

Mali Country Report 2021

The African Seed Access Index

By

Edward Mabaya, Sokona Dagnoko
Michael Waithaka, Mainza Mugoya
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TASAI
The African Seed Access Index

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Brian Damba
M'Balou Camara
Krisztina Tihanyi

Reviewed by

Walter S. de Boef
Dioncounda Camara
Marthe Diallo
Bidjokazo Fofana
Issoufou Kapran

September 2022

The findings in this report were presented to seed sector stakeholders in a TASAI dissemination meeting held in Bamako, Mali on June 7, 2022. The current version incorporates feedback from the meeting.

Cite as: Mabaya, E., Dagnoko, S., Waithaka, M., Mugoya, M., Damba, B., Camara, M., Tihanyi, K. 2022. Mali Country Report 2021 - The African Seed Access Index (version September 2022)



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LIST OF ACRONYMS

ASSEMA	Association Semencière du Mali/ Seed Association of Mali
CBA	Community Based Advisor
CGIAR	Consultative Group on International Agricultural Research
CNS	Comité National Des Semences / National Seed Committee
CIMMYT	International Maize and Wheat Improvement Center
DLCP	Division of Legislation and Phytosanitary Control
DNA	Direction Nationale de l'Agriculture/ National Directorate of Agriculture
DUS	Distinctiveness, Uniformity and Stability
EGS	Early Generation Seed
ECOWAS	Economic Community of West African States
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IER	Institut d'Economie Rurale/ Institute of Rural Economy
LABOSEM	Laboratoire des Semences/ Seed Laboratory
NGO	Non-Governmental Organization
OPV	Open Pollinated Variety
SAA	Sasakawa Africa Association
SSN	Service Semencier National/ National Seed Service
VATE	Value for Agronomic and Technological and Environmental Trait
WAAPP	West Africa Agricultural Productivity Program

INTRODUCTION

The increased use of productivity-enhancing technologies, including mechanization, irrigation, fertilizer and improved seed¹, are critical to improving food and nutritional security across Africa. For field crops, a competitive formal seed sector is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. Improved 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 Country Report summarizes the key findings of the study conducted by TASAI in 2021 to appraise the structure and economic performance of Mali's formal seed system. TASAI studies focus on the four grain and legume crops important to a country's food and nutritional security (the "four focus crops"). In Mali, these crops are maize, rice, sorghum, and cowpea. On average, the three cereals (rice, sorghum, and maize) accounted for 80% of the total cereal production of the country from 2013 to 2017. In the 2020/2021 cropping season, cowpea accounted for 34% of all legume crop production and 47% of the total area planted with legumes (DNA 2021).

OVERVIEW OF MALI'S FORMAL SEED INDUSTRY

Like most other African countries, Mali's seed industry consists of three systems²: the informal, intermediate, and formal systems. This Country Report focuses almost exclusively on the formal seed sector.

The informal system refers to a system in which seed is produced, maintained, and distributed through informal networks. These activities "tend to be decentralized and might revolve around local entrepreneurship, seed banking, community-based seed production, or seed villages" (McGuire & Sperling 2016). In many cases, farmers keep seed from the harvest and exchange it with neighbors, relatives, and through rural markets. Seed from this system is of variable varietal purity, physical and sanitary quality.³

The intermediate system comprises community-based groups (producer cooperatives or unions) that are engaged in the multiplication and distribution of non-certified seed of either modern or traditional local varieties. The system includes organized farmer groups, who access basic seed from the formal seed system and who produce and distribute seed to other farmers, both through informal arrangements and through local markets. Multiplication and distribution generally take place within the local community and nearby areas (as opposed to seed producers in the formal system, who may scale beyond the local community). In Mali, these groups are not formally registered. They involve individual and organized groups of seed producers, seed cooperatives, or associations that produce seed under the supervision of Non-Governmental Organizations (NGOs) and extension services. In this system, seed producers often work as out-growers for seed companies, projects and programs, and research institutions with which they have loose formal or informal linkages. In Mali, the informal and intermediate seed systems together produce most of the seed used in the country.

The formal system is a structured and regulated value chain for the production of improved seed varieties. This process involves many actors and institutions, whose activities range 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 and companies, and agro-dealers. This system produces seed of the highest varietal purity, physical and sanitary quality. The utilization of certified seed in Mali is low and varies by crop, ranging from 1% for groundnut seed to 15% for maize seed (ISSD, 2017). The utilization of improved varieties also varies for specific crops, depending on measurement method and geographical location. Utilization rates of certified sorghum seed, for example, vary between 13% and 30% (Smale et al., 2018).



1 In this report, TASAI uses "improved seed" as the short form of "quality seed of improved variety."

2 The seed systems in Mali are complex and this report the main ones. For further discussion see Dagnoko, S. and Asiedu, E. 2016. Innovative experiences in access to foundation seed for commercial and non-commercial crops for formal and informal seed systems. The case of Malian stakeholders and the West Africa Seed Programme (WASP). Final survey report, ISSD Africa.

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



Mali's Seed Policy provides the direction and overall strategy for the development of the formal seed sector in the country (Ministère de l'Agriculture, 2009). The policy is implemented through various decrees and by-laws, and it lists the roles of key players in the formal seed sector in Mali. Table 1 lists the roles of key players in the formal seed sector in Mali. Variety development lies within the remit of the *Institut d'Economie Rurale* (Institute of Rural Economy) (IER). Seed quality control, inspection, and certification is conducted by Mali's *Laboratoire des Semences* (Seed Laboratory) (LABOSEM). LABOSEM falls under the ambit of the *Direction Nationale de l'Agriculture* (National Directorate of Agriculture) (DNA). Under the provision of the DNA, the *Service Semencier National* (National Seed Service) (SSN), implements the National Seed Plan. Seed production and marketing are conducted by seed companies, seed cooperatives, and individual seed producers. The *Association Semencière du Mali* (ASSEMA) is the national seed association and brings together the seed producers under one umbrella.

Table 1: Role of key players in the formal seed sector in Mali

ROLE	KEY PLAYERS
Research and breeding	Institute of Rural Economy, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), WorldVeg, AfricaRice, International Institute of Tropical Agriculture (IITA)
Variety release and regulation	Direction Nationale de l'Agriculture (DNA), Comité National des Semences (CNS), Laboratoire des Semences du Mali (LABOSEM)
Seed production and processing	Seed companies, individual seed producers, seed cooperatives
Education, training, and extension	Association Semencière du Mali (ASSEMA), agricultural training colleges and universities, DNA, Sasakawa Africa Association, Non-Governmental Organizations (NGOs)
Distribution and sales	Seed companies, seed cooperatives, agro-dealers

METHODS

TASAI studies cover 22 indicators divided into five categories: **Research and Development, Industry Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers** (Table 2). In most TASAI studies, the bulk of the performance data reported comes from the year before the year in which the study is conducted (“the study year”) because this is the year for which most recent annual data are available. Accordingly, the data reported in this Country Report pertain primarily to 2020; however, whenever 2021 data were available, they are included in the report.

Table 2: TASAI Indicators

	Crop-specific	Impact on seed access
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	-

To access the progress of Mali's formal seed sector, this Country Report draws comparisons with the findings from two previous studies in Mali that drew on data from 2018, 2019, and 2020. In addition, since TASAI has conducted similar studies in 20 other African countries, this report also draws relevant cross-country comparisons.

In 2021, data collection focused on three key seed industry players: (1) seed producers (seed companies, individual seed producers, and seed cooperatives); (2) plant breeders; and (3) representatives of government entities active in the country's seed sector. Of these, seed producers constitute the primary source of information for this study. For several indicators, TASAI supplemented quantitative data with self-reported average levels of industry satisfaction on a 0-100 scale, with the following brackets: 0-19.99% **extremely poor**,

20-39.99% **poor**, 40-59.99% **fair**, 60-79.99% **good**, and 80-100% **excellent**.

The entities active in Mali's formal seed sector included seed companies, individual producers, and cooperatives. Below we describe the sampling frame for each entity.

Seed companies: In 2020, the LABOSEM registered 16 seed companies. All 16 companies were active in the production of at least one of the four focus crops in 2020 and were members of the ASSEMA. Out of the 16 active seed companies, 13 responded to the survey (Table 3). The total volume of seed that they produced included seed produced through contract farmers or purchased from individual seed producers or seed cooperatives (out-growers).

Table 3: Breakdown of seed companies respondents' activity by crop (2020)

Culture	Number of seed companies surveyed (TASAI data)	Number of registered seed companies (LABOSEM data)
 Maize	10	10
 Rice	8	8
 Sorghum	9 ⁴	8
 Cowpea	9	9
Total	13	16

4 The number of sorghum producers recorded by TASAI is higher than the number provided by the government data because three companies reported to TASAI that they produced sorghum; however, the same companies were not listed among sorghum producers in government records.

Individual producers and cooperatives: In 2020, a total of 41 individual seed producers and 88 seed cooperatives⁵ were registered with LABOSEM to produce seed. All these entities produced at least one of the four focus crops in the data collection year. The sampling of the seed producers followed two steps:

Step 1 determined the number of seed producers and cooperatives to be interviewed. These numbers were set using data from LABOSEM on the volume of certified seed produced by region and by crop. For example, if 10% of maize seed was produced in region X, then 10% of the surveyed maize seed producers would be from region X.

5 Seed cooperatives in Mali fall under the ambit of the Association des Organisations Paysannes Professionnelles (AOPP). Many seed cooperatives are involved in variety testing and evaluation, and seed production and distribution. Their members are individual seed producers, and distributors. The cooperatives sell seed nationally. See Access to Seeds Foundation, 2018. The Rise of the Seed-producing Cooperative in Western and Central Africa. Access to Seeds Foundation, Amsterdam, The Netherlands.

Step 2 validated the list of 41 individual seed producers and 88 cooperatives at the regional level in consultation with the LABOSEM regional office at Ségou, regional directorates of agriculture, and seed producers/cooperatives. To avoid double-counting, we removed from the sample seed producers who were only out-growers or contract growers for other seed producers and who were members of seed cooperatives.

Steps 1 and 2 produced a sample of 62 seed producers; however, the one seed producer in the Gao region listed in the LABOSEM database was removed when we discovered, in consultation with regional officers, that the seed producer was not active during the data collection year. This resulted in a sample of 61 individual seed producers and cooperatives, of which 30 produced maize seed, 17 produced rice seed, 12 produced sorghum seed and 4 produced cowpea seed. The breakdown is presented in Table 4 below.

Table 4: Breakdown of individual seed producers and cooperatives by region and by crop (2020)

Region	Sample of seed producers (individual seed producers and cooperatives) surveyed				
	 Maize	 Rice	 Sorghum	 Cowpea	Total
Bamako	1	0	0	0	1
Tombouctou	0	3	1	1	5
Mopti	0	10	0	0	10
Ségou	1	2	2	1	6
Sikasso	20	1	4	0	25
Koulikoro	6	1	5	0	12
Kayes	2	0	0	0	2
Total	30	17	12	2	61

In sum, combining the 58 individual seed producers and 3 cooperatives with the 13 seed companies resulted in a sample of 74 seed producers⁶ (Table 5).

of the ASSEMA, NGOs involved in the seed value chain, and breeders at the IER who worked on the production of maize, sorghum, cowpea, and rice.

