and certification of seeds and seedlings in West Africa and the Sahel zone) (CEDEAO, UEMOA, and CILSS 2021),[19] which stipulates that every consignment of seed must be inspected to verify that it is free from pests and other harmful organisms.

Applications to import seed are submitted to DISEM and include an import permit, a seed inspection report, a commercial invoice, a non-GMO declaration, a phytosanitary certificate, and laboratory reports or the results of preliminary analysis of the seed lots. DISEM reviews and forwards the application to the *Organisation Nationale pour la Protection des Végétaux* (ONPV) under the *Direction de la Protection des Végétaux* (DPV) for a phytosanitary inspection. In the case of exports, the exporter may obtain a phytosanitary certificate directly from the regional services of the ONPV/DPV. The application process takes 16 days.

Table 13: Seed import and export process (based on government data)

Indicators	2022
Volume of maize seed imports in 2022 (in MT)	85.5 MT
Country sources of maize imports	Mali, European Union
Volume of maize seed exports in 2022 (in MT)	7.2 MT
Country destination of maize seed exports	France
Average length of export process (in days)	16

Source: DISEM, 2022

18 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.

19 This regulation was adopted by the *Comite Regional des Semences et Plants de l'Afrique de l'Ouest et du Sahel* (CRSPAOS)/Regional Seed and Seedling Committee for West Africa and the Sahel at its 6th session, held in Conakry, Guinea, from June 28 to 30, 2021. However, it is yet to be published.

SEED POLICY AND REGULATIONS

LENGTH OF VARIETY RELEASE PROCESS

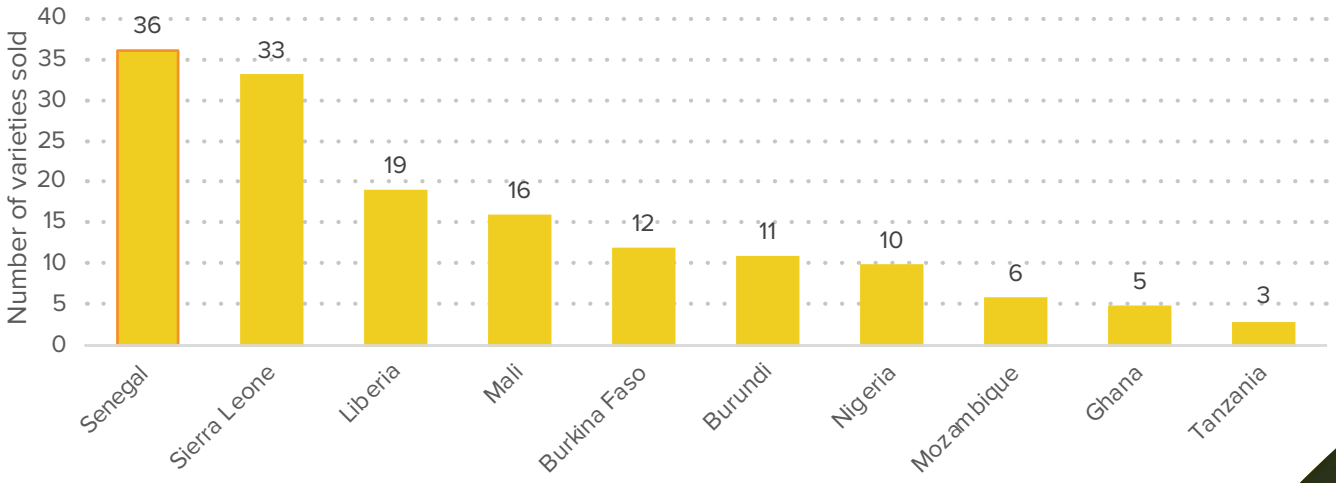
A vibrant seed sector has a functional variety release system that is well understood by the relevant actors and is followed diligently. Lengthy and/or costly variety release processes can limit the number of released varieties, which can adversely affect farmer choice. The length of the variety release 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.

In Senegal, new varieties are required to undergo tests for yield, Value for Cultivation, Use, and Sustainability (VCUS), and Distinctness, Uniformity, and Stability (DUS). Varieties that perform satisfactorily in these tests are approved for release by the DISEM. The process to register new plant varieties in the *Catalogue officiel des espèces et variétés cultivées au Sénégal* (National Catalogue of Plant Species and Varieties) follows the ECOWAS guidelines and has the following steps:

1. The breeder submits the application for variety registration to DISEM, the Permanent Secretary of the *Comité National Consultatif des Semences et Plants (CNCSP)*/ National Advisory Committee on Seeds and Seedlings.
2. ISRA conducts DUS and VCUS trials on behalf of DISEM, in line with UPOV guidelines for DUS and the ECOWAS guidelines for VCUS. The trials are conducted under the supervision of DISEM in at least two sites.
3. The results of the trials, with a seed sample, are sent to DISEM to be examined by the CNCSP.
4. If the requirements are met, DISEM prepares the ministerial order for the registration of the new varieties in the national catalogue of plants and species.

The duration of the variety release process is a minimum of 30 months, consisting of two cropping cycles lasting a total of 24 months for DUS tests on one site, and at least six months for administrative activities, including the CNCSP meetings to evaluate the test results and prepare the ministerial order (Figure 5.). The duration of 30 months places Senegal among the countries with the longest variety release processes of the countries surveyed by TASAI since 2020 (Figure 5).

