

Nigeria Country Report 2022

The African Seed Access Index

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TASAI
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LIST OF ACRONYMS

ARSCON	Association for Registered Seed Companies of Nigeria	NABDA	National Agricultural Biotechnology Development Agency
CGIAR	Consultative Group on International Agricultural Research	NACGRAB	National Centre for Genetic Resources and Biotechnology
CORIS	COVID-19 Rice Seed Response Project	NAQS	National Agricultural Quarantine Service
CSP	Collaborative Seed Programme	NARI	National Agricultural Research Institute
DUS	Distinctiveness, Uniformity and Stability	NASC	National Agricultural Seeds Council
EGS	Early Generation Seed	NATIP	National Agricultural Technology and Innovation Policy
ECOWAS	Economic Community of West African States	NGO	Non-Governmental Organization
FMARD	Federal Ministry of Agriculture and Rural Development	NCRI	National Cereals Research Institute
GESS	Growth and Enhancement Support Scheme	NCRP	Nationally-Coordinated Research Programme
HHI	Herfindahl-Hirschman Index	NVRC	National Crop Varieties and Livestock Breeds Registration and Release Committee
IAR	Institute for Agricultural Research	SEEDAN	Seed Entrepreneurs Association of Nigeria
IAR&T	Institute of Agricultural Research and Training	UPOV	International Union for the Protection of New Varieties of Plants
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics	VCU	Value for Cultivation and Use
IITA	International Institute for Tropical Agriculture		
KAFACI	Korea-African Agriculture and Food Cooperation Initiative		



INTRODUCTION

The increased use of productivity-enhancing technologies, including mechanization, irrigation, fertilizer and improved seed,¹ are critical to improving food and nutritional security across Africa. For field crops, a competitive formal seed sector is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. Improved seed can deliver state-of-the-art technology to farmers including higher yields, disease and pest resistance, climate change adaptation, reduced post-harvest losses, and improved nutrition. To facilitate the delivery of these benefits to farmers, The African Seed Access Index (TASAI) conducts seed industry assessments at the national level and uses the findings to encourage public policymakers and development agencies to create and maintain enabling environments that will accelerate the development of competitive formal seed systems serving smallholder farmers in Africa.

This report summarizes the key findings of the study conducted by TASAI in 2022 to appraise the structure and economic performance of Nigeria's formal seed sector. The report also draws comparisons to the findings of the 2018 and 2020 TASAI Nigeria studies. TASAI studies focus on the four grain and legume crops important to a country's food and nutritional security (the "four focus crops"). In Nigeria, these crops are maize, rice, sorghum, and soya bean. Together they account for 73% of the country's harvested area producing cereals, pulses, and selected oil crops.^{2,3} Further, 29% of this area produces maize, 20% produces rice, 20% produces sorghum, and 3% produces soya bean.

Both the government and development partners have identified these crops as strategic for Nigeria's food security, and they are the focus of several current intervention programs. The government will place priority on potential commodities and their value chains in the newly unveiled National Agricultural Technology and Innovation Policy (2022-2027) (FMARD 2022).

OVERVIEW OF NIGERIA'S FORMAL SEED INDUSTRY

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

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 and relatives as well as through rural markets. Seed from this system is of variable varietal purity, physical and sanitary quality.⁴ The informal seed system in Nigeria is made up of unregistered individual seed producers, community-based seed producers, and seed entrepreneurs. This sector is a significant source of small grains, legumes, rice and other food and nutrition security crops that are either not a priority for commercial seed companies or for which the supply from the formal seed sector is insufficient. Article 39 of the NASC Act (Federal Republic of Nigeria 2019) and Sections 3.6 and 3.7 of the 2021 National Agricultural Seed Policy (Federal Ministry of Agriculture and Rural Development 2021) recognize and provide for the protection of the informal sector.

The formal system is a structured and regulated value chain for the production of improved seed varieties. This process involves many actors and institutions, from breeding varieties to the multiplication, processing, and distribution of certified seed. The different stages of improved seed production are regulated by governments based on approved regulations and standards. The sale of seed from this system takes place through limited distribution channels such as registered seed companies and agro-dealers. This system produces seed of the highest varietal purity, physical and phytosanitary quality. The National Seed Policy of 2015 (FMARD 2015) and the 2019 National Seed Roadmap for Nigeria (NASC 2020) provide the framework and the strategy for the growth of the formal seed sector. The Seed Policy of 2015 was replaced by a new policy in 2021.

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

2 "Crops and livestock products," Food and Agricultural Organization of the United Nations, accessed on September 19, 2022, <https://www.fao.org/faostat/en/#data/QCL>.

3 Note that soya bean is considered as an oil crop in FAOSTAT.

4 "Seed System Definitions," Agrilinks, USAID, accessed on January 30, 2023, <https://www.agrilinks.org/post/seed-system-definitions>.



Table 1 lists the agencies in charge of various aspects of Nigeria's seed industry.⁵ The National Agricultural Seeds Council (NASC) is a semi-autonomous agency of the Federal Ministry of Agriculture and Rural Development (FMARD) and is responsible for regulating Nigeria's seed industry. The National Centre for Genetic Resources and Biotechnology (NACGRAB) was established, in part, to conduct research, gather data, and disseminate technological information on matters related to the conservation and utilization of genetic resources.⁶ One of NACGRAB's core programs focuses on servicing the activities of the National Committee on Naming, Registration and Release of Crop Varieties, Livestock Breeds and Fisheries. In Nigeria, the National Agricultural Research Institutes (NARIs), centers of the Consultative Group on International Agricultural Research (CGIAR), and universities are responsible for variety research and development. The Institute for Agricultural Research (IAR) is in charge of the genetic improvement of maize, cowpea, sorghum, cotton, sunflower, and groundnut. The Institute of Agricultural Research and Training (IAR&T) covers the genetic improvement of maize, kenaf and jute. Finally, the National Cereals Research Institute (NCRI) is in charge of the genetic improvement of rice, among other cereal crops. NARIs and the CGIAR centers in Nigeria - the International Institute for Tropical Agriculture (IITA) and AfricaRice - work in close collaboration with universities, e.g., Ahmadu Bello University, the Federal University of Agriculture, and Obafemi Awolowo University. The Seed Entrepreneurs Association of Nigeria (SEEDAN) is the umbrella body for seed companies and other key private seed sector players.