Other key respondents interviewed for the TASAI Mali study included the government seed sector regulatory services, LABOSEM in Bamako and Ségou, the DNA, representatives

The 2021 study was carried out successfully despite challenges posed by restricted travel and physical interactions due to the COVID-19 pandemic. In addition, Mali went through transition from civilian to military rule and terror attacks in some parts of the country. However, they did not disrupt the study.

⁶ In this report, we use the term ‘producer’ to refer to seed companies, individual producers, and cooperatives. In some instances, we only focus on seed companies.

Table 5: Breakdown of seed producers by crop (2020)

Crop	Number of registered seed producers (government data)	Number of seed producers surveyed (TASAI data)
 Maize	49	41
 Rice	74	26
 Sorghum	43	21
 Cowpea	43	13
Total	209	74

RESEARCH AND DEVELOPMENT

NUMBER OF ACTIVE BREEDERS

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

⁷ TASAI studies define an "active breeder" as (1) a breeder who is currently engaged in breeding/maintaining a variety or (2) 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.

Table 6 shows the number and adequacy of breeders for the four crops. In 2021, Mali had a total of 16 active breeders⁸ for the four crops, of whom one was a woman. Of the 16 breeders, 15 worked in the IER, while one maize breeder worked in the private sector. The private breeder worked on all four crops and introduced improved varieties that were originally developed outside the country. Of the 15 public breeders, 2 work on maize, 6 work on rice, 6 work on sorghum, and 1 works on cowpea. The number of breeders for a given crop depends on the economic importance of that crop, funding, and on partnership opportunities, especially with the Consultative Group on International Agricultural Research (CGIAR) centers, such as the International Institute for Tropical Agriculture (IITA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Maize and Wheat Improvement Center (CIMMYT), and the Africa Rice Center.

⁸ In some cases, the same breeder may work on multiple crops, so the total number of breeders may not equal the sum of breeders by crop.

Table 6: Number and adequacy of active breeders in Mali

Crop	2018	2021			Satisfaction with adequacy of breeders (out of 100%)	
		Public	Private	Total	2018	2021
 Maize	3	2	1	3	68	65
 Rice	3	6	1	7	78	53
 Sorghum	2	6	1	7	72	70
 Cowpea	1	1	1	2	75	48
Total	9	15	1	16		

extremely poor
poor
fair
good
excellent

The number of breeders in Mali increased from 9 in 2018 to 16 in 2021. The 2021 data includes one private breeder; there were no private breeders prior to that year. As Table 6 shows, the increase is due to more breeders working on rice, sorghum, and cowpea. The four new rice breeders work in two different programs: the irrigated rice breeding program and the rainfed rice breeding program.

The increase in the number of rice breeders in Mali indicates that the country is committed to its role as the host of the National Center of Specialization (NCOS) for rice in the ECOWAS community. The rice NCOS is one of seven centers established by the Western African Agriculture Productivity Program (WAAPP) within the ECOWAS region to facilitate regional integration (WAAPP 2015). Under the program, Mali is expected to lead rice technology development and to supply those technologies to other countries in the ECOWAS region.



The increase in the number of rice breeders also reflects that rice is important for food security in Mali, and that the country has a diverse set of existing rice production systems: rainfed and irrigated. The rainfed rice system further includes the rainfed upland, rainfed lowland, traditional flooding, and controlled flooding subsystems. Each subsystem demands varieties with adapted features. Ideally, each subsystem should have at least one dedicated breeder; however, at present three rice breeders focus on the two rainfed sub-systems, and no breeder works on varieties for the flooding subsystem, even though this occupies 45% of the country's rice-producing area (DNA, 2020). Three breeders work on irrigated rice system.

There are ongoing initiatives with the CGIAR centers to supply new varieties directly to private companies for their own release and use. Moreover, multinational seed companies work with several local seed companies to test and register new improved varieties for hybrid rice, maize Open Pollinated Varieties (OPVs) and hybrids, and sorghum.

TASAI surveys ask seed companies to rate the adequacy of breeders for the four focus crops: in 2021, maize and sorghum were rated “good” at 65% and 70%, respectively. The adequacy of plant breeders for rice and cowpea was rated “fair” at 53% and 48%, respectively. Compared the 2018, the ratings for all crops declined in 2021. The largest drop was for rice and cowpea. The drop in the rating for rice can be attributed to the breeders being stretched across the different rice systems and sub-systems. In addition, cowpea and rice breeding programs are located far from the seed companies and this could explain the low rating.

VARIETIES RELEASED IN THE LAST THREE YEARS

The number of varieties released is a good measure of the variety development and release system. The greater the number of varieties released in a country, the higher the chances of enhancing smallholders' access to improved seed. In addition to higher yields, new varieties often carry desired traits such as climate smartness, disease/pest resistance, and nutrition enhancements.

Since 1987, Mali has maintained a national seed catalogue called the *Catalogue Officiel des Espèces et Variétés Végétales du Mali*. The document provides the list of varieties released in the country that are eligible for seed production and marketing. Since its first edition, the catalogue has been updated five times, with the most recent update in 2020. In addition, varieties released in Mali are also registered in the ECOWAS Catalogue of Plants and Species. The ECOWAS Catalogue was last updated in June 2021 (INSAH/CILSS and CORAF 2021). The 2021 edition of the national catalogue contains the varieties released up to 2021.

Figure 1 shows the trend of variety releases from 2002 to 2020. Looking at the actual variety releases during the three-year period of 2018-2020, a total of 37 varieties were released: 23 maize varieties, 4 rice varieties, and 10 sorghum varieties. In 2018, a total of 18 varieties were released: 14 maize varieties and 4 sorghum varieties. In 2019, only 4 rice varieties were released, while in 2020 a total of 15 varieties were released: 9 maize varieties and 6 sorghum varieties. No cowpea variety was released during the 3-year period. The significant drop in the number of varieties released is correlated with funding constraints in breeding activities. Note that data from 2018 and 2020 were obtained from the 2021 ECOWAS catalogue. Whenever differences were found between the figures in previous versions of the regional catalogue, the figures from the 2021 updated version were used.

In their interviews, breeders noted that the irregular publication schedule of the national variety catalogue is demotivating, because new varieties the breeders have devoted significant resources to developing may only be published years later. This frustration is somewhat tempered by the fact that released varieties are regularly added to the ECOWAS Catalogue of Plant Species, while the national catalogue is not updated regularly. Adding varieties to the ECOWAS Catalogue allows for the varieties to be commercialized regionally.

VARIETIES WITH SPECIAL FEATURES

In addition to increased productivity, varieties may have special characteristics. Examples include climate-smart, fast-cooking, nutrition-enhanced, or industry-demanded features. While acknowledging the increase in biotic stresses (pests, weeds, and diseases) due to climate change, TASAI studies narrowly define “climate-smart features” as those that respond to extreme weather events (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. All 37 varieties released between 2018 and 2020 had at least one special feature, as indicated in Table 7. Among the 23 maize varieties released between 2018 and 2020, 14 are drought tolerant and 12 are early maturing, with 50% maturity being reached within 90 days. In addition, 19 maize varieties are yellow. These are useful for the poultry industry because of their high carotenoid content. Other special attributes are related to grain color, such as white long-grain rice or white sorghum grain, which are desired by the processing industry.

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

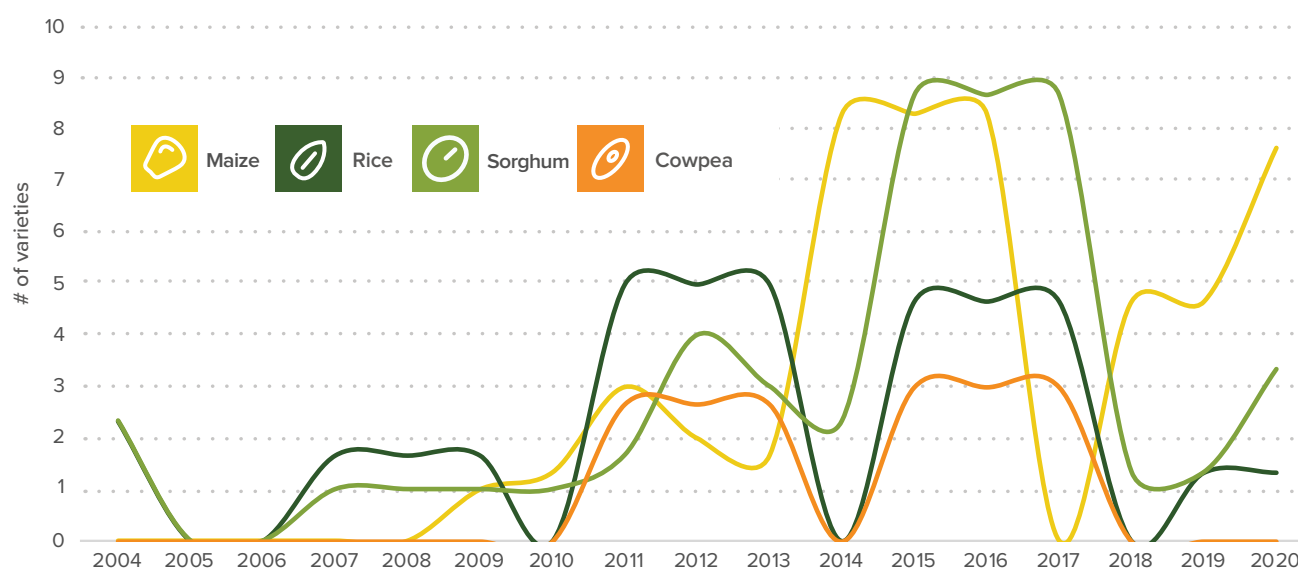


Table 7: Number of varieties released with special features

Feature	Description of feature	Number of varieties released 2018-2020				
		Maize	Rice	Sorghum	Cowpea	TOTAL
All varieties released		23	4	10	0	37
All varieties released with special features		23	4	10	0	37*
Climate-smart features	All climate-smart features	23	0	1	0	23
	Drought tolerant	14	0	0	0	14
	Early / extra-early maturing	12	0	1	0	13
Fast cooking and nutrition-enhanced features	All fast cooking and nutrition-enhanced features	19	0	0	0	19
	Fast cooking	0	0	0	0	0
	Nutrition-enhanced features	19	0	0	0	19
Industry-demanded features	All industry-demanded features	19	4	8	0	19
	Grain color	19	4	8	0	31

* The total number of special features exceeds the number of varieties with special features, as the same variety may have multiple special features.



NUMBER OF VARIETIES SOLD IN 2020

An increase in the number of varieties sold in a country often results in an increased set of variety options that are available to farmers. In 2020, seed producers sold a total of 63 varieties of the four focus crops: 16 maize varieties, 16 rice varieties, 17 sorghum varieties and 14 cowpea varieties.