Figure 5: Cross-country comparison on average length of variety release process in countries covered by TASAI between 2020 and 2023.



One reason for the delayed process is that the CNCSP meetings, which are supposed to take place twice a year, are often postponed due to a lack of funding to cover the costs of DUS and VCUS tests and trial site visits by the CNCSP staff. Despite the long duration of the process and the lack of an updated catalogue, the seed producers surveyed rated the variety release process as 'excellent' (90%) reflecting that their experience with the process is positive (Table 14).

Table 14: Average length of the variety release process

Indicators	2022
Average length of variety release process (in months)	30
Satisfaction with variety release process (out of 100%)	90%

extremely poor | poor | fair | good | excellent

Newly registered varieties are also submitted to the ECOWAS Regional Seed Committee for West Africa and the Sahel Region for inclusion in the ECOWAS Regional Catalogue of Plant Species and Varieties. This process is coordinated by the *Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricole* (CORAF), the secretariat of the West Africa Regional Seed Committee, under the supervision of a task force of regional seed experts. Before a new variety is added to the ECOWAS Catalogue, the task force verifies that the candidate varieties have been properly entered in the national catalogue and that the DUS and the VCUS characteristics are all documented. However, this verification has not taken place since Senegal's variety catalogue has not been updated since it was first published.

COST OF VARIETY RELEASE PROCESS

In well-functioning seed systems, the costs of releasing a variety should not be so high as to disincentivize variety releases altogether. Senegal is in the process of preparing a draft decree that would set the costs of conducting DUS and VCUS examinations. To date, the costs of the DUS and VCUS tests are borne by the applicant breeders, as part of their research program.

Based on the cost of these services in other countries in the region, ISRA has set the cost of a single DUS test per campaign (season) per single site at US$ 3,000 each, bringing the cost of two independent growing cycles of DUS testing to US$ 6,000. A VCUS trial is conducted in at least three sites across the country, costing a minimum of US$ 9,000 per test. Since two independent tests are required, the total cost for the VCUS tests is US$ 18,000, making to combined total for the two tests a minimum of US$ 24,000.

These fees are the same in all OAPI DUS technical examination centers in the region and apply to both private and public breeder applicants. Table 15 shows the cost of variety release across countries studied by TASAI between 2021 and 2023. Ghana has the highest costs, followed by Senegal and Uganda.

Table 15: Cost of variety release across countries studied by TASAI between 2021 and 2023

Country	Average / range of cost of variety release (USD)
Ghana	10,000 - 53,050
Kenya	3,000
Mali	7,031
Nigeria	18,000
Senegal	24,000
Tanzania	1,800
Uganda	5,000 – 24,000

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. Table 16 lists all key seed policy instruments in Senegal and provides details on their status and degree of implementation. The table also provides information on the status of seed sector harmonization with the regional (ECOWAS) regulations.

Table 16: Key seed instruments in Senegal

Instrument	Description	Status/degree of implementation
Règlement C/REG.04/05/2008 (République du Sénégal 2014) régissant le contrôle de qualité, la certification et la commercialisation des semences et plants en Afrique de l'Ouest et au Sahel	This regional regulation harmonizes all operations relating to the control, certification, and marketing of seeds and seedlings in ECOWAS and the Sahel regions.	This regulation is under implementation.
Décret nº 97-616 (République du Sénégal 1997a) portant réglementation de la production, de la certification et du commerce des semences et des plants. 1997-06-17	Decree that governs all seed production, certification, and marketing operations in Senegal.	This decree is under implementation.
Décret nº 97-602 (République du Sénégal 1997b) instituant un catalogue des espèces et variétés de plantes. 1997-06-17	Decree that institutes a national catalogue of plant species and varieties.	This decree is under implementation.
Décret nº 97-603 (République du Sénégal 1997c) portant création du Comité national consultatif des Semences et des Plants (CNCSP). 1997-06-17	Decree that established a national seed committee.	The committee is functional but is constrained by a lack of funding.
Arrêté N°014617 14 mai 2019 (MAERSA 2019), portant statut des contrôleurs agréés, attribuant: à la DISEM, le contrôle de qualité des prébases ; à la DRDR, le contrôle de qualité des semences de base et certifiées; à des agences privées, le contrôle privé.	Ministerial order that • stipulates DISEM's responsibilities in quality control and the certification of breeder seed. • assigns the task of quality control for certified seed (generations R1 and R2) to the regional directorates for rural development (DRDR) • authorizes private agencies to conduct field quality control in Senegal.	All aspects of this order are under implementation.