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

ROLE	KEY PLAYERS
Research and breeding	The International Institute for Tropical Agriculture (IITA), AfricaRice, the Institute for Agricultural Research (IAR), the National Cereal Research Institute (NCRI), seed companies
Variety release and regulation	National Centre for Genetic Resources and Biotechnology (NACGRAB), National Agricultural Seeds Council (NASC), National Crop Varieties and Livestock Breeds Registration and Release Committee (NVRC)
Seed production and processing	Seed companies, seed producers, IAR, Institute of Agricultural Research and Training (IAR&T), NCRI
Education, training, and extension	Universities, local and international Non-Governmental Organizations (NGOs), Seed companies, NASC, State departments of agriculture, rural agro-dealers, Seed Entrepreneurs Association of Nigeria (SEEDAN)
Distribution and sales	Agro-dealers, seed companies, NGOs, state-registered agricultural input supply companies (e.g., Kano Agricultural Supply Co.)

⁵ Although Nigeria has a dual system of federal and state governments, when it comes to the seed sector, all the relevant institutions are at the federal level.

⁶ "National Centre for Genetic Resources and Biotechnology," NACGRAB, accessed on January 30, 2023, <https://www.nacgrab.gov.ng/>



METHODS

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

Table 2: TASAI Indicators

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

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

To assess the progress made by Nigeria's seed sector, the Country Report draws comparisons to the findings of the 2018 and 2020 TASAI Nigeria studies (with performance data primarily from 2017 and 2019, respectively).⁷ In addition, since TASAI has conducted similar studies in 21 other African countries, this report also draws relevant cross-country comparisons. More detailed temporal (across previous studies) and cross-sectional (across other African countries) comparisons are available through an online dashboard available at <https://dashboard.tasai.org>.

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

In 2021, 177 seed companies were registered by the NASC, to produce, process, and/or market certified seed or planting material of any crop in the country. The number of registered seed companies in 2021 represents a nearly two-fold increase from the number registered in 2019 (92

⁷ Since the TASAI sampling methodology has improved over the course of the country studies, the number of years in the temporal comparison may vary for the different indicators.

companies). NASC records show that 135 new companies were registered in 2021 alone. According to the NASC and other players in the seed industry, the primary reason for the increase over the two-year period was the anticipated restart of the government's Growth and Enhancement Support Scheme (GESS) program. The GESS was started in 2011 to purchase agricultural inputs to support farmer productivity; it discontinued in 2015.

Table 3 provides details on the seed companies surveyed. First, we narrowed the 177 seed companies to 87, who were registered to produce, process, and/or market seed of at least one of the four focus crops and who represented 90% of total production volumes for certified seed reported to the government. Of this group, the TASAI survey reached 62 companies which accounted for 82% of maize seed production, 77% of rice seed production, 82% of sorghum seed production and 59% of soya bean seed production.

In addition to the 62 seed companies, other respondents that were interviewed included the NASC, SEEDAN, the NACGRAB, the FMARD. Relevant agricultural research institutions who took part in the study included the NCRI and the IAR&T. Due to security challenges in the north-west and north-central areas, telephone calls and emails were used to gather data.

Table 3: Breakdown of registered and surveyed seed companies by focus crop

Crop	No. of registered seed companies (NASC)		No. of companies representing 90% of production (NASC) (2021)	No. of seed companies surveyed by TASAI (2021)	Production share of surveyed seed companies (2021)
	2019	2021			
 Maize	68	120	61	47	82%
 Rice	69	139	76	51	77%
 Sorghum	26	53	39	28	82%
 Soya bean	26	58	41	35	59%
Total^a	92	177	87	62	

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

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 active⁸ public breeders is indicative of the level of investment in research and development. In addition to tracking the number of breeders working on the four focus crops, the study also measured satisfaction with the public breeding programs, as reported by seed companies/producers. The latter reflects the ability of active breeders in public institutions to produce new varieties.⁹

All plant breeders in Nigeria register as members of the Plant Breeders' Association of Nigeria (PBAN).¹⁰ In 2021, the association had 74 members who had training as breeders for one or more of the four crops. However, only 22 were actively engaged in plant breeding work: 11 for maize, 14 for rice, 7 for sorghum and 1 for soya bean (Table 4). All but two breeders (all of whom focus on maize) work in the

⁸ TASAI studies define an "active breeder" as a breeder who is currently engaged in breeding/maintaining a variety or a breeder who had either developed and released at least one variety or was developing a variety of the crop of interest at the time of the TASAI study.

⁹ The intention of this indicator is to assess the vibrancy of public breeding programs. Therefore, TASAI does not assess the adequacy of breeders from the CGIAR centers since their mandates cover multiple countries and regions

¹⁰ "Plant Breeders Association of Nigeria," Plant Breeders Association of Nigeria (PBAN), accessed on Feb 1, 2023, <https://pban.org.ng>

public sector, employed by the national agricultural research institutions. The 2 private breeders work at Bayer and SeedCo.

The remaining 52 breeders, while breeders by training, were not 'active' breeders, as they did not work or collaborate on any of the varieties released during the data collection year. Rather, 47 of them were employed by academic institutions, where they focused on teaching and 5 worked for international research institutes like the IITA, AfricaRice, WACCI and ICRISAT.

The majority of seed companies in Nigeria depend on publicly bred varieties; the number of breeders working in private seed companies remains very low. Between 2019 and 2021, the number of breeders declined by 40% from 38 to 22. It was not possible to get detailed explanation on all the changes behind the decline; however, some breeders had retired, and, in the case of rice, five new rice breeders have been hired since 2019. The relocation of the IITA's soya bean breeding program from Nigeria to Zambia has decreased the number of active soya bean breeders in the country.

Seed companies' level of satisfaction with the numbers of maize breeders in 2021 was "excellent" at 84%, an increase from the "good" rating in 2019. For rice, sorghum, and soya bean, the rating in 2021 was "good." The 2021 ratings were an improvement for maize, rice, and soya bean, while the rating for sorghum registered a small decline.