Table 8 lists the most commonly sold varieties for each of the focus crops. The most commonly sold maize varieties are Sotubaka, Brico, and Dembanyuman. For rice, they are Adny11, Gambiaka suruni, NERICA 8, and NERICA L2. For sorghum, the most commonly sold varieties are CSM63 E, Séguifa and four hybrid varieties (Fadda, Pablo, Sewa, and Grinkan Yerewolo). For cowpea, they are Korobalen, Wilibali, and Dounanfana.

Table 8: Name and age of commonly sold varieties

Crop	Number of varieties sold in 2020	Names of commonly sold varieties	% of producers selling the variety	Age of variety (years) in 2020
 Maize	16	Sotubaka (OPV)	71%	25
		Brico (OPV)	51%	9
		Dembanyuman (OPV)	46%	22
		Adny11	54%	33
 Rice	16	Gambiaka suruni	35%	33
		NERICA 8	27%	18
		NERICA L2	27%	13
		Jakunbe (OPV)	62%	33
 Sorghum	17	Séguifa (OPV)	19%	27
		Hybrid varieties (Fadda, Pablo, Grinkan Yerewolo, and Sewa)	43%	8-10
		Korobalen	77%	22
		Wilibali	54%	9
 Cowpea	14	Dounanfana	38%	22

AVERAGE AGE OF VARIETIES SOLD

In vibrant seed systems, farmers regularly replace old varieties with new ones. In many African countries, old varieties persist, despite the fact that newer varieties often outperform older varieties in terms of traits that respond to the demands of farmers, consumers, and industry. A lower average age of varieties signals higher rates of variety turnover and innovation. TASAI tracks the average age of varieties by crop. The data is presented above in Table 8. Varieties sold by seed producers in Mali in 2020 were generally old, with ages ranging from 8 to 33 years. Hybrid sorghum varieties, aged between 8 and 10 years old, were the youngest varieties sold among the four focus crops. TASAI could not obtain volumes of seed sold by varieties to calculate the weighted average. This would have been a more accurate representation of the average age.

SOURCES AND AVAILABILITY OF FOUNDATION (BASIC) SEED

Seed companies use basic seed to produce certified seed for sale to farmers. In many African countries, limited access to foundation seed from public research institutions often limits the ability of seed companies to scale up production. In Mali, the general process to obtain basic seed starts with the seed producer sending a request for basic seed, specifying the crop, variety, and quantity, to a research institution that produces or supplies the particular type of basic seed. The research institution invoices the seed producer for the basic seed, and upon payment, the producer receives the seed.



Sources of basic seed: Table 9 shows the sources of basic seed for the four crops and the number of seed producers sourcing basic seed from each source. The IER was the main source of basic seed for all crops accounting for 86% of all maize transactions, 90% of rice transactions, 88% of sorghum transactions, and 77% of cowpea transactions. The CGIAR institutions (IITA, ICRISAT, and Africa Rice) were minor suppliers of basic seed and worked closely with the IER in the production of early generation seed. Finally, a small

number of seed producers sourced basic seed from other seed companies and NGOs like Sasakawa Africa Association. Individual seed producers access basic seed directly from cooperatives. Although the main producers of basic seed are the national and international research institutions, in some cases, NGOs support individual seed producers, cooperatives, and private seed companies to produce basic seed. The basic seed produced in such cases is recorded at the LABOSEM under the name of the supporting NGO.

Table 9: Source of basic seed by crop, number of transactions, and percentage of total transactions (2020)

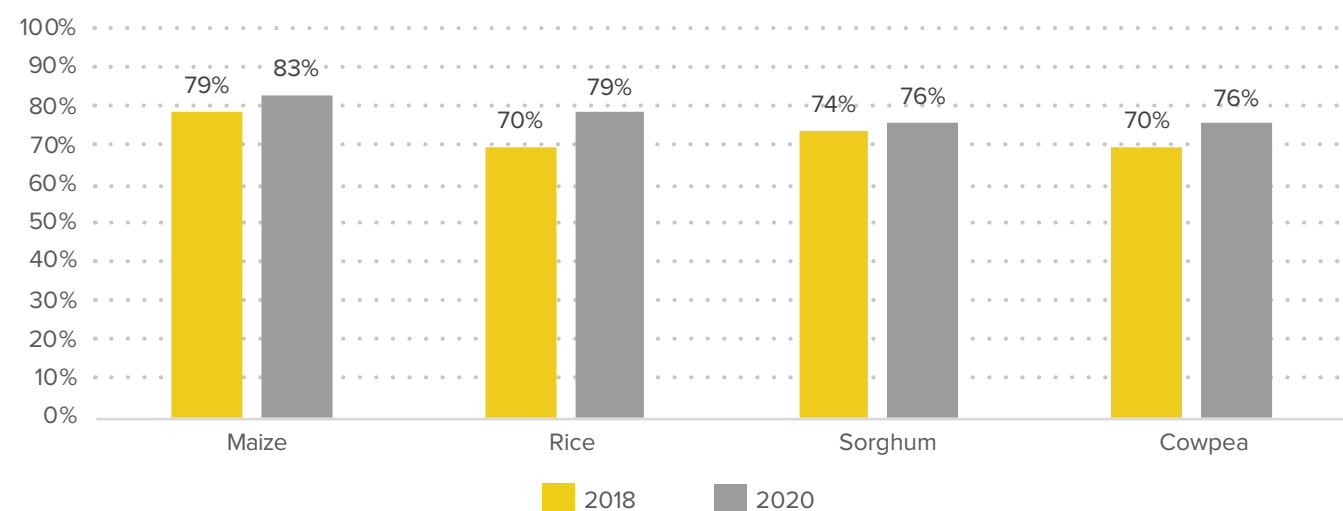
Source	Maize		Rice		Sorghum		Cowpea	
	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total	Number of transactions	% of total
IER	38	86%	26	90%	21	88%	10	77%
IITA	2	5%	-	-	-	-	-	-
ICRISAT	-	-	-	-	2	8%	-	-
Africa Rice	-	-	2	7%	-	-	-	-
Other	4	9%	1	3%	1	4%	3	23%
Totals	36	100%	24	100%	8	100%	18	100%

Seed producers' assessment of the availability of basic seed: The TASAI study assessed seed producers' satisfaction ratings with the supply of basic seed based on three criteria: (1) whether producers received the quantity of seed requested (quantity); (2) whether the seed received was of the expected quality (quality), and (3) whether they received the seed on time (timeliness). It is important to note that these ratings only concern seed supplies from the IER, as other sources of seed were reported in fewer than five transactions each and including them might compromise the anonymity of the seed producers rating these services.

Overall, seed producers were satisfied with all three aspects of the supply of basic seed from the IER, rating quantity at 80%, quality at 84%, and timeliness at 76%.

Further, the study tracks the overall satisfaction rating for the availability of basic seed by crop, which is calculated for all sources of basis seed. The 2021 results were: "excellent" for maize (83%), and "good" for rice (79%), sorghum (76%), and cowpea (76%). These ratings are a modest improvement from the 2018 ratings (Figure 2).

Figure 2: Overall satisfaction ratings for the availability of basic seed



INDUSTRY COMPETITIVENESS

NUMBER OF ACTIVE SEED PRODUCERS

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

Table 10 breaks down the number of seed producers by crop in 2018 and 2020. The number includes seed companies, individual producers, and seed cooperatives. In both years, rice seed had the highest number of seed producers among the four crops. The number of maize seed producers and cowpea seed producers increased during this period, while the number of rice and sorghum seed producers decreased. The reason for the decline in rice seed is the close-out of the WAAPP in 2018, which was a key buyer of seed.

Table 10: Breakdown of active seed producers as registered at LABOSEM

Crop	Number of active seed producers ⁹				
	Total (2018)	2020			
		Seed Companies	Individual Producers	Seed cooperatives	Total
 Maize	44	10	8	30	48
 Rice	83	8	19	47	74
 Sorghum	52	8	6	31	45
 Cowpea	33	9	9	25	43

⁹ Some seed producers produce seed for more than crop.



GENDER IN MANAGEMENT OF SEED BUSINESSES

TASAI also tracks the number of women in management and ownership positions in seed companies. This indicator is only tracked among seed companies where ownership may be attributed to a single person in the 13 seed companies surveyed for this study.¹⁰ The data shows that women's involvement in the management of seed companies in Mali is low. Of the 13 companies, 3 companies were owned by women, 2 companies had a woman top manager such as managing director, country manager/director or chief executive officer and one company indicated that its management consisted of at least 50% women (Table 11). The 13 companies employed a total of 182 staff members in top management, of which only 47 (26%) were women.

Figure 3 shows cross-country comparisons for women's participation in Africa's seed industry in 8 countries where TASAI has conducted research in the last two years. Mali ranks second when it comes to the percentage of companies where the top manager is a woman, and it is fourth when it comes to women's participation in seed company management.

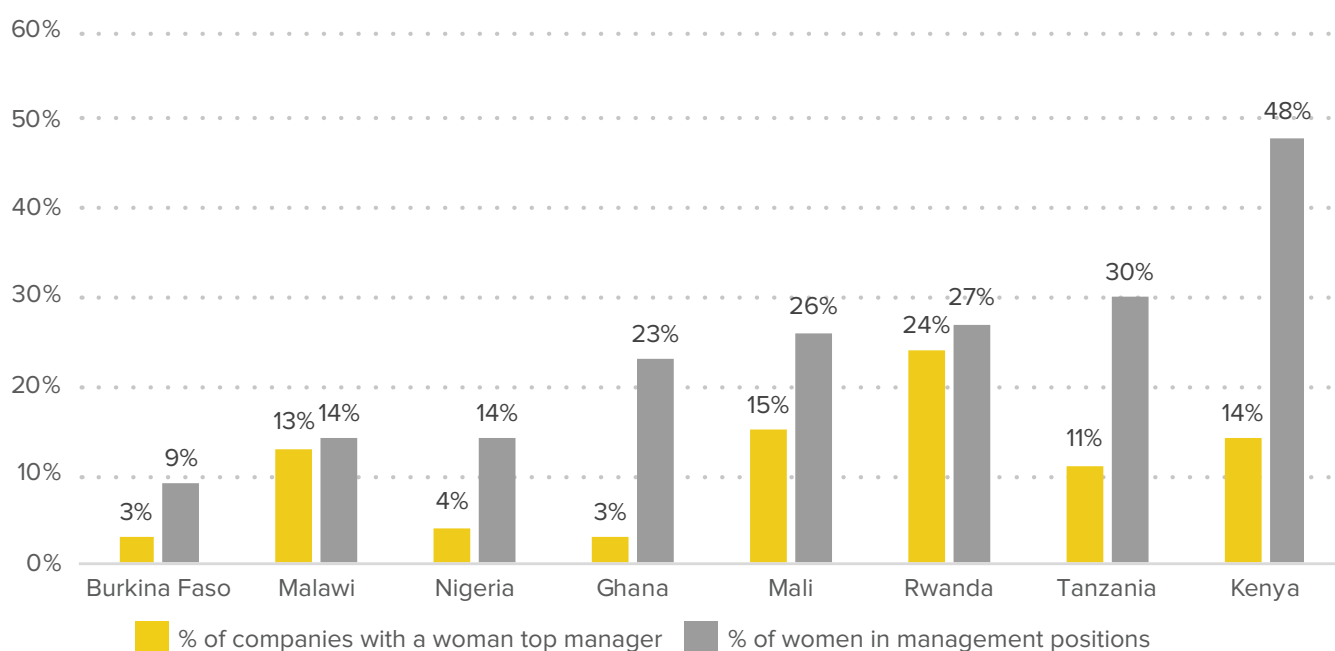
¹⁰ This measurement only applies to companies for which ownership can be attributed to a single person. The number excludes government-owned companies, multinationals, some family-owned businesses and the like, which have multiple shareholders.