Règlement d'exécution portant organisation du catalogue régional des espèces et variétés végétales en Afrique de l'Ouest et au Sahel (CREVAOS)	Implementing regulation that outlines the variety release procedures in the ECOWAS and the Sahel regions, including guidelines for DUS and VCUS testing.	This regulation was adopted by the Regional Committee for ECOWAS-UEMOA-CILSS Seeds and Plants in August 2016 but it yet to be published.
Règlement d'exécution portant règlements techniques annexes relatifs aux modalités d'exercice du contrôle de qualité et la certification des semences et plants en Afrique de l'Ouest et au Sahel	Implementing regulation that outlines seed quality control and certification operations in the ECOWAS and the Sahel regions	This regulation was adopted by the Regional Committee for ECOWAS-UEMOA-CILSS Seeds and Plants in August 2016, but it is yet to be published.
Règlement d'exécution portant modalités d'exercice du contrôle et de la certification phytosanitaires des semences et plants en Afrique de l'Ouest et au Sahel	Implementing regulation that outlines seed phytosanitary control and certification operations in the ECOWAS and the Sahel regions, including the pest lists.	This regulation was adopted by the Regional Committee for ECOWAS-UEMOA-CILSS Seeds and Plants in August 2016, but it is yet to be published.
Seed Sector Support Fund (SSSF)	The Government of Senegal has not established the *Fonds de Reconstitution du Capital Semencier* (Seed Capital Replenishment Fund), a fund to support the supply of and access to quality seed.	The SSSF has not been established.
Annexe 10 de l'Accord de Bangui révisé, portant protection des obtentions végétales (OAPI 2015)	Plant Variety Protection (PVP) Act that protects new plant varieties. It is in line with the UPOV Act of 1991.	Senegal is following the executive regulation on the conduct of the phytosanitary control and certification of seeds and seedlings in West Africa and the Sahel zone

Seed producers' assessment of implementation of seed regulations:

Overall, seed producers rated their satisfaction with the implementation of seed regulations as "good" at 72%.

QUALITY AND ENFORCEMENT OF SEED REGULATIONS

Seed regulations give structure to the formal seed sector. The TASAI study assesses stakeholder perspectives on various aspects of seed regulations, including whether they are supportive to 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.

Implementation of the Senegal Seed Regulations/Decrees: Regulation C./REG. 4/05/2008 on the Harmonization of the Rules Governing Quality Control, Certification and Marketing of Plant Seeds and Seedlings in the ECOWAS region, commonly referred to as the ECOWAS seed regulations, is Senegal's national seed regulation. The ECOWAS Regulations are implemented through various decrees and regulations outlined in Table 15. These documents are shared with seed quality controllers[20] working in different regions in the country.

Implementation of the ECOWAS seed regulations: By gazetting the ECOWAS seed regulations in 2014, Senegal begun to harmonize its national seed regulation with the regional one. As part of this process, decrees and ministerial orders related to the seed industry have been updated to fall in line with regional provisions.

20 "Seed controller" as used in the ECOWAS Seed Regulations and is equivalent to "seed inspector".

The status of the implementation of some of the key aspects of the ECOWAS seed regulations can be summarized as follows. Article 10 of the ECOWAS seed regulations requires that the country should set up a support fund for the seed sector. This fund has not yet been set up. However, the government has a seed capital reconstitution fund that supports the seed subsidy program and covers key activities such as the production of breeder seed, the rehabilitation of laboratory equipment, and the construction of seed stores at the village level.

The national variety catalogue is supposed to be updated as soon as a new variety is approved. However, the catalogue has not been updated since it was first released in 2012 (MAERSA 2012).

Article 76 requires the government to develop texts governing the import and export of non-conventional seeds. The draft ECOWAS regulation for seed import and export was developed by CORAF and discussed and adopted by the *Comite Regional des Semences et Plants de l'Afrique de l'Ouest et du Sahel* (CRSPAOS)/ Regional Committee for ECOWAS-UEMOA-CILSS Seeds and Plants in May 2023. However, it is yet to be published.

Article 83 requires member states to establish a list of seed controllers (train, hire, and deploy) authorized to carry out compliance checks. In Senegal, this list has not yet been published, as the officers first need to take an oath before they are authorized to work. Nevertheless, these seed controllers are already fully operational and conduct their activities in line with Organization for Economic Cooperation and Development (OECD) schemes. In addition, seed samplers and analysts working at the national seed laboratory follow International Seed Testing Association (ISTA) standards for seed testing. Article 78 requires the government to develop and update the national list of harmful pests and quarantine organisms. The list was updated in 2018.

Nearly all seed producers interviewed (103 out of the 105) reported that they had a clear understanding of the regional regulations. The rating on the level of satisfaction with the degree of enforcement of seed regulations was "good" at 72%.

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 producers and the government in the data collection year. In addition, seed producers report their level of satisfaction with government efforts to eliminate counterfeit seed.

DISEM, as part of its regular monitoring activities, records cases of counterfeit seeds. In 2022, five incidents were collected by DISEM's accredited quality control officers (Table 17). For its part, the TASAI study recorded two instances of counterfeit seeds, as reported by seed producers surveyed. The reported cases included the deliberate sale of non-certified seed by seed producers. Another common source of counterfeit seed is so-called skimmed seed, which may be one of two types: either grain selected from the best grain in stock and sold as seed or 3rd generation-certified seed, known as R3, whose quality is considerably lower than that of the original certified seed. The ECOWAS Seed Regulations permit countries to sell R3-certified seed in emergencies or in times of supply shortages; however, skimmed seed is now often used in non-emergency situations. However, in instances where quality assurance measures have not been followed adequately, the quality of skimmed seed has declined, giving rise to the erroneous assumption that it was counterfeit seed. According to DISEM, the quantities of skimmed seed have declined, while those of R3 seed have increased.