Table 4: Number and adequacy of active breeders in Nigeria

Crop	Number of public breeders	Number of private breeders	Total number of active breeders			Satisfaction with breeders (out of 100%)		
			2017	2019	2021	2017	2019	2021
 Maize	3	2	11	12	11	58%	75%	84%
 Rice	2	0	5	9	14	58%	68%	76%
 Sorghum	6	0	5	12	7	42%	65%	63%
 Soya bean	0	0	4	5	1	38%	58%	73%
Total^a	11	2	24	38	22			

extremely poor poor fair good excellent

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

VARIETIES RELEASED IN THE LAST THREE YEARS (2019-2021)

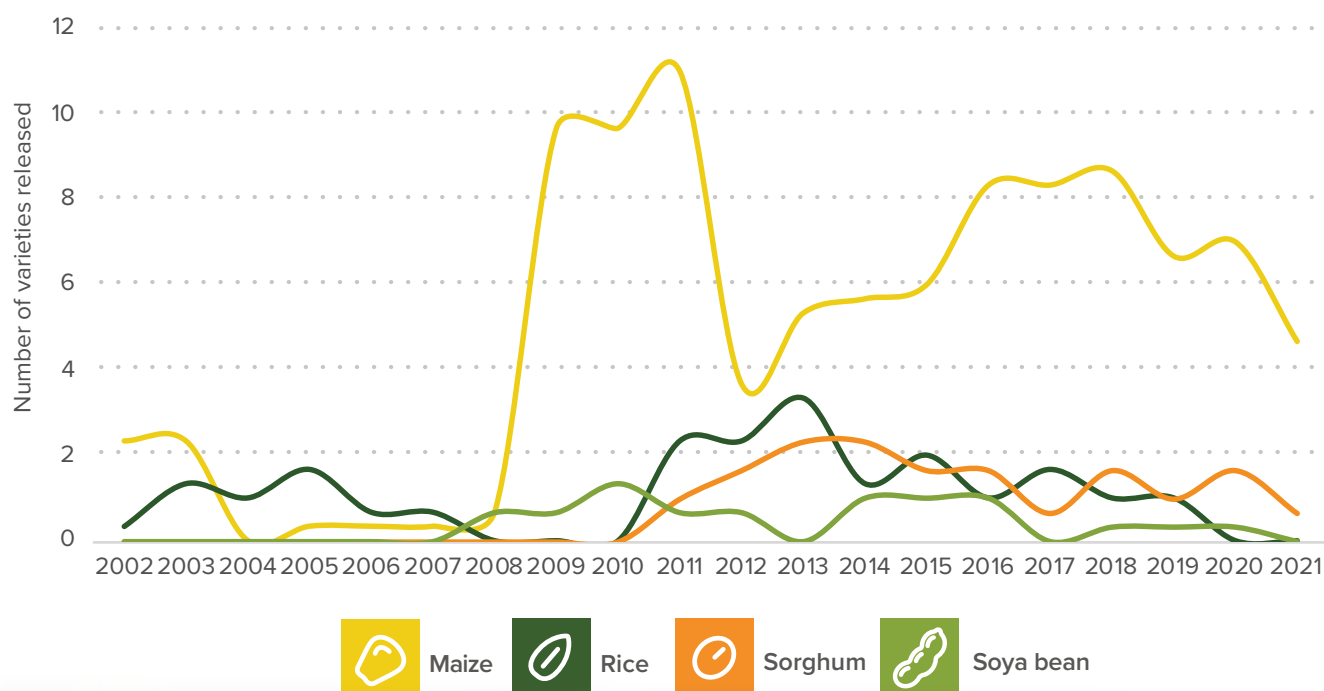
The number of varieties released is a good measure of the functioning of the variety development and release system. The greater the number of varieties released in a country, the higher the chances of enhancing smallholders' access to improved seed. In addition to higher yields, new varieties often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

Figure 1 shows the 3-year moving average of variety releases from 2000.¹¹ The graph shows that, for most years, maize accounted for the majority of the varieties released. Of the four crops, a total of 16 varieties (14 maize and 2 sorghum) were released between 2019 and 2021. The IAR and IITA

¹¹ A 3-year moving average is commonly used to smooth out short-term fluctuations in time series data.

were the owners of these varieties. The IITA's varieties were developed and released in collaboration with other public research institutions. The IITA also makes varieties available to private seed companies to market – sometimes a variety is given to one seed company, at times to multiple companies. In addition, three private seed companies released two maize varieties each. No rice or soya bean varieties were released during this 3-year period. However, two varieties were released for each of these crops in 2022, according to the catalogue (which was updated in February 2022). These varieties were developed by public research institutions – the IAR for soya bean and the NCRI for rice. The number of varieties released for the other three crops has been consistently low since 2000. For the past six years, the number of varieties released has further declined. Research institutions tend to be held back from actively developing and releasing new varieties due to a lack of resources. The variety release committee attributed the decline to the greater levels of scrutiny applied during the variety release process, which is intended to ensure that new varieties are markedly distinct from existing varieties. At times, breeders use the performance and adoption rate of a previously released variety as the basis of their proposal. The variety release committee has turned down several of these nominations.

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





VARIETIES WITH SPECIAL FEATURES

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

Industry-demanded varieties are those that are suitable for making starch, livestock feed, and for brewing as well as those that have a high oil content.

A total of 16 (14 maize and 2 sorghum) varieties were released between 2019 and 2021. Of these, 9 maize varieties had special features, 5 of which were climate-smart features (Table 5). Four of the maize varieties were nutritionally enhanced with provitamins or had a high protein content; of these three varieties were released by private companies. The two sorghum varieties released during this period both had industry-demanded features (high brix content).

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

Feature	Description	Number of varieties released				
		Maize	Rice	Sorghum	Soya bean	Total
All varieties released		14	0	2	0	16
All varieties released with special features		9	N/A ^a	2	N/A	11
Climate-smart features	All	5	N/A	0	N/A	5
	Drought tolerance	2	N/A	0	N/A	2
	Early / extra-early maturing	3	N/A	0	N/A	3
Use-related features	All	4	N/A	0	N/A	4
	Fast cooking	0	N/A	0	N/A	0
	Nutrition-enhanced	4	N/A	0	N/A	4
Industry-demanded features	All	0	N/A	2	N/A	2
	High Brix Content	0	N/A	2	N/A	2

^a “N/A” means that the information requested does not apply to the crop.



NUMBER OF VARIETIES SOLD

An increase in the number of varieties sold in a country often results in an increased choice of varieties available to farmers. This may be accompanied by changes in crop yields, especially when new varieties carry traits that increase yields and crop quality.

A total of 85 varieties of the four crops were sold in 2021, a slight decrease from the 86 varieties sold in 2019. Similar to 2019 (50 out of 86), most of the varieties sold were maize in 2021 (54 out of 85), (Table 6). The increase in the number of maize varieties can be attributed to two main factors. First, the increase in the number of seed companies in the seed market was largely driven by a growing demand for seed from farmers. Senior NASC officials responsible for seed industry development noted an emerging trend of companies springing up across the country to capture the seed market in their immediate localities. Of the 54 maize varieties that were sold in 2021, only 15 were sold by more than one seed company, indicating that most seed companies sold unique maize varieties. Most of these were public varieties. Thirty-one of the 54 maize varieties sold were of the SAMMAZ series, a group of public varieties, most of which have been released in the last 15 years. A second factor driving the increase in maize varieties sold was an increase in the number of requests for varieties with climate-smart features, as reported by IAR and NCRI breeders. This was due to the growing impact of climate change in the form of reduced

rainfall and shorter growing seasons. In 2021, 17 of the 54 maize varieties sold had climate-smart features, either drought tolerance or early or extra-early maturity.