Table 11: Gender in management in seed businesses¹¹ (2020)

Gender indicator	Number	Percentage (%)
Number of seed companies with a woman owner (n=13)	3	23%
Number of seed companies with a woman top manager (n=13)	2	15%
Number of seed companies where management consists of at least 50% women (n=13)	1	8%
Number of women in top management (n =182)	47	26%

¹¹ TASAI first collected data for this indicator in 2020; in Mali, it was first collected in the 2021 study. As such there is no comparison with earlier data.

Figure 3: Comparison of women in seed management in countries studied by TASAI



PRODUCTION AND SALE OF CERTIFIED SEED

To measure the overall size of a country's seed sector, TASAI tracks the volumes of certified 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 12 shows data for certified seed production and sales by crop comparing data sourced from the government with data from TASAI. In 2020, the seed producers surveyed produced 1,651 MT of maize seed, 1,207 MT of rice seed, 422 MT of sorghum seed, and 272 MT of cowpea seed. The

aggregate seed production reported by TASAI for maize, sorghum, and cowpea was slightly higher than the seed production recorded by LABOSEM. A possible reason for this difference is that seed companies may have included imports as part of their seed production data provided to TASAI. LABOSEM data focuses on seed produced and certified in the country. On the other hand, TASAI survey data on rice seed produced (1,207 MT) is significantly lower than the LABOSEM data (3,207 MT). According to LABOSEM, areas where rice is grown were unreachable due to security concerns and data from seed producers cannot be verified. For maize, rice, and cowpea, there was a steady increase in the volume of seed produced over the period 2019/20 and 2020/21. However, for sorghum seed, production slightly decreased over this period.

Table 12: Seed production

Crop	Seed production (government data) in MT		Seed production (TASAI data) in MT	Seed sales (TASAI data) in MT
	2019/20	2020/21	2020	2020
 Maize	1,253	1,382	1,651	1,102
 Rice	3,137	3,207	1,207	1,262
 Sorghum	398	360	422	290
 Cowpea	165	244	272	278

MARKET SHARE OF TOP SEED COMPANIES

Competition among seed companies benefits farmers through lower prices, wider sets of choices, increased innovation, and better customer service. To assess the level of industry market concentration, TASAI uses seed sales data for each crop, as reported by seed companies. To calculate the market share of the four largest firms, TASAI calculates a measure known as the four-firm concentration ratio (CR4), as well as a measure known as the Herfindahl-Hirschman Index (HHI).¹²

Table 13 shows that for the four focus crops, the market share of the top four seed producers ranged between 74% for maize and 89% for cowpea. The HHI scores were "moderate" for maize (2,386) and rice (2,954), but "high" for sorghum (3,689) and "extremely high" for cowpea (4,473). The market shares and HHI scores indicate that the sorghum and cowpea seed markets are not competitive and are dominated by a few seed producers. For these crops, the intermediary and informal seed systems are more dominant. However, the maize seed market is competitive. Although the top four rice seed producers make up 88% of the market, there are many players who contribute small percentages, leading to a "moderate" HHI score.

¹² See below Table 13



Table 13: Market shares and market concentration (2020)

Crop	Market share of top four seed producers (out of 100%)	HHI scores
	2020	2020
 Maize	74%	2,386
 Rice	88%	2,954
 Sorghum	81%	3,689
 Cowpea	89%	4,473

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 **average**, 3,000-3,999 is **high**, and greater than 4,000 is **extremely high**, i.e., monopoly or near monopoly.

MARKET SHARE OF GOVERNMENT PARASTATAL

In some countries, public entities are still active players in the marketing and sale of certified seed. Public seed companies can play a critical role in meeting farmer demand for varieties that private seed companies deem less profitable. In addition to seed production, public companies may support other national objectives, such as university training and research. However, state-owned companies may benefit from preferential treatment, less stringent enforcement of regulations, access to competitor information, and indirect production subsidies. Collectively, these privileges can result in unfair competition against purely private seed companies. In Mali, no government entities are involved in the production and marketing of certified seed.

SEED SALES TO DIFFERENT CATEGORIES OF BUYERS

The TASAI study tracked five different categories of seed buyers in Mali in 2020: government institutions, agro-dealers, farmers, NGOs, other buyers, and other seed companies. Figure 4 shows the breakdown of seed sales to these categories of buyers. Agro-dealers are the most important buyers of seed for all four crops, accounting for 30% of rice seed sales and more than 50% of seed sales for the other three crops. Farmers who purchase seed directly are the second most important category of buyer of seed for all four crops, accounting for 20% of cowpea, 23% of maize, 24% of rice, and 31% of sorghum seed sales. NGOs are also important buyers of rice seed, accounting for between 7-23% of sales, depending on the crop. Government institutions represent a small category of buyers, accounting for between 4-10% of

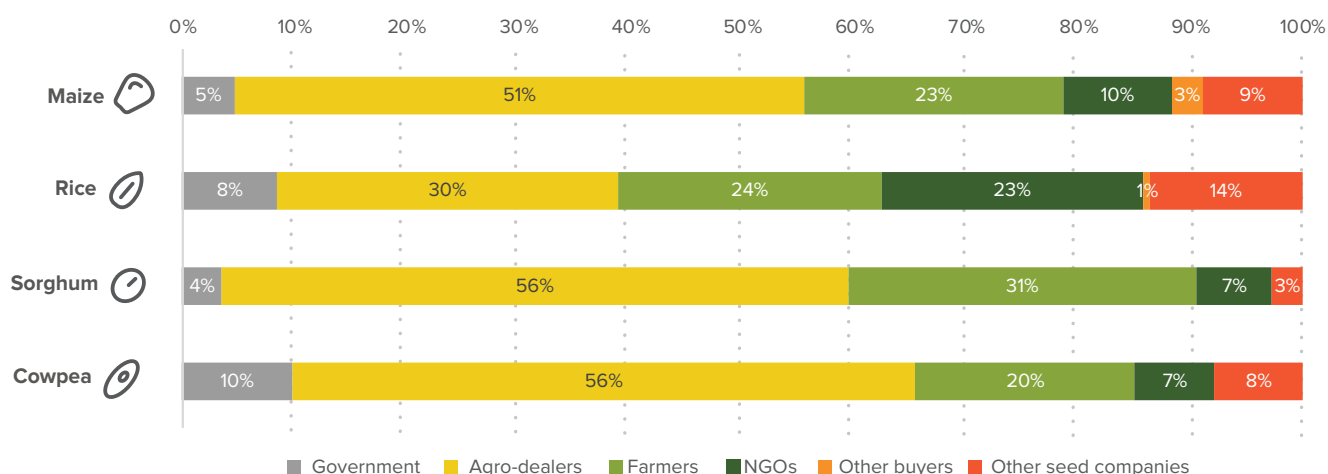
seed sales. Other seed companies and “other” buyers, both of whom purchase small amounts. All 16 seed companies sell certified seed through agro-dealers and directly to other entities. Most seed producers are individual seed producers, who produce low volumes and sell directly to farmers and cooperatives, who sell to their members.

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 DNA is the regulatory body for seed import and export in Mali. In order to import or export, an entity must be registered as a formal seed business with the DNA for at least three years and must obtain an import or export permit. The latter certifies that the seed to be imported or exported meets the phytosanitary requirements as stipulated by the seed regulations of the importing or exporting country. The process begins with the submission of the request for an import or export permit, which specifies the crop, variety, seed class, and country of origin or destination. In the case of imports, a document outlining the minimum standards for the imported seed is also appended to the import permit. The process ends when the seed is cleared at the border.

Table 14 provides data on the import and export processes in 2018 and 2020. In 2020, a total of 2 seed companies imported 46 MT of seed, a significant decrease from the 174 MT imported by a total of 7 companies in 2018. Breaking down the figures for 2020, one seed company imported 40 MT of maize seed from Senegal, and 5 MT of rice seed from Senegal. The other company imported 1 MT of rice seed from Cote d'Ivoire (1 MT). In contrast, in 2018, most of the seed imported was maize seed. According to seed companies, the decrease from 2018 to 2020 corresponds to an increase in local maize seed production.

Figure 4: Seed sales by category of buyers (2020)



Seed companies reported that the average length of the seed import process was 91 days in 2020, a five-fold increase from the 18 days reported in 2018. The COVID-19 pandemic and the resultant travel restrictions imposed by governments explain this sudden increase. Nonetheless, importers were generally satisfied with the import process, rating it as “good” (63%), similar to the rating of 60% given in 2018. According to seed companies, the low rating in 2019 was due to the fact that it took a long time to obtain the import permit and clear the seed at the border, and that the process required numerous visits to the customs office, further increasing the length.

Only two seed companies exported seed in 2020, compared to three companies in 2018 and five companies in 2019. The volume of seed exports also dropped from 317 MT in 2019 to only 7.5 MT in 2020. Only maize seed was exported in 2020 to Sierra Leone and Guinea. The two seed companies that exported seed reported that the average duration of the export process was only 9 days. Their rating of satisfaction with the export process was “good” at 60%. A possible reason for the decrease in the duration of the export process is that the exports processes are handled by the customs authorities in the importing country and the importing company.

Tableau 14 : Processus d'import/export des semences

Indicators	2018	2019	2020		
Number of seed companies importing seed	7	8	2		
Volume of imports (in tons)	174	56	45,8		
Average length of import process (in days)	18	15	91		
Satisfaction with import process (out of 100%)	60%	41%	63%		
Number of seed companies exporting seed	3	5	2		
Volume of exports (in tons)	MD*	397	7,5		
Average length of export process (in days)	MD	19	9		
Satisfaction with export process (out of 100%)	MD	MD	60%		
	extremely poor	poor	fair	good	excellent

MD : Missing Data. This information was not collected during the studies that were conducted in 2018 and 2019.

SEED POLICY AND REGULATIONS

VARIETY RELEASE PROCESS

Plant variety release is the process during which new varieties undergo various tests, Value for Agronomic and Technological and Environmental Traits (VATE). This test is equivalent to Value for Cultivation and Use (VCU), and it includes yield, adaptability, and other traits. The other test is Distinctness, Uniformity, and Stability (DUS). Varieties that perform satisfactorily in these tests are approved for release by the National Variety Release Committee. 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 spent in developing the variety by the breeder.