Table 17: Industry satisfaction with government efforts to address counterfeit seed

Indicators	2022
Number of cases of counterfeit seed (seed producers)	2
Number of cases of counterfeit seed (government)	5
Seed industry satisfaction with government effort to address counterfeit seed (out of 100%)	50%

extremely poor | poor | fair | good | excellent

As part of its efforts to combat the challenge of counterfeit seed, the government has authorized quality control officers in private entities, provides DISEM quality control officers with resources for field operations and tools for data collection and sampling, maintains the national seed laboratory and its annexes in the different regions in good working conditions, and rehabilitated dilapidated seed processing centers and purchasing mobile seed processing units. These efforts notwithstanding, seed producers' satisfaction with government efforts to address the challenge of counterfeit seed is relatively low at 50% ("fair"). An important reason for the low satisfaction rating is the prevalence of skimmed 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 scale, targeting, distribution arrangements, and payment systems, may contribute to the development of the seed market in positive ways or may be disruptive to market forces.

Senegal had a subsidy program in 2022, which included both input subsidies and budgetary support for DISEM and ISRA. The overall objective of the seed subsidy program was to ensure that farmers have access to quality seed. The input subsidies, which covered seed, fertilizer, and agricultural equipment, received the largest share of the overall budget for agricultural subsidies during the May 2022-May 2023 period: 60 billion FCFA, or about US$ 100 million.[21] The budgetary support provided seed quality control and laboratory equipment to the DISEM and support for ISRA to produce breeder seed.

The specific part of the subsidy program that pertains to seed production has the following steps:

- DISEM selects seed producers from the list of accredited producers. Both small and large-scale producers may participate in the subsidy program; the eligibility criteria are defined locally for small-scale producers, while, for large-scale producers, they include over 15 hectares of land and access to equipment, labor, and processing facilities. The list of producers is finalized in consultation with the *Direction Régionale du Développement Rural* (DRDR)/ Directorate of Agricultural Rural Development.
- The program is implemented through national, regional, departmental, and local committees, which are headed by the Minister of Agriculture, the governor, the prefect,[22] and the sub-prefect, respectively.
- Seed producers sell their seed to so-called "operators," who are contracted by the ministry to deliver seed to the local commissions. Farmers buy the seed from the operators; the retail price, that is, the price paid by the farmers, is the difference between the set price and the subsidy amount. Once the seed operator has delivered all the seed to a particular location, they prepare a report of their deliveries and submit it to MAERSA for payment.
- A tracing and monitoring system is in place that includes notifications to the seed operators, the terms of the contract, the implementation schedule, and the fixed price of subsidized inputs for the agricultural campaign.

21 In August 2023, on average 1 FCFA was equivalent to 0.001679 US$.

22 Prefects are government appointees to head departments. Departments are the administrative units under the regions.

Of the 105 surveyed seed producers, 68 (65%) participated in the subsidy program in 2022. The crops covered by the subsidy program included three of the four focus crops, groundnut, maize, and rice – as well as cowpea, fonio, sesame, sorghum, and watermelon. Just over two-thirds (46) of the 68 seed producers who participated in the program reported that they had sold at least half of the seed they produce to the government.

The subsidy program for rice follows the same steps but is administered under a separate government program, the *Programme National d'Autosuffisance en Riz* (PNAR)/National Rice Self-Sufficiency Program. Sixty percent of rice seed producers in the rainfed areas in the middle of the country and the natural Casamance region in the South participated in the program in 2022. Most of these producers belong to cooperatives. The remaining 40% of rice seed producers did not participate in the subsidy program for rice seed. These producers operate highly developed and mechanized seed production facilities in the irrigated Senegal River Valley (SRV). They are formal private businesses, who feel that subsidy programs threaten the competitiveness of the rice seed business because they encourage participation by opportunistic seed producers.

Table 18 shows seed companies' satisfaction ratings with the implementation of the government subsidy program in 2023. "Openness and transparency of the seed procurement process" and "predictability of the procurement process" were rated "fair" at 54% and 53%, respectively, signaling room for improvement in making sure that the rules and operations of the subsidy program are transparent and followed. "Efficiency of payments" was rated "poor" (37%), reflecting the common complaint of late payments from the commissions for seed deliveries among seed producers.

Table 18: Seed companies' opinion of the implementation of the government subsidy program (2023)

Aspect of the government seed subsidy program	Opinion rating out of 100%	
	Opinion	Interpretation of opinion
Openness and transparency of the seed procurement process	54%	Fair
Predictability of the seed procurement process	53%	Fair
Efficiency of payments	37%	Poor