There was no change in the number of soya bean varieties sold. However, breeders noted a higher demand for the soya bean varieties from seed companies. This was due to a growing demand for soya bean grain from processors who prefer varieties with bold grain and high oil content. This is driven by the industrial utilization of the crop, as several processing companies have emerged as key buyers of soya bean. World Grain¹² also reports an increase in the demand for soya bean in Nigeria, for both food and feed. World Grain reports that soya bean production has increased by 43% from 2020/21 to a projected 1.25 million MT in 2021/22. This growing demand is reflected in the increasing price of soya bean, which doubled from about N500 (US\$ 1.15¹³) to N1,000 (US\$ 2.30) per kilogram during 2019-2021. The increased demand for soya beans has led to an increase in the number of soya bean varieties being produced and sold by seed companies. Four of the eight varieties sold in 2021 had climate-smart features, while one, TGX 1448-2E, was listed as being resistant to shattering. Another reason for the increase in soya bean production is a shift away from maize production, as the latter requires more complimentary inputs, such as fertilizers and agricultural chemicals, thus increasing the cost of production.

12 “Nigeria soybean demand on the rise,” World-grain.com, June 28, 2021, accessed on January 30, 2023, <https://www.world-grain.com/articles/15474-nigerian-soybean-output-demand-on-the-rise>

13 Exchange rate 1US\$ = N434.8

Table 6: Number, name, age, and average age of commonly sold varieties

Crop	Number of varieties sold		Name of commonly sold variety	Age of variety in years (2021)	Average age of commonly sold varieties in 2021 (all varieties sold)
	2019	2021			
 Maize	50	54	SAMMAZ 15	13	7(10)
			SAMMAZ 51	5	
			SAMMAZ 52	4	
 Rice	15	10	FARO 44	31	21 (11)
			FARO 59	10	
 Sorghum	13	13	SAMSORG 17	51	51(14)
 Soya bean	8	8	TGX 1448-2E	29	18(16)
			TGX 1951-3F	7	
Total	86	85			



AVERAGE AGE OF VARIETIES SOLD

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

The simple average was used as a proxy to volume weighting since there was low variability in the age of all varieties sold. The age of commonly sold varieties varies by crop (Table 6). The popular maize varieties are less than 15 years old. These are all from the SAMMAZ series and include SAMMAZ 15 (13 years old), SAMMAZ 51 (5 years) and SAMMAZ 52 (4 years). SAMMAZ 15 is the most popular variety: it is a high-yielding, medium-maturing maize variety with striga resistance. SAMMAZ 51 is an advanced version of SAMMAZ 15 and is drought tolerant in addition to being striga tolerant. SAMMAZ 52 is a provitamin A yellow maize variety. SAMMAZ 27, released in 2009, is the most popular early-maturing maize variety while SAMMAZ 14, released in 2005, is a variety offering high-quality protein. SAMMAZ 14 is the popular Obatanpa early maturing variety from Ghana.

Despite shifts from the cultivation of lowland rice varieties (like FARO 59, 63, 66, 67) to upland varieties in Nigeria as a result of climate change, the lowland varieties FARO 44 (31 years old) and FARO 59 (10 years old) remained the most popular rice varieties. The popularity of FARO 44 was attributable to its traits, including its aromatic flavor and long grains, which are preferred by consumers and processors, respectively. There has been an increase in the number of rice millers who prefer long grain, and local demand has surpassed local supply, such that millers are now procuring rice from outside Nigeria.

Based on the TASAI survey, the most popular sorghum variety is SAMSORG 17. This variety is 15 years old, and since there are newer varieties with the same color and nutritional advantages, its dominance is not well understood. Seed companies opine that farmers prefer the variety because it has been used for a long time and its field performance in terms of yield and color traits has been consistent.

Soya bean variety TGX 1448-2E (29 years old) is the most preferred soya bean variety because it has a high oil content and does not shatter. The demand for bold soya bean with high oil content, both of which TGX 1448-2E possess, has grown tremendously in the last two years.

Seed growers are now looking for extra early- and early maturing varieties, dropping intermediate-maturing varieties as a result of the decline in rainfall. Processors are demanding varieties with bold grain and high oil content. While NCRI breeders claimed that newer varieties like TGX 1951-04 have bolder seeds with appreciable oil content, the fact that the farmers have been using TGX 1448-2E for a long time has made it difficult for them to drop the variety.

SOURCES AND AVAILABILITY OF FOUNDATION (BASIC) SEED

Seed companies use basic seed (also referred to as foundation seed) to produce certified seed for sale to farmers. In many African countries, limited access to basic seed from public research institutions tends to constrict the ability of seed companies to scale up production. The NASC Act (2019) permits private entities to produce basic seed. In the wake of the Act, several companies have been licensed to produce and market basic seed (though not certified seed). Public institutions with a national mandate to produce basic seed are the IAR for maize and sorghum and the NCRI for rice and soya bean. These research institutions have set up, or are in the process of setting up, companies to specialize in the production and marketing of basic seed.

In Nigeria, the process by which seed companies obtain basic seed from public institutions is as follows: the seed company applies to the research institution stating the quantities of basic seed that it requires, specifying the crop and variety. The research institution sends an invoice to the company. Upon payment, the company collects the basic seed from the research institution.

Sources of basic seed: There are three main sources of basic seed for the four crops in Nigeria. These are the national agricultural research institutions (IAR and NCRI), the CGIAR institutions (including AfricaRice, the IITA and ICRISAT), and private seed companies (Table 7). The IAR is the main source of basic seed for maize and sorghum, accounting for more than half of all transactions in 2021. The NCRI, the second government entity, is the most important source of basic seed for rice and soya bean. The IITA is a key source of maize and soya bean basic seed, while ICRISAT is an important source of sorghum basic seed.

As indicated above, the government has liberalized the production of basic seed by issuing licenses to private companies to produce basic seed. This change is evident in the number of seed companies sourcing basic seed from other sources, including their own: for the two main crops, maize and rice, the numbers have grown from 4 to 5 and 7 to 15, respectively. It is important to note that, to produce basic seed, existing seed companies must register a separate entity to focus on this activity.

Breeders noted that the main challenges to the provision of basic seed to seed companies was the persistent problem of insecurity. For example, IAR breeders mentioned that they switched from maize seed production to rice seed production, when maize in the fields, owing to their height, became a hideout for bandits.