The *Comité National des Semences* (CNS) is responsible for the process of variety release and registration in the national seed catalogue. The CNS was established by decree N° 0757/P-RM in 2019 (Ministère de l'Agriculture 2020a). It is composed of 27 members and is chaired by the Minister of Agriculture or his/her representative and is supposed to meet twice a year. However, in practice, the meetings are irregular and depend on availability of funds. LABOSEM serves as the secretariat of the CNS. The variety release process is handled by the variety release committee (*Comité National d'Homologation*) directed by LABOSEM, which acts as the technical adviser to the CNS.

For a new variety to be released and then registered in the official seed catalogue, it must meet DUS and Value for Agronomic and Technological and Environmental Traits (VATE) tests. These tests are conducted over a two-year independent cycle. They are carried out by third parties (other breeders who are not from the public breeding programs) under the supervision of the CNS and are paid for by the requesting breeder.

Length of the variety release process: According to the breeders at the IER, the average length of the variety release process in 2020 was 36 months. However, according to LABOSEM it takes 24 months.



COST OF VARIETY RELEASE PROCESS

In well-functioning seed systems, the cost of releasing a variety should not be so high as to disincentivize variety releases altogether. In Mali, the cost of the variety release process is paid for by the applicant breeder and includes the following: (i) the cost of the multi-location trials over two years; (ii) the cost of transportation and accommodation for at least two-thirds (6 out of the 12 members according to the order n°2011-2219/MA-SG from June 9, 2011) of the variety release committee for the field visits to these trial sites; and (iii) the cost of a one-day meeting when the CNS makes its final decision about whether a variety should be released. As with the field visits, all members of the variety release committee must attend this meeting for the decision to be valid.

After the CNS was established in 2019, the process, requirements, and procedures of variety release became more well defined. However, CNS did not specify the costs of the different procedures. Based on information collected from breeders, the average cost of releasing a new variety in 2020 ranged from US\$ 5,405 for cowpea to US\$ 18,018 for rice. The average cost across the four crops was US\$ 14,775 (Table 15). However, according to LABOSEM the costs ranged from US\$ 2,567 for sorghum, US\$ 1,860 for cowpea to US\$ 2,698 for lowland rice, US\$ 2,541 for irrigated rice, and US\$ 1,170 for maize. LABOSEM sets the cost of certification of new varieties that are candidates for DUS and VATE testing, depending on the number of sites hosting the DUS and VATE tests and the distance between them. In all cases, the number of people for the field visits was reduced by more than half, resulting in a decrease in the cost of certification. According to LABOSEM, five people were involved in the verification field visits. The TASAI study brought out this discrepancy. LABOSEM is following it through.

According to breeders, compared to data gathered in 2018, the cost of variety release increased significantly for all four crops, almost doubling for maize, rice, and sorghum.

In comparison with other countries studied by TASAI, the average total cost for variety release in Mali is higher than in Tanzania (US\$ 1,602) and Kenya (US\$ 3,000) but is lower than the variety release process in Nigeria (US\$ 18,280) and Ghana (US\$ 41,668) (Mabaya, Ajayi, et al. 2021; Mabaya, Mburu, et al. 2021; Mabaya, Mizambwa, et al. 2021; Mabaya, Waithaka, et al. 2021).

Table 15: Average cost of the variety release process

Crop	Average cost of variety release process in US\$ ¹³	
	2018	2020
 Maize	6,140	15,315
 Rice	9,211	18,018
 Sorghum	7,895	17,117
 Cowpea	4,866	5,405
Average	7,031	14,775

¹³ Based on an exchange rate of US\$ 1 to Francs CFA (XOF) 555, which was the average rate in 2021. (<https://www.exchangerates.org.uk/USD-XOF-spot-exchange-rates-history-2021.html>)



STATUS AND IMPLEMENTATION OF NATIONAL SEED POLICY FRAMEWORK

Well-functioning formal seed systems have effective coordinating institutions that work well together, following rules and procedures stipulated in clearly defined and regularly updated legal instruments. Mali's seed regulatory framework comprises an agricultural policy law (République du Mali 2013), a national seed policy, a seed law, decrees, and by-laws guiding the seed law's implementation. A policy is a statement of intent or course of action adopted by a government to achieve long-term goals. Laws provide regulatory frameworks for policies. Regulations (decrees) provide the procedures and modalities for the implementation of laws.

Mali's national **seed policy** was adopted in 2009 (Ministère de l'Agriculture 2009) and is based on two strategic objectives: (1) develop a well-organized and well-performing seed industry and (2) incentivize breeders to develop new varieties through a law on breeders' rights. The policy was updated in 2018 (Ministère de l'Agriculture 2020b) and adopted in March 2022. It provides the framework for all actors involved in the seed value chain. It highlights the declining role of the government in production and marketing of seed and increasing roles of the private sector in driving seed sector matters.

The **seed law** of July 2010 (Loi N°10-032 of July 12th, 2010, *Relative aux Semences d'Origine Végétale*) (République du Mali, 2010a) was adopted by the National Assembly on July 1, 2010, as the main legal instrument governing Mali's seed sector. Implementation of the law is facilitated by decrees and by-laws. To date, seven **legislative texts** (three decrees and four by-laws) are aligned with the seed law. Published in Mali's official gazette in 2018 and 2019, they established the CNS, defined the criteria for seed production, outlined the scope for seed certification and the procedure for the registration of seed producers, and institutionalized the national plant variety catalogue.

In Mali, the Direction Nationale de l'Agriculture (National Directorate of Agriculture) (DNA) leads the implementation of national seed laws and regulations (decrees) across the 15 decentralized agricultural regions of Mali and the district of Bamako. A decentralized agency, the DNA operates through the *Division Législation et Contrôle Phytosanitaire* (Regulation and Phytosanitary Control Division), the seed laboratory (LABOSEM), and the SSN. The DNA and LABOSEM offices oversee field inspections by collecting and transferring seed lot samples to

LABOSEM in Bamako. In an effort to decentralize operations further, in 2019 LABOSEM opened a second laboratory station in Ségou, a key agricultural region in Mali. Mali's CNS is responsible for implementing and legislating seed sector regulations (decrees and by-laws).

In addition to the seed law and its regulations (decrees), Mali has adopted the **ECOWAS seed regulations** (C/Reg.4/05/2008), which harmonize the rules governing the quality control, certification, and marketing of seed and seedlings in the ECOWAS region (ECOWAS, 2008). The ECOWAS regulations were published in the official gazette in Mali on June 6, 2014 (Official Journal N°23) (Journal Officiel de la République du Mali, 2014). While the ECOWAS regulations contain multiple clauses, this report focuses on regulations pertaining to the regional seed catalogue, the CNS, the registration of seed producers, the National Seed Support Fund, and the decree on seed import and export procedures. Varieties released in any member state are automatically eligible for inclusion in the ECOWAS catalogue. Mali, like other ECOWAS member states, is highly dependent on the regional variety release mechanism. This ensures that Mali benefits from varieties developed and released in neighboring countries. In addition, member countries are expected to form national seed committees to oversee seed certification. Further, member states are expected to establish a national seed support fund. This fund, which is supported by the national governments, is expected to provide funding for seed sector activities, e.g., enforcement of regulations that are critical to the growth of the seed sector. In Mali, this includes building the capacity of seed producers to increase seed production and supporting the IER's basic seed production. Member countries are also expected to adopt the ECOWAS regulations on seed import and export procedures.

QUALITY AND ENFORCEMENT OF SEED REGULATIONS

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

Table 16 lists the key seed instruments that govern the operations of the seed sector in Mali. This section briefly describes the mandate of each instrument and discusses the current level of enforcement.

Table 16: Key seed instruments in Mali

Instrument	Description
1. National Seed Policy	The 2009 seed policy provides strategic guidance on the development of the seed sector. The draft that was updated in 2018 has yet to be approved.
2. Seed law	Seed law is the main legal instrument governing Mali's seed sector. Implementation of the law is facilitated by decrees and by-laws.
3. Decree N°2019-0757/P-RM	Decree that established the CNS (National Seed Committee)
4. Decree N°2019-0756/P-RM	Decree that established the Le Catalogue officiel des espèces et variétés (The Official Catalog of Species and Varieties)
5. Decree N°10 428 PRM	Decree that defines requirements for the importation and exportation of seed
6. Decree No 2018-1814	Decree that sets requirements for registration of persons wishing to produce seed
7. Arrêté N° 2018-1813	Ministerial statement that sets the costs of seed field inspection and sampling of raw seed lots and analysis seeds in the laboratory
8. Arrêté N° 2018-1810	Ministerial statement that specifies the types, quality, and size of authorized packages to be used for seed packaging
9. Règlement C/Reg.4/05/2008	Regulation to harmonize ECOWAS seed regulations

National Seed Policy has been in place since December 2009. In 2018, an update was initiated to capture the changing dynamics of the seed sector in Mali. However, the updated draft has not been finalized so it can be implemented. According to seed sector stakeholders surveyed by TASAI in 2021, the strategic goals of Mali's overarching national seed policy have yet to be achieved.

Seed Law Loi N°10-032 *Relative aux Semences d'Origine Végétale*: regulates the main components of the national seed sector, including seed quality management and variety release, intellectual property rights, formally recognized plant breeders' rights, and biodiversity (specifically agrobiodiversity) conservation and use.

Registration requirements for seed producers/companies are described in the Seed Law and the Ministerial Statement Arrêté n°2018-1814/MA-SG du 29 MAI 2018 (*Fixant les superficies minima et maxima par culture et par parcelle*). The requirements are followed by the DNA.

However, registration requirements are not strictly followed. For example, according to Article 2 of the by-law, the registration should be completed every three years. In practice, however, the registration is renewed annually upon submission of a seed production plan (*déclaration des cultures*), which producers submit to the DNA before producing seed. The process is mandatory and is done annually. In general, these procedures are well respected by all parties.

In practice, each year before May 15, or at the beginning of the agricultural season, LABOSEM sends letters to all IER programs, seed companies, seed cooperatives, and individual seed producers requesting them to send their crop declarations to LABOSEM for control purposes and statistics on area under seed. Presently, this crop declaration replaces the registration of seed producers in Mali.

Decree N°2019-0757/P-RM: Decree establishing the National Seed Committee *Comité National des Semences* (CNS) (Journal Officiel de la République du Mali 2019a). CNS is responsible for implementing seed sector regulations (decrees), in collaboration with the variety release committee (VRC) (see section on Variety Release process for detail).

Decree N°2019-0756/P-RM: Decree establishing the Official Catalog of Species and Varieties (*Le Catalogue officiel des espèces et variétés*) (Journal Officiel de la République du Mali 2019b). By decree, LABOSEM is mandated to update the digital catalogue each year; however, the catalogue is printed frequently depending on availability of financial resources. The last three updates were completed in 2011, 2013 and 2020. LABOSEM announces the publication of new editions. In 2020, the cost of the catalogue was US\$ 45.