INSTITUTIONAL SUPPORT

QUALITY OF THE NATIONAL SEED TRADE ASSOCIATION

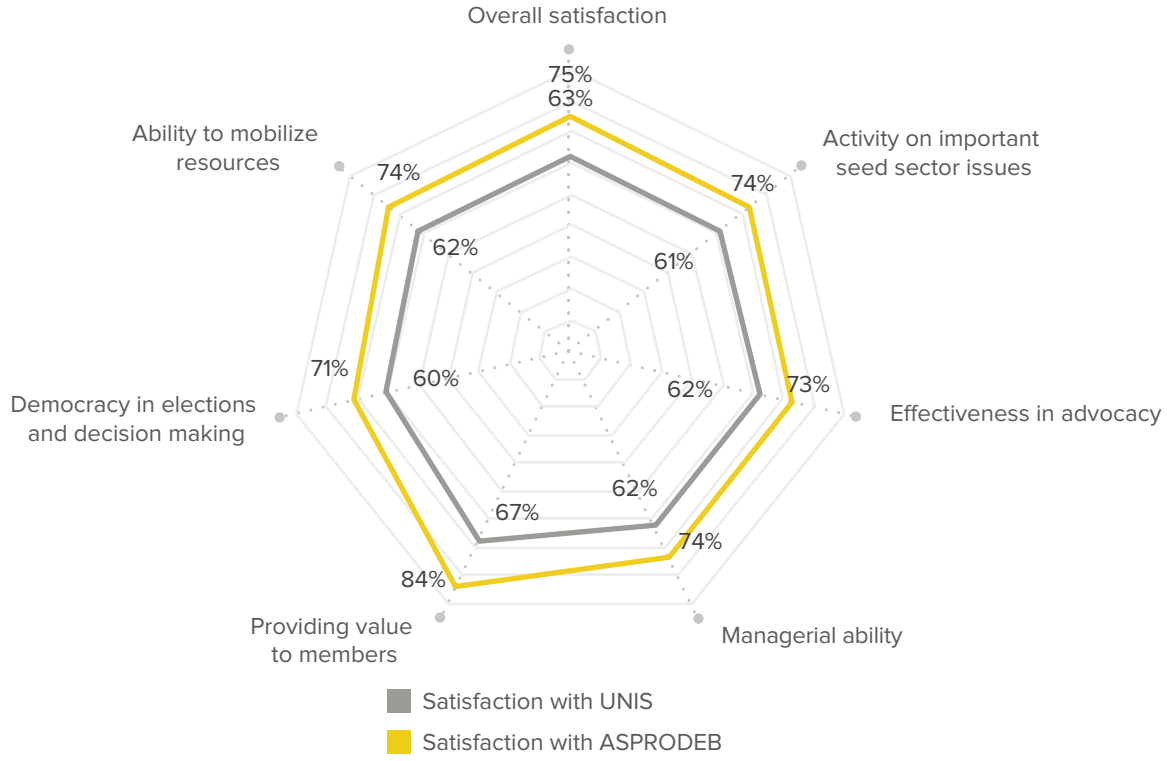
Well-functioning national seed trade associations play a key role in representing the interests of the industry and engaging with the government. Senegal has two national associations active in the seed industry: the *Union Nationale Interprofessionnelle des Semences (UNIS)*/National Interprofessional Seed Union and the *Association Sénégalaise pour la Promotion du Développement à la Base* (ASPRODEB)/Senegalese Association for the Promotion of Development at the Base. Though their roles are somewhat different, both associations are recognized by the government. A small number of seed producers are members of both UNIS and ASPRODEB.

UNIS: UNIS is the national seed trade association in Senegal, whose main objective is to support its members in the areas of seed production, processing, and marketing (UNIS 2018). It was established in 1996 and as of 2023, it had 554 active seed producer members. Its governance structure consists of an executive committee and a general assembly. The day-to-day running of the association is handled by the Secretariat, headed by the President, the Secretary-General, and the Executive Committee. The current secretariat has five employees: 3 men (the Secretary-General, an agronomist, and a communication specialist), and 2 women (a finance and administration officer and an executive secretary). The so-called Bureau (formal assembly of the Board) is elected by the General Assembly and comprises the President, Vice-President, Secretary General, Treasurer, and Assistant Treasurer. UNIS has representation in 5 zones in the country, and each has a zonal President. UNIS works closely with the government, specifically with the MAERSA, DISEM, ISRA, and DRDR, to achieve its goals. Its members are involved in the production of foundation and certified seed. UNIS is a member of the African Seed Trade Association (AFSTA).

ASPRODEB: ASPRODEB is a grassroots organization whose goal is to improve the living conditions of families and rural populations by promoting agriculture-based, sustainable rural development. ASPRODEB's membership consists of 30 federations of cooperatives, unions, and associations, distributed in 4 regions of Senegal. The organization's mission is to support the national federation of farmer-based organizations (FBOs) and regional West African FBOs to implement programs supported by the state and development partners.

The surveyed seed producers included 56 UNIS and 36 ASPRODEB members. The members were asked to rate their respective association's performance across six service areas. Across the board, ASPRODEB was rated more highly than UNIS by its members (Figure 6). Most of the ratings for ASPRODEB fell between 71% and 75%, with a high score of 84% on "providing value to members." For its part, UNIS's performance was rated between 60% and 7%, with a high score of 67% on "providing value to members." Both associations scored the lowest on "democracy in elections and decision-making." When asked about the main challenge faced by their members, management in both entities cited a lack of sufficient quantities of breeder seed produced by ISRA.

Figure 6: Member satisfaction with UNIS and ASPRODEB (2023)



ADEQUACY OF SEED INSPECTORS

Seed inspection services ensure that certified commercial seed meets the regulatory quality standards. To provide adequate inspection services requires enough 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.

The *Division des Semences* (DISEM) in the MAERSA oversees seed inspection and certification in Senegal. In 2022, DISEM employed 107 public seed inspectors (103 males and 4 females) (Table 19). DISEM works with the regional DRDRs, which oversee the quality control of foundation and certified seed (R1 and R2[23]), including seed lab analysis and seed certification.