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

Source of basic seed	Maize		Rice		Sorghum		Soya bean	
	No. of transactions	% of total	No. of transactions	% of total	No. of transactions	% of total	No. of transactions	% of total
AfricaRice	N/A ^a	N/A	5	9%	N/A	N/A	N/A	N/A
IAR	35	57%	4	7%	15	54%	8	25%
IITA	18	30%	3	6%	1	3%	10	31%
NCRI	3	5%	27	50%	2	7%	11	35%
ICRISAT	N/A	N/A	N/A	N/A	10	36%	N/A	N/A
Other	5	8%	15	28%	N/A	N/A	3	9%
	61	100%	54	100%	28	100%	32	100%

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

Seed companies' opinion of the availability of basic seed: Seed companies were asked to assess each source organization on three aspects related to the availability of basic seed: the quality of basic seed received, whether they received the quantity of basic seed that they requested, and the timeliness of delivery of the seed. Across the four focus crops, seed companies were satisfied with these three aspects (Table 8). Despite these high ratings (70% and above), breeders reported that the demand for basic seed in 2021 declined, especially for maize seed. In addition, the high cost of inputs also led some of the institutes to cut down on maize seed production.

The decrease in demand was attributed to the fact that some large seed companies had been licensed to produce and sell basic seed and thus purchased less seed from research institutes. In addition, according to seed companies, the research institutions do not have adequate capacity to

meet their demands for basic seed. Several donor-funded projects¹⁴ have stepped in to increase the production and supply of basic seed in the country. These projects have emphasized strengthening basic seed production at the seed company level.

Seed companies' overall assessment of the availability of basic seed: Overall, seed companies' satisfaction with the availability of basic seed in 2021 was "excellent" for all crops. Since 2017, ratings improved (Figure 2). The improvement over the years can be attributed to the diversification of the sources of basic seed, namely, the licensing of private companies mentioned above. Though still rated "excellent," there was a slight drop in satisfaction levels with the availability of maize basic seed between 2019 and 2021 (84 to 81%). Respondents attributed the rating decrease to insecurity in the northern part of the country, where most maize seed production takes place. As a result, the research institutions were not able to produce the quantities that were demanded by seed companies.

14 The projects include: (i) the Korea-African Agriculture and Food Cooperation Initiative (KAFACI) for rice seed; (ii) the COVID-19 Rice Seed Response Project (CORIS) for rice seed; and (iii) an AGRA-funded project on maize seed systems.

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

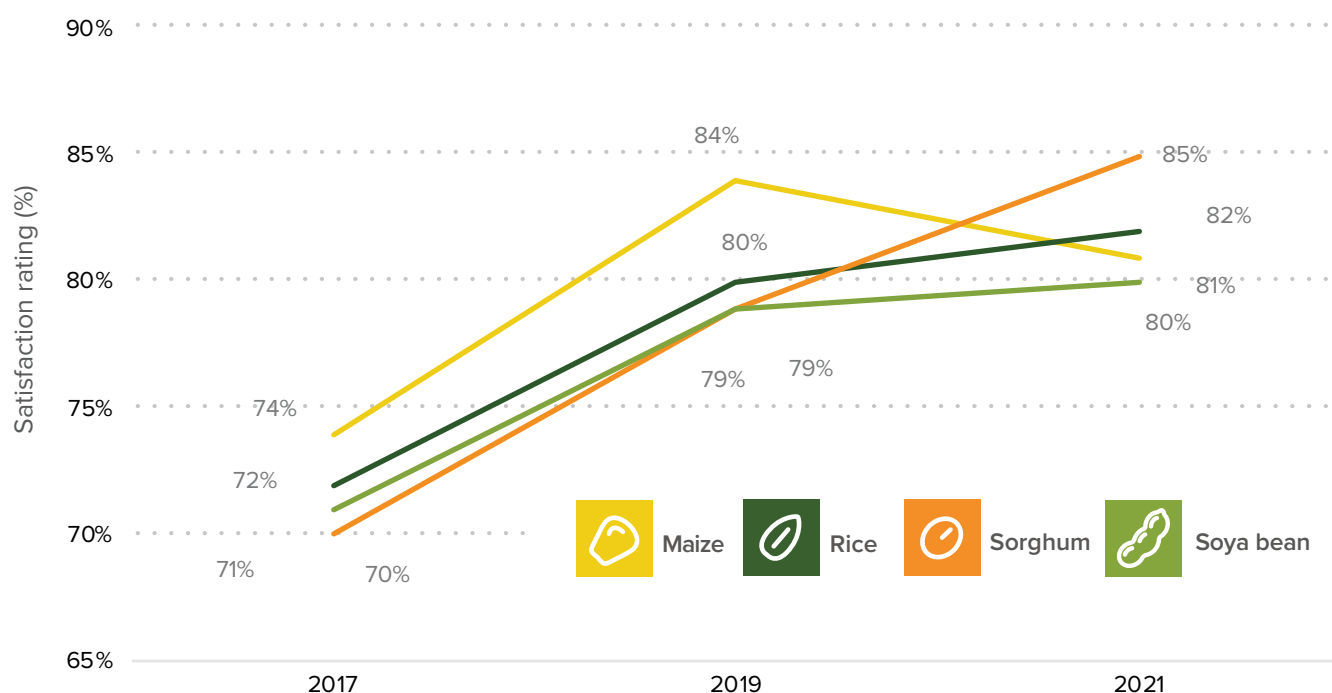
Crop		IAR	IITA	NCRI	Africa Rice	ICRISAT	Other
Maize (n=61)	Quality	80	81	80	N/A ^a	N/A	84
	Quantity	81	79	85	N/A	N/A	80
	Timeliness	82	87	80	N/A	N/A	78
Rice (n=54)	Quality	73	87	80	82	N/A	83
	Quantity	70	80	81	86	N/A	87
	Timeliness	73	87	80	88	N/A	84
Sorghum (n=28)	Quality	83	80	90	N/A	77	N/A
	Quantity	88	100	95	N/A	80	N/A
	Timeliness	86	100	90	N/A	87	N/A
Soya bean (n=7)	Quality	78	84	76	N/A	N/A	83
	Quantity	85	78	78	N/A	N/A	93
	Timeliness ^b	80	86	72	N/A	N/A	87

extremely poor poor fair good excellent

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

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

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



INDUSTRY COMPETITIVENESS

NUMBER OF ACTIVE SEED COMPANIES

Competition breeds excellence: the presence of more active seed companies¹⁵ 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.