Decree N°10 428 PRM: Decree to guide the import and export of seed (République du Mali 2010). It outlines the requirements for the importation and exportation of seed, which were described in detail in the section "Seed Import and Export Process." The procedures are also in line with



Chapter 23 of the ECOWAS seed regulations (ECOWAS 2008). According to the DNA, the government entity in charge, the import/export procedures are strictly applied to all importing and exporting companies by the Regulation and Phytosanitary Control Division.

Arrêté N° 2018-1813: Ministerial statement to regulate the cost of seed quality control and seed certification (Journal Officiel de la République du Mali 2018a). Through Act N° 2018-1813 the DNA set the costs of seed field inspection and seed sampling and analysis of raw seed lots in the laboratory. The same act also specifies the costs of printing the two labels that are required per seed package at 80 FCFA per unit. The costs are paid by the seed producer. Generally, these procedures are well implemented.

Arrêté N° 2018-1810: Ministerial statement to regulate seed packaging (Journal Officiel de la République du Mali 2018b) sets out the types, quality, and size of authorized packages to be used for seed packaging. It also specifies requirements for seed labeling. These regulations are being implemented.

Règlement C/Reg.4/05/2008: Regulation that governs the harmonization with ECOWAS regulations. The TASAI studies assesses progress on four pre-requisites that are of particular relevance to the seed sector. One of these is the establishment of the National Seed Committee, which has been established and is functioning fairly well in Mali. Through its certification commission led by LABOSEM, the CNS oversees the process of variety release and registration in the national and regional seed catalogue. Another pre-requisite to harmonization, the registration of all seed producers in the country, is also well implemented by the DNA through LABOSEM. As mentioned above, the decree on seed import and export procedures has been approved and is being implemented. One prerequisite not yet in place is the National Fund to support the seed sector.

When it comes to implementing the above policy instruments, the key challenges faced by DNA is a lack of sufficient financial and human resources. Despite the challenges, the seed producers surveyed were generally satisfied with the level of enforcement of seed regulations in Mali, rating it “good” at 72%.

EFFORTS TO ERADICATE COUNTERFEIT SEED

Counterfeit seed (also known as fake seed) threatens the seed sector in two important ways. First, seeds of inferior quality that are falsely labeled as certified seed may cause farmers to lose confidence in certified seed and opt for informal sources that they know. Second, it threatens the success of efforts to increase the adoption of improved varieties, because farmers are not sure which seed is genuine. In many instances the incidences of counterfeit seed are associated with institutional and NGO markets which are predominant in immature sectors. TASAI tracks the number of cases of counterfeit seed reported by seed companies and the government in each data collection year and asks seed companies to report their level of satisfaction with government efforts to eliminate counterfeit seed.

Mali’s Seed Law N° 10-032 (République du Mali, 2010) stipulates that only certified seed may be multiplied and marketed in the country. Further, for a seed to be produced in Mali, its variety must be registered in the *Catalogue Officiel des Espèces et Variétés Végétales du Mali*, (National Seed Catalogue of Plant Varieties of Mali), and the seed must pass through a quality control process overseen by a certified seed inspector. If one or more of these requirements is not followed, the seed is legally considered counterfeit. Violation of the law is punishable by a fine ranging from 20,000-1,000,000 XOF (equivalent to USD 36-1,802¹⁴) or a prison term of 2-3 months.

The TASAI survey collects information on the number of cases of counterfeit seeds by asking both seed producers and the relevant government agencies about the number of reported cases. In the case of Mali, the data reported comes from seed producers only, as government does not yet have a clear system for tracking, recording, and reporting cases of counterfeit seed. For their part, seed producers reported a total of 55 cases of counterfeit seed in 2020, an increase from the 45 cases reported in 2018 (Table 17). While the number of cases has increased, seed companies’ level of satisfaction with government efforts to address the problems have decreased slightly since 2018.

14 Amounts based on the average exchange rate of US\$ 1 to Francs CFA (XOF) 555, the average rate for 2021. (<https://www.exchangerates.org.uk/USD-XOF-spot-exchange-rates-history-2021.html>)



Table 17: Cases of counterfeit seed and industry satisfaction with government efforts to address the issue

Indicators	2018	2020
Number of cases of counterfeit seed (seed companies)	45	55
Number of cases of counterfeit seed (government)	MD	MD
Seed industry satisfaction with government efforts to address counterfeit seed (out of 100%)	50%	46%

extremely poor poor fair good excellent

The DNA, through its Division of Legislation and Phytosanitary Control (DLCP) is in charge of tracking counterfeit seeds, does not data on the number of cases. However, the government is aware of the problem and has implemented the following measures to improve seed testing and analysis and to reduce the incidence of counterfeit seeds:

- Opening of second regional seed laboratory in Ségou: the added capacity for testing and analysis should allow the government to catch more cases of counterfeit seeds.
- Training young farmers to produce quality seed that meets the certification requirements. This is a project funded by the Food and Agriculture Organization (FAO). The training is intended to increase the technical capacity in various seed processes.
- Deploying five mobile seed processing and conditioning units funded through the WAAPP program in 2018. This was followed by training for the beneficiaries of the mobile seed processing and conditioning units, supported by the Center for Green Innovation (CGI / GIZ) at the SSN in Ségou from February 20 to 25, 2019. These units ensure that seed is processed immediately after harvest. The units also reduce the failure of farmers' seed to pass the certification process and hence reduce the quantity of uncertified seed that may otherwise be classified as counterfeit seed.
- DNA issuing the exact number of ECOWAS seed tags for seed that successfully passed the certification process. This ensures that there will be no leftover certified seed tags, which could be used to label counterfeit seed.
- The mandatory labeling of seed bags by seed inspectors instead of the previous case where this was done by the seed producers themselves and the use of ECOWAS seed tags ensure that the labels are only used for genuine seed lots.
- Deploying authorized seed inspectors to check the authenticity of the certificates of analysis and labels of seed purchased under government subsidy programs. This takes place at the site of seed delivery in the presence of the supplier.

In addition to these measures, Articles 28 to 34 of the National Seed Law outline the penalties for offenders. The penalties include the confiscation of the counterfeit seed, followed by its destruction or sale as grain (if appropriate), as well as a fine of 20,000 XOF to one million XOF, paid to the public treasury, or imprisonment of 2 to 3 months.





USE OF GOVERNMENT SUBSIDIES

Seed subsidies are intended as a short or medium-term measure to encourage farmers to adopt quality seed of improved crop varieties. The design and execution of subsidy programs (in terms of the scale, targeting, distribution arrangements, and payment systems) may contribute to the development of the seed market in positive ways. It may foster private sector value chain development and provide incentives for humanitarian seed aid or it may create unsustainable business models in the seed sector.

Since 2008, the Ministry of Agriculture has implemented a seed subsidy program focused on hybrid maize seed and fertilizers, the *Programme national de subvention des intrants agricoles: engrais et semence de maïs hybride*. The program has the following steps:

- State extension agents identify beneficiary farmers at the village level. This information is sent to the chief of the agricultural sector who aggregates the quantities of the total inputs needed in the following season for the DNA and selects input suppliers following a procurement process at the DNA.
- State extension agents appoint local delivery and reception committees nominated by the local authorities. The commission is composed of farmers, agricultural sector agents, and representatives of the local agricultural chamber. The latter is the chief of the committee.
- State extension agents submit applications by suppliers at the DNA.
- The Ministry of Agriculture (DNA and the Regional Directorates of Agriculture (DRAs)) evaluate the applications for technical and financial viability.
- Input suppliers deliver seed to the local reception committee upon receipt of delivery authorization by the Ministry of Agriculture.
- The local committee checks the content of the delivery truck and the chief of the committee signs the delivery voucher
- The chief of the agricultural sector informs farmers by radio asking them to pick the inputs according to the list of beneficiaries of each village.
- The Ministry of Finances processes payments of the suppliers.

In 2020, the total value of the subsidy program was 15.6 billion Francs CFA, equivalent to US\$ 27.1 million¹⁵. Of this amount, US\$ 175,439, or 1% of the overall budget, was allocated to subsidies for hybrid maize seed. The government subsidizes maize hybrid seed at a rate of 50% of the seed cost to farmers. However, only 5% of the seed producers interviewed stated that they had participated in the hybrid maize subsidy program. The lack of information about the program explained these low levels of participation. In addition, seed producers were not involved in the key aspects of the program such as selection of seed to be distributed to farmers.

A narrow majority of the surveyed seed producers (54%) felt that the seed subsidy program had a net positive impact on the seed industry in the country. However, on average, the interviewed seed producers did not have a favorable opinion on the implementation of the program, as indicated in Table 18. Their overall satisfaction levels with the three aspects of the subsidy program measured by TASAI were “fair”: openness and transparency of the seed procurement process was rated at 41%, predictability of the seed procurement process was rated at 47%, and the efficiency of payment was rated at 45%. In addition, seed producers highlighted that one of the shortcomings of the subsidy program was that it focuses on seed that is available on the market, which may not correspond to what the farmers need.

Table 18: Opinion of the implementation of the seed subsidy program (2020)

Aspect du programme de subvention gouvernemental	Opinion (out of 100%)
Openness and transparency of the seed procurement process	41%
Predictability of the seed procurement process	47%
Efficiency of payments	45%
extremely poor poor fair good excellent	

¹⁵ Based on average exchange rate in 2020, of USD 1 to CFA 575. <https://www.exchangerates.org.uk/USD-XOF-spot-exchange-rates-history-2020.html>

INSTITUTIONAL SUPPORT

QUALITY OF THE NATIONAL SEED TRADE ASSOCIATION

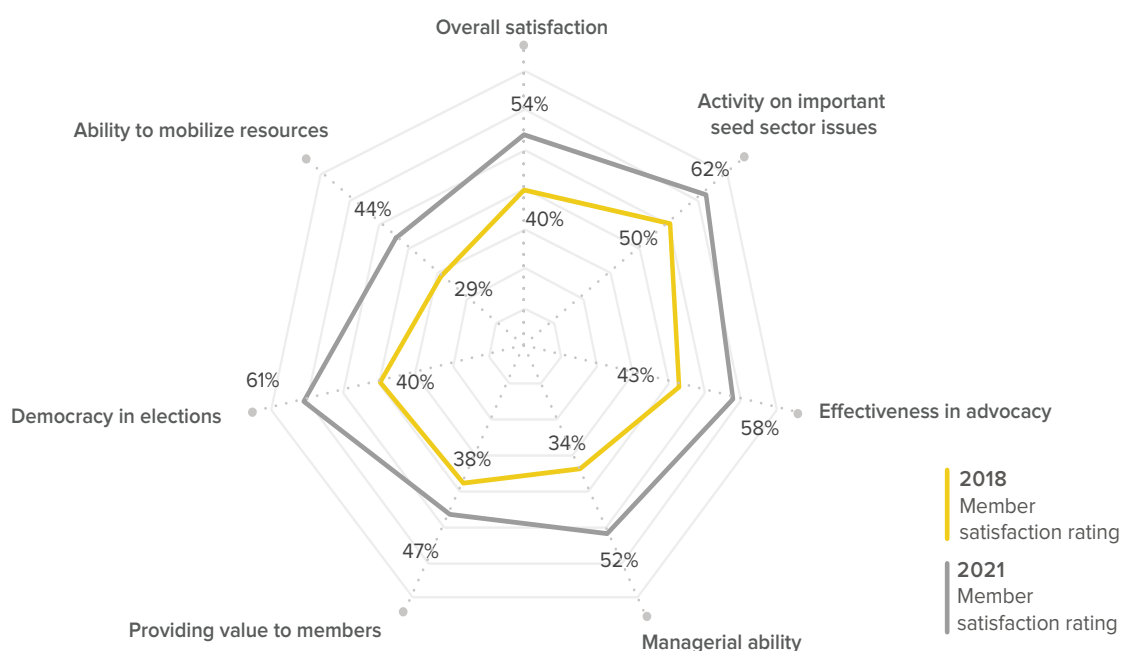
Well-functioning national seed trade associations play a key role in representing the interests of the industry and engaging with the government. The membership of the national seed associations includes seed companies, seed growers, seed cooperatives, seed associations, individual seed producers and, at times, agro-dealers.