Table 19: Number and rating of the adequacy of public inspectors

Indicators	2022
Number of public seed inspectors	107
Number of private seed inspectors (seed technicians)	13
Seed industry satisfaction with seed inspectors (out of 100%)	70%

extremely poor | poor | fair | good | excellent

23 R1 and R2 are the first two generations of certified seed.

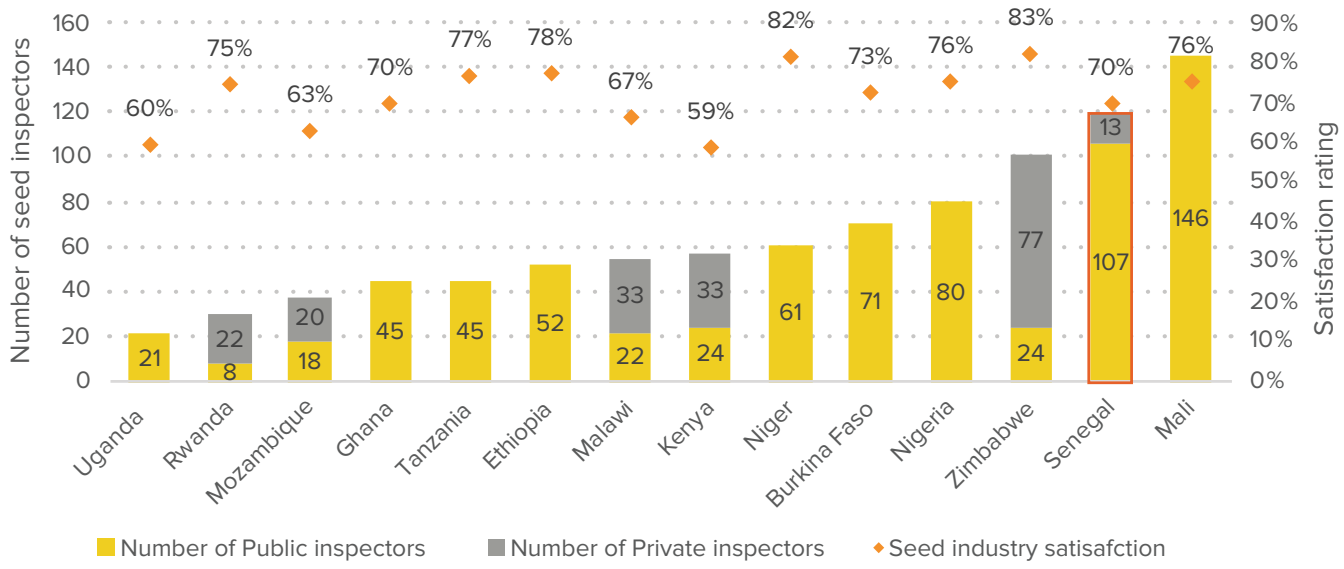
Until the year 2000, seed inspection was centralized under DISEM and its regional offices. Since then, the system has become decentralized through the introduction of three private agencies - two in the SRV region and one in the southern region of Casamance - to conduct seed inspection services, as well as seed sampling, seed analysis, and seed testing. In addition, in 2022 there were 13 private, approved, and licensed technicians (inspectors), who ensured that seed producers maintained the required quality standards during production. All services are paid for by seed producers.

DISEM has a central seed laboratory, with local branches in each of the main agricultural regions. All accredited seed producers' fields are inspected. If a seed producer does not comply with the national standards their seed production plots may be declassified. According to DISEM, in 2022 the percentage of rejected seed was 38% for maize, 30% for millet, 18% for groundnut, and 28% for rice.

TASAI studies track seed producers' opinions of public inspection services. In Senegal, seed producers rated public seed inspection services "good" at 70%. In fact, a few producers whose fields had been declassified provided a high score, indicating that the declassification of their seed fields was evidence of DISEM's efforts in quality control. At the same time, some public and private seed inspectors preferred the previous, centralized, system, which they felt was better coordinated. Others advocated for the need to license more private entities to support quality control at other stages of the seed value chain, for example, storage.

Figure 7 compares the numbers of seed inspectors and ratings of adequacy of seed inspection services across 14 African countries surveyed by TASAI between 2021 and 2023. The number of seed inspectors in Senegal is among the highest. In addition, Senegal is one of six countries out of the 14, and the only one in the ECOWAS region, to utilize authorized private seed inspectors to complement the work of public inspectors. Figure 7 also presents the satisfaction ratings with inspection services reported by seed producers. With its rating of 70%, Senegal ranks in the middle of the pack.

Figure 7: Number and adequacy of seed inspection services across countries surveyed by TASAI between 2021 and 2023



SERVICE TO SMALLHOLDER FARMERS

ADEQUACY OF EXTENSION SERVICES

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

Operating under the MAERSA, the *Agence Nationale de Conseil Agricole et Rural* (ANCAR) /National Agricultural and Rural Advisory Agency is the national extension service. The government launched ANCAR in 1997 with support from the World Bank's *Programme de Services et d'Appui aux Organisations Paysannes* (PSAOP)/Agricultural Services and Producer Organizations Program. Besides overseeing agricultural extension services, ANCAR collaborates with DISEM on various services and activities across the seed value chain.

In 2022, ANCAR employed 180 public extension officers, who were located throughout the country, and whose services were available to farmers upon request. In addition, the seed producers surveyed employed a total of 658 private extension officers - seed technicians who also served as extension officers. This complies with Article 37 of the ECOWAS Seed Regulations, which requires that seed producers engage seed technicians if they lack the requisite skills in seed production. Most seed producers reported that they employed at least three seed technicians each. Based on the number of public and private extension officers reported in 2022, the ratio of extension officers to agricultural households is 1:1,040 (Table 20). Seed producers' satisfaction with the adequacy of extension services was "good" at 65%. According to seed producers, ANCAR is well-represented in most parts of the country and provides its services to seed producers and other farmers. However, ANCAR staff call on DRDR regularly for assistance with seed quality control.