NASC data showed that there were 177 active seed companies in 2021, a marked increase from the 92 companies in 2019 (Table 9). While this significant increase was thought to be mainly due to anticipation of a major government intervention for seed use in 2022, there is a consensus among stakeholders that awareness of the importance of quality seed is growing. The 2021 National Agricultural Seed Policy supports the seed value chain in the form of access to knowledge, skills, technologies and business development service and by promoting youth entrepreneurship.

Table 9: Number of active seed companies

Crop	2017	2019	2021
 Maize	71	68	120
 Rice	87	69	139
 Sorghum	27	26	53
 Soya bean	26	26	58
Total^a	106	92	177

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

GENDER IN MANAGEMENT OF SEED BUSINESSES

TASAI also tracks the number of women in management and ownership positions in seed companies. For this study, management positions include managing director/

¹⁵ TASAI defines an “active seed company” as a company that produces and/or markets seed of one or more of the four focus crops in the TASAI study year.

chief executive officer, distribution manager, operations manager, finance and administration manager, research and development manager, country lead, and sales and marketing manager.

Based on the seed companies that were interviewed, very few women were involved in the management or ownership of seed companies in 2021. Only 5 out of 49¹⁶ seed companies surveyed had a woman as their top manager, and only 8 out of 51 companies had a female owner (Table 10). In the cases where the company had a woman top manager, often the person used to be a senior manager who subsequently was promoted to the top management position. Importantly, 23% of the management positions in the surveyed companies were held by women¹⁷, which indicates that the pipeline for such advancement is relatively small. However, the new National Agricultural Seed Policy (2021) actively promotes gender equality by increasing opportunities in the industry and by creating an enabling environment for women entrepreneurs.

Table 10: Gender in management of seed businesses

Gender indicator	2019		2021	
	Number	%	Number	%
Entities^a with a woman top manager (n=56 in 2019; n=49 in 2021)	2	4%	5	10%
Entities with a woman owner (n=56 in 2019; n= 51 in 2021)	7	13%	8	16%
Women in management positions	18 ^b	14%	175 ^c	23%

a Entities refers to seed companies, seed cooperatives or the regional unions.

b Out of 157 positions in 56 entities in 2019.

c Out of 772 positions in 51 entities in 2021.

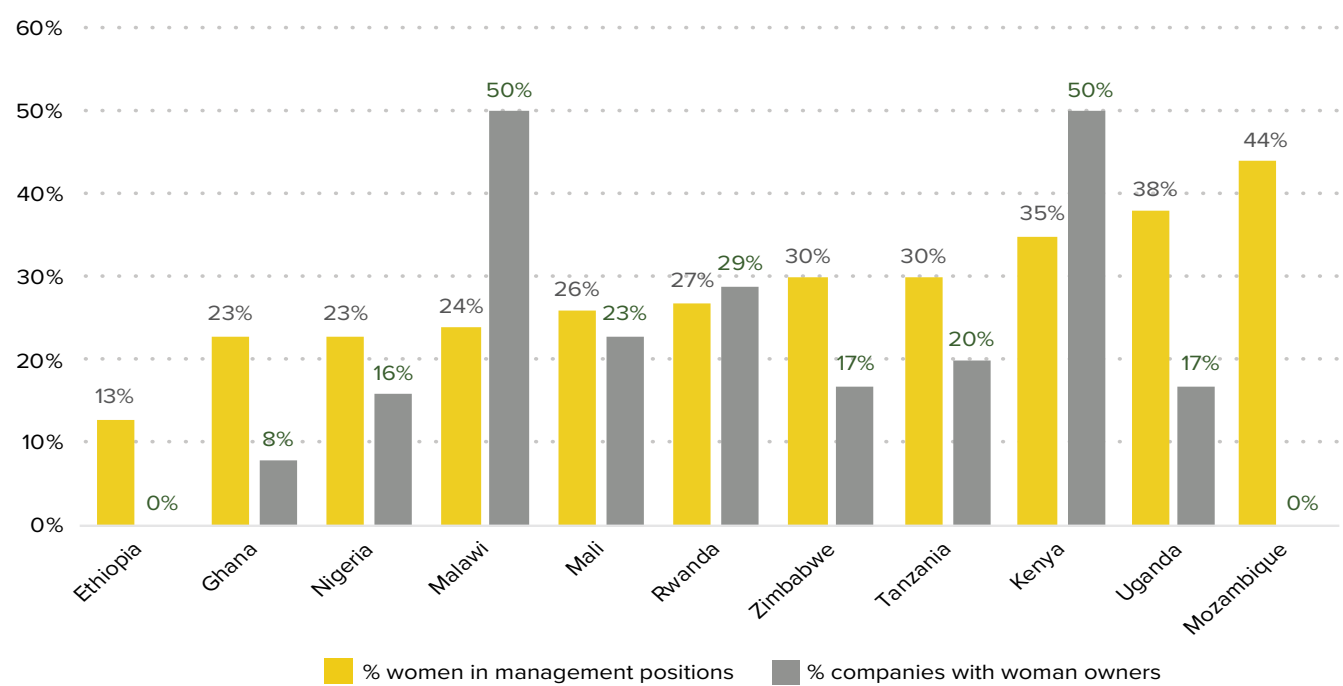
Compared to other African countries surveyed by TASAI between 2020 and 2022, the percentage of women as owners or in management positions in the surveyed seed companies in Nigeria is among the lowest (Figure 3).

¹⁶ Note that this number is lower than the total of 62 companies surveyed because not all companies have a management structure that allows respondents to answer this question (e.g., multinationals or parastatals).

¹⁷ “Interview with Dr. Olusegun Ojo, Director-General, Nigeria National Agricultural Seed Council,” Youtube video, “CORAF,” March 22, 2021, accessed on January 30, 2023, https://www.youtube.com/watch?v=s9M_MO_jMVk



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



PRODUCTION AND SALE OF CERTIFIED SEED

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

Table 11 shows the volume of seed produced by seed companies in 2021 as reported to the NASC and TASAI. TASAI data was collected directly from seed certification officers. Maize and rice seed had the highest production volumes. Nigeria is by far the largest producer of rice seed in the Economic Community of West African States (ECOWAS) region. The two crops are followed by sorghum and soya bean, with much lower volumes.

According to the NASC, production levels for maize and rice seed were higher in 2021 than in 2019 while, during the same period, they were lower for sorghum and soya bean seed. According to the NASC, maize and rice seed production increased due to efforts to strengthen seed companies’ direct involvement with farmers through farmer awareness programs and improved linkages with agro-dealer seed distributors. Such efforts include the Korea-African Agriculture and Food Cooperation Initiative (KAFACI), sponsored by the Republic of Korea, which aims to strengthen capacity to multiply and distribute rice seed. The COVID-19 Rice Seed Response Project (CORIS), funded by AfricaRice and GIZ, is implemented by the NASC and 10 seed companies, to strengthen seed companies’ capacity to produce and disseminate seed to farmers. Yet another program, funded by AGRA, has set up a consortium of five institutions to produce and market maize seed. These, and other initiatives, have contributed to an increase in maize and rice seed production over the last few years.