The ASSEMA was founded in 2002 to promote the development of the Malian seed industry. The ASSEMA is a member of the African Seed Trade Association (AFSTA) and currently serves on its board of directors. The ASSEMA is governed by a management committee of 15 members, elected for a two-year period, which may be renewed once. The secretariat has one permanent secretary and one part-time employee. In 2021, it had more than 70 members: 25 seed companies, agro-dealers and a few cooperatives. Note that membership requirements favor seed companies over seed producers, hence the lack of seed producers among members. The growth in membership is partly due to the financial support that the ASSEMA received in 2017 under the West Africa Seed Program, implemented through the West and Central African Council for Agricultural Research and Development (CORAF/WE CARD).

Despite the recent growth, only 19% of the 74 surveyed seed producers (seed companies, individual producers and cooperatives) were members of the ASSEMA. The TASAI survey assessed these members' perceptions about the ASSEMA. The overall rating assigned to the ASSEMA was "fair" at 54%. Members' satisfaction ratings were highest for "activities on important seed sector issues" (62%) and "democracy in elections" (61%). The area with the lowest rating was the ASSEMA's ability to mobilize resources (44%).

Figure 5 also compares the 2021 satisfaction ratings with those measured in 2018, the last time TASAI conducted a study in Mali. The ratings increased across the board, with the biggest increase observed in the area of "democracy in elections". This is due to the fact that the management committee of the association held elections in 2020. In addition to surveying members, the TASAI survey also asked non-members about the reasons for not joining the ASSEMA. As was the case in 2018, the most common reason was a lack of awareness of the existence of the association. Also, as mentioned earlier, membership requirements favor seed companies, which means that a significant portion of TASAI respondents are not eligible to join the ASSEMA in the first place. The result is that ASSEMA only captures a limited part of the seed sector.

Figure 5: Members' satisfaction ratings for the ASSEMA





ADEQUACY OF SEED INSPECTORS

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

All seed inspectors in Mali work in the public sector under the DNA's *Division Legislation et Contrôle Phytosanitaire* (DLCP) (division in charge of seed regulation and phytosanitary control). The DLCP has 172 inspectors, of whom 146 are actively involved in field inspections and seed quality control in the laboratories and 26 are located at the different border points of entry and exit. However, they are not involved in field seed inspection and seed quality control¹⁶. Of the 146 field inspectors, 10 are based at the LABOSEM headquarters in Bamako, while the rest are distributed across the 15 Regional Directorates of Agriculture (RDAs). Of the 146 seed inspectors, 32 (22%) are women and 114 (78%) are men.

The field inspectors use smartphones, tablets, laptops, and desktops for field inspections and the analysis of seed samples. The use of smartphones in seed inspection and quality control was facilitated by Sasakawa Africa Association (SAA) through its e-extension pilot project. As part of this project, in November 2020, the SAA trained 72 extension agents and seed inspectors from the 15 regional directorates of agriculture on the use of digital tools in seed field inspections. As part of the initiative, 50 of the 72 participating seed inspectors received smartphones to aid their work.

16 They inspect all plant/animal materials and seed entering or exiting the country to verify compliance with the import and export requirements.

Seed producers interviewed were satisfied with the availability of inspectors both at the border and in the field, rating their services a “good” at 76%. This is a modest increase from the rating of 70% in 2018 (Table 19). Despite the relatively high satisfaction ratings by producers, seed companies interviewed felt that Mali does not have enough seed inspectors to carry out the required number of field inspections. This is due to several factors, including the short duration of the rainy season and cropping cycle, which requires the deployment of the inspectors across multiple locations at the same time; a lack of sufficient transportation to allow seed inspectors to visit all seed fields, which are distributed over different regions of the country, and the security risk present in some parts of Mali. Despite these challenges, the inspectors conduct at least one visit per field and some fields are not visited at all.

Table 19: Number and rating of seed inspectors

Indicators	2018	2021
Number of public seed inspectors	60	146
Number of private seed inspectors	0	0
Seed industry satisfaction with public inspectors (out of 100%)	70%	76%
Interpretation of the rating	Good	Good



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.

In Mali, the DNA oversees the provision of agricultural extension services, as well as its coordination, policy design, and monitoring across the country. Other actors that complement the DNA's extension services are the government's rural development offices, NGOs, farmers' organizations, and seed companies.

According to the DNA, in 2021 Mali had 3,245 agricultural extension agents. Of those, 2,009 were employed by the public sector: 852 by the DNA through its regional directorates and local offices, the rest by government rural offices and parastatals. Of the remaining 1,236 extension agents not employed by government, 1,196 agents worked either for farmer organizations or NGOs, and the remaining 40 worked for seed companies. In 2021, AGRA established a private sector last mile extension network of over 4,682 Community Based Advisors (CBAs) in the regions of Koulikoro, Sikasso, and Segou. The CBAs were trained and deployed as agro-dealers, linking seed companies to farmers, selling seed, and fertilizer. According to AGRA, the impact of the business linkages established between seed companies, CBAs, and agro-dealers was impressive and contributed to the system's sustainability. The last-mile delivery improved significantly. The distances traveled by farmers to reach input selling agents reduced from 15 km to 7.7 km on average.

Table 20: Number and adequacy of agricultural extension services

Indicators	2018	2021
Number of public extension officers employed by the government (including parastatals)	1,135	2,009
Number of private extension officers employed by seed companies	127	40
Number of private extension officers employed by NGOs and farmers' organizations	86	1,196
Number of extension officers (CBAs) under AGRA	MD-	4,642
Total number of extension officers	1,348	7,887
Ratio of extension officers to agricultural households	1:598	1:172
Seed industry satisfaction with extension services (out of 100%)	72%	77%

MD: Missing data

extremely poor poor fair good excellent



The number of public extension agents increased from 1,348 in 2018 to 3,245 in 2021. One reason for the increase was that new extension agents were hired when the number of regions increased from 8 to 15 in 2019. Second, the number of extension agents also went up when the *Association des Organisations Paysannes Professionnelles* (AOPP) recruited community-based extension workers/facilitators. Besides presenting data collected by TASAI in 2018 and 2021, Table 20 also provides the ratio of extension officers to agricultural households. Since 2021 data for the number of agricultural households was not available, we used the country's population growth rate to estimate the number of agricultural households in 2020 (the most recent year for which data were available). Mali's average annual population grew by 3.1%¹⁷ during the 2018-2020 period. Assuming the same growth rate for the number of agricultural households, the number of agricultural extension agents in 2021 translates to one extension agent for every 172 agricultural households. This was an improvement from the ratio of 1:598 in 2018. In 2018, the count did not include extension officers employed by the farmer organization *Confédération Nationale des Organisations Paysannes* (CNOP) and other important NGOs such as My Agro, the IFDC, and the parastatal entity OBM. TASAI sampling in 2020 was more robust than in 2018. The 2018 sample included respondents who did not sell much seed through agro-dealers. In 2020, the TASAI team deliberately sought out the main players who sell seed to agro-dealers. As a result, the 2020 rating is more reflective of reality. Finally, there was no notable change in either government policy or industry/NGO projects on agro-dealers that would significantly shift opinions.

Last, Table 20 shares information on the seed producers' satisfaction ratings with the extension services in Mali. In 2021, the extension services were rated "good" at 77% signaling a minor improvement from the 2018 rating at 72%.

CONCENTRATION OF THE AGRO-DEALER NETWORK

Agro-dealers play a key role in 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.

¹⁷ <https://data.worldbank.org/indicator/SP.POP.TOTL?end=2020&start=1960>
Accessed 14 April 2022.

One of the objectives of the National Seed Plan is to ensure that certified seed is available in various production zones through the creation of networks of approved seed distributors and the establishment of input shops owned by farmers' cooperatives. To operate as an agro-dealer, an entity must first register with the General Directorate of Trade, Consumers, and Competitiveness (GDTCC). As the next step, the DNA accredits registered entities to sell agricultural inputs. The accreditation process is as follows: (1) the registered agro-dealer submits a request, specifying the nature of the input to be sold. The request includes the entrepreneur's registration number, tax identification number, certificate of conformity of the premises, and a payment of 50,000 CFA for pesticide sales and 100,000 CFA for the sale of fertilizer and seed; (2) the DNA reviews the information and inspects the premises; (3) if the inspection is satisfactory, the DNA accredits the agro-dealer.

The government and its partners occasionally offer capacity-strengthening programs for agro-dealers in business management and the handling of agricultural inputs. These programs do not have a gender focus. They target both women and men.

Despite the clear registration process for agro-dealers, many agro-dealers are not registered with the DNA, making it difficult to obtain up-to-date information on the number of agro-dealers in the country. The most recent data from the Alliance for a Green Revolution in Africa (AGRA) shows that AGRA trained 4,689 agro-dealers from 2007 - 2015 (AGRA, 2017) as part of an agro-dealer strengthening program implemented in collaboration with the CNFA and MaliMark. Given that recent data on the number of agro-dealers are not available we used the 3,003 agro-dealers that were applied in the 2018 TASAI study. For Mali's 1,354,222 farming households in 2020, this translates to one agro-dealer for every 378 farming households. This is a slight increase from the ratio of 1:268 in 2018 (Table 21). On average, a seed producer works with 6 agro-dealers, and 31% of the seed producers report that they have their own exclusive agro-dealers. In 2021, AGRA Mali linked 589 CBA-agro-dealers to input and output markets. According to AGRA, the CBA-agro-dealers played a fruitful business role in linkages with seed companies, as well as hub-agro-dealers and aggregation and collection centers by selling improved seed and fertilizers to farmers and collecting grain in their villages.

Seed producers rated their satisfaction with the agro-dealer network as "fair" at 50%, a decrease from the rating of "good" at 72% in 2018. One reason for the decrease in the rating is that seed companies are avoiding working with agro-dealers, because, in many instances, agro-dealers have defaulted on payments to seed companies for seed offered on credit.