Table 20: Number and adequacy of agricultural extension officers

Indicators	2022
Number of public extension officers employed by the government	180
Number of private extension officers employed by seed companies	658
Total number of extension officers	838
Number of agricultural households	871,042
Ratio of extension officers to agricultural households	1:1,040
Seed industry satisfaction with extension officers (out of 100%)	65%
Interpretation of satisfaction	Good

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 DISEM, Senegal had 1,493 agro-dealers in 2023[24] (Table 21), all licensed by DISEM. The registration and accreditation process for agro-dealers follows the *Règlement C/REG.04/05/2008* (République du Senegal 2014). The seed producers surveyed rated their level of satisfaction with the adequacy of the agro-dealer network as "good" at 67%.

Table 21: Number and satisfaction with the agro-dealer network

Indicator	2022
Number of agro-dealers	1,493
Seed industry satisfaction with agro-dealer network (out of 100%)	67%
Interpretation of satisfaction	Good

24 Source: Seed Sector Performance Index (SSPI): 2023 Status Report for Africa. Forthcoming

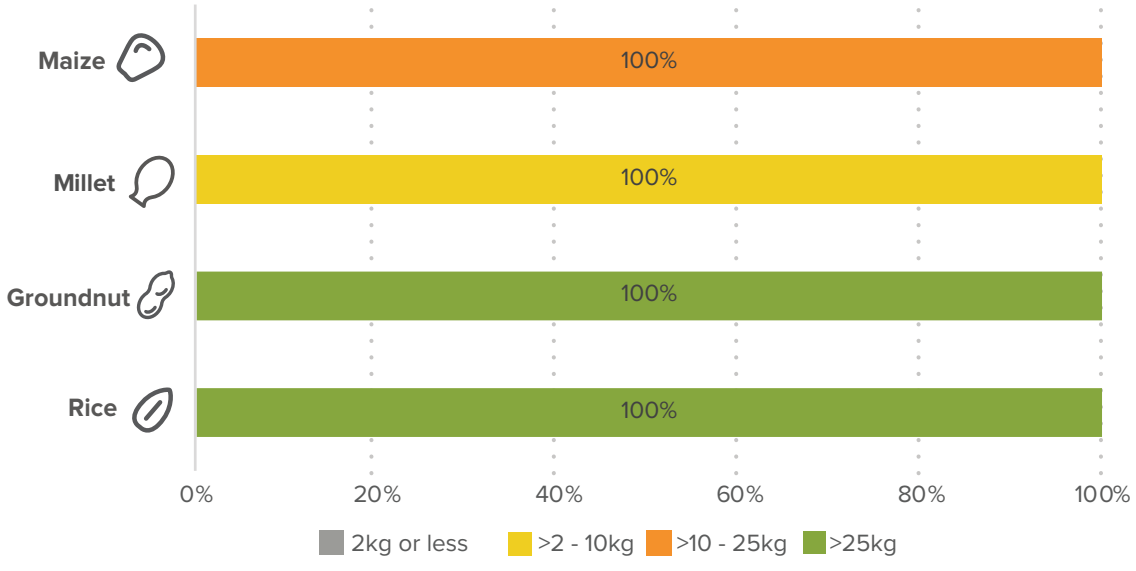
AVAILABILITY OF SEED IN SMALL PACKAGES

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.

Règlement C/REG.04/05/2008 stipulates standard sizes for seed packages, namely, 50 kg for groundnut seed, 40 kg for rainfed rice seed, 80 kg for irrigated rice seed, 16 kg for maize seed, and 4 kg for millet seed. The package sizes are set according to ISRA recommendations. For millet, rice, and maize, they correspond to the volume of seed needed to sow a hectare of land. For groundnut, they vary according to the size of the seeds. Seed producers comply with these packaging requirements, although some producers package maize in 20 kg bags because that is easier to measure. Given the above required package sizes, none of the seed for the focus crops is sold in small packages of 2 kg or less (Figure 8). This makes Senegal different from many other countries surveyed by TASAI, where seed companies sell seed in small packages to meet the demands of large segments of smallholder farmers. However, in Senegal, the availability of farmland is not a constraint[25], and many farmers work relatively large hectarages, for which the available package sizes are appropriate.

25 Access to land is granted by the communal commission based on applications.

Figure 8: Percentage of seed sold in different package sizes (2022)



AVERAGE SEED AND GRAIN PRICES

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

At the start of each rainy season, the MAERSA announces seed prices through a circular as part of the seed subsidy program. Table 22 presents the prices for the 2022/23 season when the government subsidized the price of maize, rice, and groundnut seeds among the four focus crops. For rice, both R1 and R2 varieties were subsidized. As mentioned above, while rice producers from other regions participated in the program, those in the SRV region did not. The price of rice seed produced by these producers ranged between 450 and 780 FCFA/kg (US$ 0.76 and 1.31).

Millet was not among the subsidized crops for the 2022/23 season. The price of millet seed ranged between 300-500 FCFA/kg (US$ 0.50 and 0.84) and reached as high as 600 FCFA/kg US$ 1.01), depending on the area.