The original data obtained from the NASC is based on data collected from all registered companies, of which TASAI only interviewed a subset. To allow for a more even comparison, Table 11 also presents the production volumes for the subset of companies interviewed by TASAI. Comparing these two sets of figures reveals discrepancies across all four crops, especially for maize and rice. For maize, the NASC data is 63% over the volumes reported to TASAI (a difference of 20,069 MT), while for rice, the trend is the opposite, with the government data being 35% less than that reported to TASAI (a difference of 14,736 MT). Sorghum and soya bean also recorded discrepancies, though they are much smaller: 1,389 MT less sorghum seed was reported to TASAI than to the government, and 867 MT more soya bean seed was reported to TASAI than to the government.

Though it is not possible to pinpoint the exact source of the difference, several factors are at play. In cases where NASC data exceeds TASAI’s (as is the case for maize and sorghum), one reason may be that companies include carryover stock from the previous year in their production figures reported to the government. In addition, to better position themselves for participation in the upcoming government subsidy program (GESS), some companies likely overreport production to show greater than actual production capacity. In cases where NASC data is below TASAI data, companies may be underreporting to the government. According to the NASC, companies may do this to cut down on the company’s costs of seed inspection and certification. There are also reports of companies producing seeds without being registered to do so. Such factors are likely behind the discrepancies in the data for rice and soya bean.

The NASC is aware of the constraints it faces when it comes to collecting and verifying production data and is making efforts to improve its overall data management system.

Table 11: Seed production and seed sales

Crop	Seed production (in MT)				TASAI data on seed sales in MT (2021)
	NASC data (2019)	NASC data (2021, all)	NASC data (2021, part)	TASAI data (2021)	
Number of companies	92	177	62	62	62
 Maize	50,720	62,534	51,580	31,511	13,524
 Rice	37,386	54,144	41,456	56,192	20,170
 Sorghum	6,332	5,749	4,737	3,348	1,443
 Soya bean	6,585	3,921	2,305	3,172	2,432

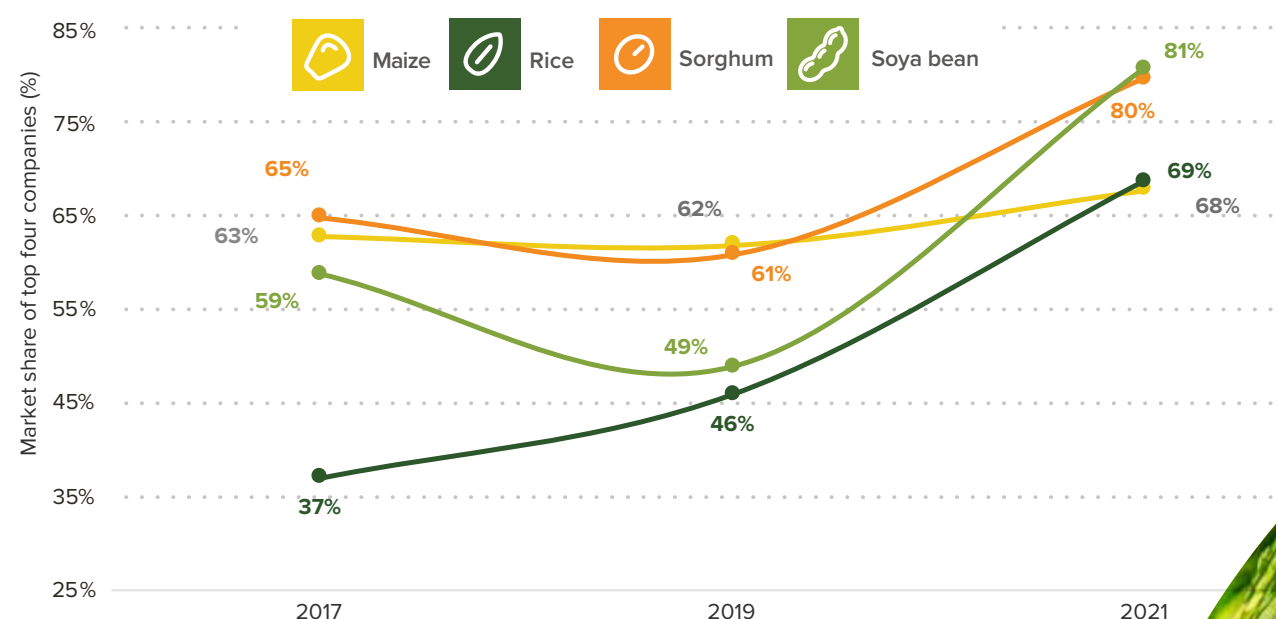
MARKET SHARE OF TOP SEED COMPANIES

Competition among seed companies benefits farmers via lower prices, wider choices, increased innovation, and better customer service. To assess the level of industry market concentration, TASAI uses seed sales data for each crop, as reported by seed companies, to calculate the market share of the four largest firms, also known as four-firm concentration ratio (CR4), as well as the Herfindahl-Hirschman Index (HHI).¹⁸

¹⁸ See below Table 12

In 2021, the market shares for the top four seed companies, as reflected by the CR4 scores, were 68% for maize, 69% for rice, 80% for sorghum, and 81% for soya bean, an increase from the CR4 ratios in 2019 for all crops (Figure 4). While the market share of the top four seed companies did not change much for maize seed, the top four companies selling rice and soya bean seed increased their market shares significantly between 2019 and 2021. This increase is partly explained by the top seed companies increasing their seed production, in some cases supported by the ongoing donor-funded initiatives, to meet the increasing demand. This is especially true for soya bean and rice seed. By contrast, the new entrants in the seed markets are mainly small companies and only account for a small percentage of the seed market.

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





The HHI scores were low for maize (1,708) and soya bean (1,878) and moderate for rice (2,664) and sorghum (2,115), indicating that the maize and soya bean seed markets are not as concentrated as the rice and sorghum seed markets in 2021 (Table 12). The low level of concentration is mainly due to the higher number of active seed companies in these markets. In contrast, the rice and sorghum seed markets were more concentrated in 2021 than they were in 2019.

The increased level of concentration in the rice seed market is due to an increase in the scale of business of some of the large seed companies. Several large seed companies have benefited from projects that aimed at increasing rice seed production. These include the Netherlands-funded Collaborative Seed Programme (CSP), which supports seed marketing and promotion for 10 selected companies, and the GIZ-funded CORIS.