Table 21: Number and satisfaction with agro-dealer network

Indicator	2018	2020
Number of agro-dealers	3,003	3,003*
Number of agro-dealers supported by AGRA	-	579
Ratio of agro-dealers to agricultural household	1 : 268	1 : 378
Average number of agro-dealers per seed company	MD	6
% of companies with exclusive agro-dealers	MD	31%
Seed industry satisfaction with agro-dealer network (out of 100%)	72%	50%

MD: Missing data

* This is the 2018 figure

extremely poor poor fair good excellent

AVAILABILITY OF SEED IN SMALL PACKAGES

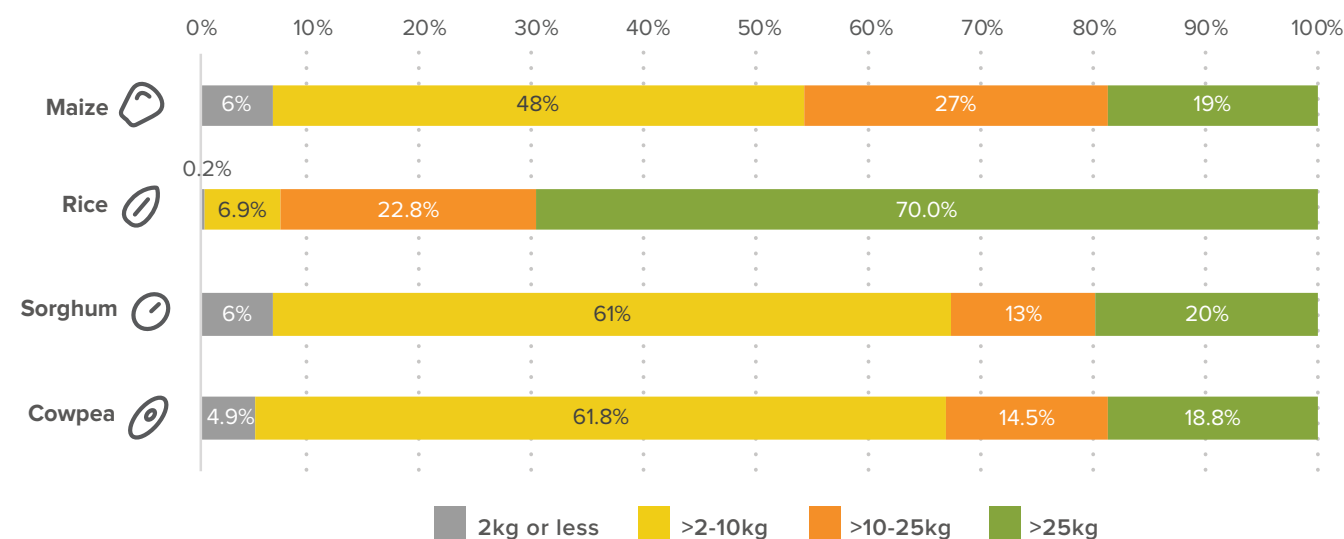
Because most farmers in Sub-Saharan Africa operate on a small scale, making seed available in small, more affordable packages is a good way to increase adoption rates of improved seed. TASAI tracks the percentage of seed sold in different package sizes, i.e., 2 kg and below, 2-10 kg, 10-25 kg, and above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

In 2020, seed producers sold seed in all four package size categories tracked by TASAI (Figure 5). The bulk of maize, sorghum, and cowpea seed was sold in packages of 2-10 kgs (48%, 61%, and 62%, respectively), making this the most popular package size. In contrast, 70% of the rice seed was sold in packages greater than 25 kg. This is because the

seeding rate requirement for rice is 60 kg per ha, while for the other crops, the rates range from 6 to 25 kg per ha. In contrast, the authorized packages are: 500 g, 1 kg, 5 kg, 10 kg, 20 kg, and 50 kg.

Related to the topic of seed packaging, seed producers were asked whether and how they obtained feedback from their customers about their products. For a start, 24 (32%) of the 74 seed producers surveyed reported that their packaging included contact information. Nearly all the seed producers (95%) reported receiving feedback from customers by phone. In-person interactions through field days and sales agents were mentioned by 59% and 57% of the seed producers, respectively. The other important feedback mechanism listed was WhatsApp. None of the seed producers received feedback via their website.

Figure 6: Percentage of seed sold in different package sizes (2020)



SEED-TO-GRAIN PRICE RATIO

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

Table 22 compares the seed and grain prices and the seed-to-grain price ratios for the four crops in 2018 and 2020, including hybrid varieties for maize, rice, and sorghum. The seed prices were slightly higher in 2020 than in 2018 for all four crops. The prices of grain had not changed for maize and rice, while grain prices for sorghum and cowpea increased slightly over the three years. As a result of these changes, in 2020, the seed-to-grain price ratios were unchanged for maize and rice but were higher for sorghum and cowpea. Of the four crops, the seed-to-grain price ratio for hybrid maize seed was the highest in both years. Seed producers did not report any sales of hybrid sorghum or hybrid rice seed in 2020.

Table 22: Seed-to-grain price ratios

Crop	2018			2020		
	Average seed price (XOF ¹⁸ /kg)	Average grain price (XOF/kg)	Seed-to-grain price ratio	Average seed price (XOF/kg)	Average grain price (XOF/kg)	Seed-to-grain price ratio
 Maize OPV	650	200	3:1	896	280	3:1
 Maize Hybrid	1,500	200	8:1	2,185	280	8:1
 Rice OPV	650	400	2:1	840	448	2:1
 Rice Hybrid	1,500	400	4:1	MD	448	-
 Sorghum OPV	650	225	3:1	952	224	4:1
 Sorghum Hybrid	1,500	225	7:1	MD	224	-
 Cowpea	1,350	500	3:1	1,625	840	2:1

¹⁸ The average exchange rate in 2021 was US\$ 1 to Francs CFA (XOF) 555. (<https://www.exchangerates.org.uk/USD-XOF-spot-exchange-rates-history-2021.html>)





CONCLUSION

Mali's formal seed system is in the emerging stage of development (Ariga et al., 2019). The emerging stage is characterized by some original breeding, formalized variety release, incomplete policy instruments, a few small seed companies and a limited agro-dealer network. The 2021 TASAI Mali Country report reveals many positive developments in the seed industry, most of which are the result of recent improvements and programs initiated by the government. At the same time, the study also identifies challenges that may constrain growth.

Under the **research and development category**, the research and development environment has improved in Mali with the number of breeders increasing from 9 in 2018 to 16 in 2021. However, of the 16 breeders, only one works in the private sector, which indicates that the participation of private sector players in research and development is low. Most of the varieties released had special features, showing responsiveness on the part of breeding programs to the needs of farmers and industry. One shortcoming is that the IER remains the main source of basic seed; diversifying the list of sources would enhance seed producers' access to basic seed.

In the **industry competitiveness** category, the 74 seed producers who were surveyed sold a combined 63 varieties in 2020. However, most of the varieties on the market are old. For example, Sotubaka maize variety is 25 years old, Adny11, a rice variety and CSM 63 E (Jakunbè), a sorghum variety, are each 33 years old. While the number of maize and cowpea seed producers has increased in the last two years, there has been a decrease in the number of sorghum and rice producers. The decline is attributed to the closing of the WAAPP, a major buyer of seed, in 2018. Although the maize and rice seed markets are relatively competitive, there has not been a significant increase in the volumes of seed sold.

Mali's **seed policy** framework has a wide array of policy instruments which are aligned with harmonized ECOWAS seed regulations and are being implemented. One of the main achievements in this area has been the creation of the CNS to oversee variety release and registration in 2019. However, the CNS is not able to meet regularly due to funding constraints, the seed catalogue is not updated regularly, and the National Fund to support the seed sector has yet to become operational. The TASAI study has also found that Mali does not have enough seed inspectors to carry out the required number of field inspections and that the existing inspectors lack adequate transportation to get to all the field locations. This is exacerbated by security risks in some regions. As a positive development, the government has initiated new programs to counter the threat of counterfeit seeds. However, the government has no proper tracking system for counterfeit seeds yet, which will be needed to measure the effectiveness of the new programs. The government seed subsidy program is not perceived positively by the industry players due to insufficient openness and transparency of the program, a lack of predictability of the procurement process and in the efficiency of payments. Such improvements will be needed if seed companies are to satisfy farmers' demands on time.

In terms of **institutional support** for the seed sector in Mali, the services provided by ASSEMA to its members improved compared to 2018 particularly, in the areas of "democracy in elections" and "activity on important seed sector issues". Areas singled out for improvement by members were improving provision of value to members, the ability to mobilize resources, and effectiveness in advocacy on seed sector issues.

Under **services to smallholder farmers**, the registration of agro-dealers is not carried out routinely, making it hard to ascertain the actual number of agro-dealers in the country. The services provided by the industry to farmers are favorable, with a ratio of one extension worker for 420 agricultural households. However, this coverage rate is still low, especially in the context of the extension workers' limited logistical means.



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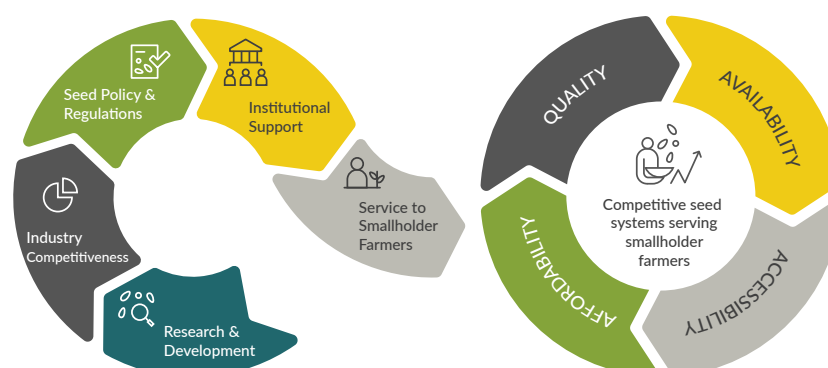
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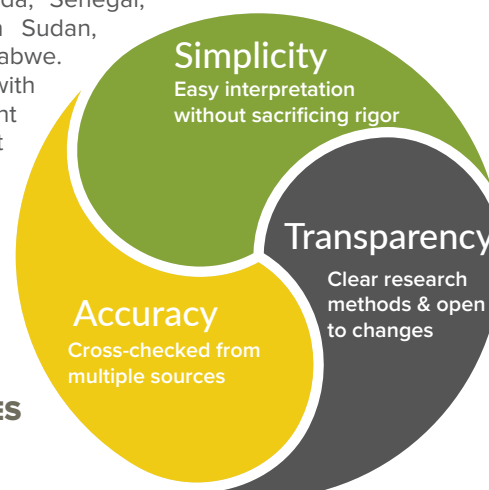


PILLARS OF COMPETITIVE SEED SECTORS

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 2022, TASAI studies will have been completed in 22 African countries: Burkina Faso, Burundi, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. In each country, TASAI works closely with local seed industry actors, government and international development agencies to share the TASAI findings and to identify the next steps for creating a vibrant national seed sector. TASAI's approach is guided by the principles of Simplicity, Transparency, and Accuracy.

TASAI PRINCIPLES



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