Table 23 compares average prices for seed and grain for the four crops. For all four crops, the price of grain is higher than the price of seed. This contradicts expectations and results from other countries studied by TASAI, where grain costs less than seed. To understand the explanation for this anomaly would require a more in-depth assessment, which was beyond the scope of this study. Consequently, the price of grains needs to be taken with caution.

Table 22: Supplier and subsidized seed prices for maize, groundnut, rice and millet

Crop	Supplier price (FCFA/kg)	Subsidy (FCFA/kg)	Subsidy as percentage of supplier price(%)	Retail price (FCFA/kg)
Maize	500	275	55%	225
Groundnut (55-437 variety)	385	165	43%	220
Groundnut (Other varieties)	375	165	44%	210
R1 ***Rice: 15 varieties including 6 from the Sahel series***	500	425	85%	75
R2 ***Rice: 15 varieties including 6 from the Sahel series***	450	390	87%	60
R1 ***Rice: NERICA series: 1, 4, 5, 6, 8, 544; and ORYLUX***	780	705	90%	75
R2 ***Rice: NERICA series: 1, 4, 5, 6, 8, 544; and ORYLUX***	730	660	90%	70
Millet	400[26]	Not subsidized in 2023.		

Table 23: Average seed and grain prices (2022)

Crop	Prices in 2022 (FCFA/kg)	
	Average Seed price	Average grain price
Maize (OPV)	231	625
Maize (Hybrid)	317	625
Millet	207	600
Groundnut	168	400
Rice	92	640

26 The supplier price for millet was given as an average price.

CONCLUSION

The formal seed system in Senegal is in the growth stage of development (Ariga et al. 2019). Since the 1990s, the state has withdrawn from seed production to make way for private seed companies, which produce foundation and certified seed of the first (R1) and second generations (R2). Breeder seed is produced by the *L'Institut Sénégalais de Recherches Agricoles* (ISRA), following the ECOWAS seed regulations.

Senegal's priority crops are maize, millet, groundnut, and rice. Combined, these crops account for approximately 85% of the area under rainfed agriculture in the country. The actors in the seed value chain include seed cooperatives, associations, unions, companies, individual producers, and *Groupement d'Intérêt Economique* (GIEs).

Under the **research and development** category, the study noted spikes in the release of varieties. Between 2020 and 2022 five varieties of maize, 4 varieties of rice, and 4 varieties of millet were released. In 2018, 10 groundnut varieties and 15 rice varieties were released. The adoption of newer varieties remains a challenge, as seed operators continue to produce and market older varieties. Two of the popular millet and groundnut varieties are approximately 50 years old. In addition, ISRA's seed production unit lacks the financial and human resource capacity to produce the requisite quantities of breeder seed to meet the national demand.

Under the **industry competitiveness category**, the market shares and the HHI scores for each crop show that there is no individual company/cooperative or group of seed companies/ cooperatives that dominate the seed market for any of the four crops. Although there are discrepancies between government and TASAI data, both datasets indicate that seed producers produced high volumes of certified seed for maize and groundnut compared to rice and millet seed. This may be partly due to the incentive of the government subsidy program, which is the main buyer of seed for these two crops. However, rice seed producers in the Senegal River Valley opted out of the subsidy program, because it can potentially limit the competitiveness of the rice seed industry. These rice seed producers are known to be highly professional, organized, and compliant with national seed quality standards.

Senegal's **seed policy instruments** are aligned with the ECOWAS seed regulations. The government has developed decrees and ministerial orders to implement these regulations. However, they are yet to be implemented, because the regulations on variety release procedures, seed quality control and certification, and seed phytosanitary control are not yet published

Under **institutional support** for the seed sector in Senegal, the study surveyed two national seed associations – UNIS and ASPRODEB. Both organizations serve seed producers, but ASPRODEB members include cooperatives and unions, while UNIS' members are mainly seed producers. Both entities received high average satisfaction scores, indicating that their membership is overall satisfied with their performance.

The government has strengthened seed inspection services by accrediting private agencies to conduct seed quality control activities. In addition, the recent purchase of new laboratory equipment has improved the functioning of the national seed laboratory, which is accredited by the OECD and ISTA to test rice, maize, and sorghum.

The indicators under **Service to smallholder farmers** offer some of the bright spots in the study. The government agricultural extension services provided by ANCAR support farmers. In addition, the country has seed technicians, who work directly with seed producers and are more knowledgeable on seed issues than the regular extension agents. Agro-dealer networks are adequate, partly because much of the seed of the four focus crops are distributed through the government subsidy program or is sold directly to farmers by the seed producers.

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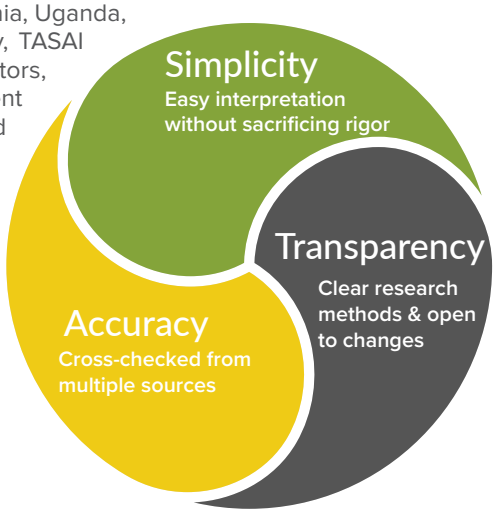
ABOUT TASAI

PILLARS OF COMPETITIVE SEED SECTORS

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 2023, 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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