Table 12: Market concentration (HHI)^a

Crop	HHI (2017)	HHI (2019)	HHI (2021)
 Maize	1,441	1,090	1,708
 Rice	552	700	2,664
 Sorghum	1,337	1,736	2,115
 Soya bean	1,236	964	1,878

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

MARKET SHARE OF GOVERNMENT PARASTATAL

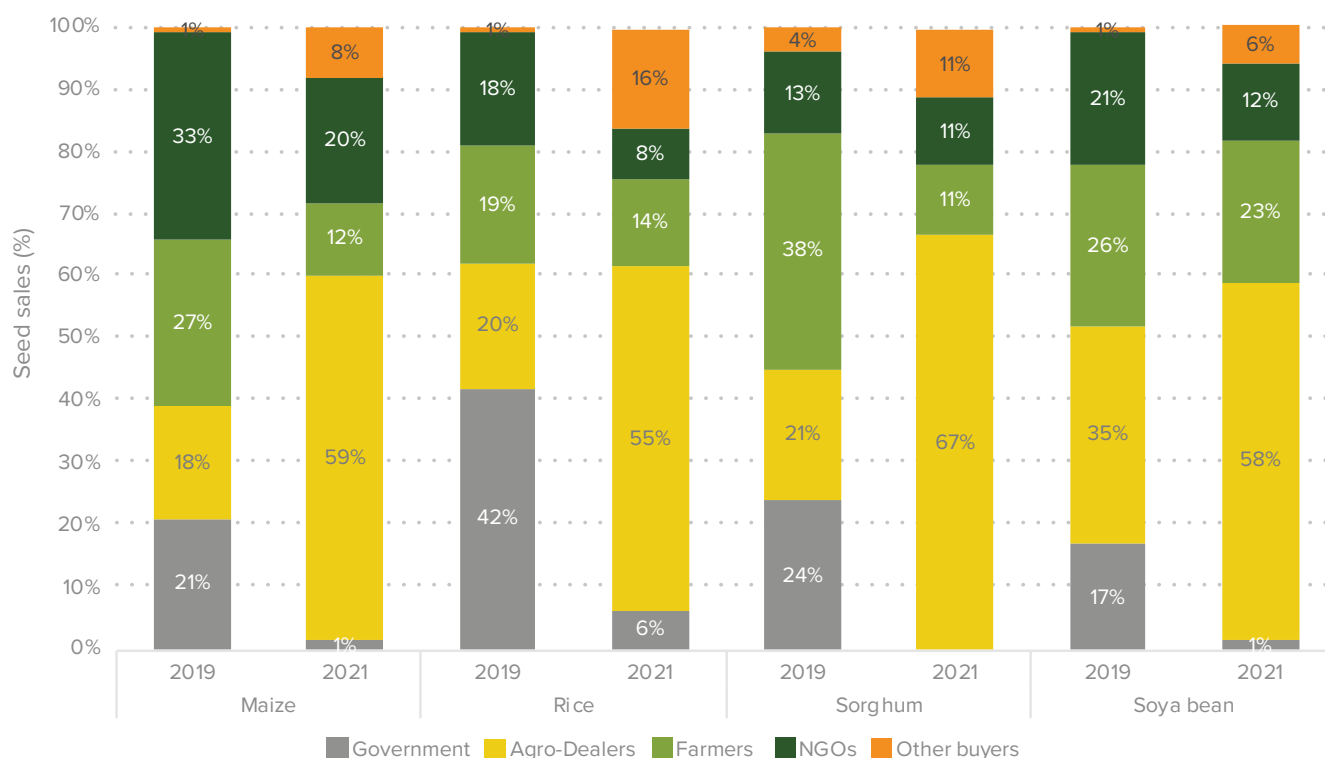
In some countries, public entities are still active players in the marketing and sale of certified seed. Public seed companies can play a critical role in meeting farmer demand for varieties that private seed companies deem less profitable. In addition to seed production, public companies may support other national objectives, such as university training and research. However, state-owned companies may benefit from preferential treatment, less stringent enforcement of regulations, access to competitor information, and indirect production subsidies. Collectively, these privileges can result in unfair competition against purely private seed companies. There was no known government agency that was involved in the sale of certified seed in Nigeria in 2021.

SEED SALES TO DIFFERENT CATEGORIES OF BUYERS

The TASAI study tracked five different categories of seed buyers in Nigeria in 2021. These were agro-dealers, the government, farmers, NGOs, and other buyers. Agro-dealers were the main buyers of seed for all four crops in 2021, significantly increasing their importance as buyers since 2019 (Figure 5). This increase can be attributed to several interventions to strengthen seed companies' marketing and distribution efforts. These efforts include field demonstrations and extension services to increase farmers' awareness of the importance of improved seed. These efforts have increased the demand for seed sourced the formal system. Furthermore, some seed companies offer discounts to agro-dealers of up to 10%, based on sales. To benefit from these discounts, agro-dealers work with community-based advisers (CBAs) or rural sales promoters to reach out directly to farmers. Through this arrangement, the seed companies reduce the risks associated with seed marketing and build a customer base by incentivizing the agro-dealers (who also incentivize the CBAs). The next most important channels of seed sales were farmers purchasing seed directly from seed companies and NGOs, whose combined share ranged between 22% and 32% across the four crops. Importantly, for all crops, the share of these two sellers of seed had declined between 2019 and 2022. Finally, it is noteworthy that the share of government in seeds sales had declined significantly, from an average of 26% to 4% across all four crops. The decline followed from the lack of a government-funded subsidy program, which typically serves as the most common avenue through which the government purchases seed.



Figure 5: Seed sales by category of buyers



SEED IMPORT AND EXPORT PROCESS

Efficient seed import and export processes extend the seed market beyond national borders. While seed companies benefit from an expanded market, farmers can access a wider range of varieties from across the region. The length of the import process in days is measured as the sum of the number of days needed to obtain import documentation (import permit, phytosanitary certificates, and an International Orange Certificate¹⁹, if applicable) and the number of days it takes to clear seed at the border. It excludes transportation time.

Seed importation to Nigeria is regulated by both the NASC and the National Agricultural Quarantine Service (NAQS). To import seed, a seed importer submits an application to the Director General of the NASC, including the certificate of registration of the importing entity, a seed license certificate,

and a letter of reference from their bank. The application specifies the country from which seed will be imported, the crop and variety name, the class of seed, and the quantity of seed per variety. If the application is accepted, the applicants complete a seed importation form and pay the prescribed fees. The NASC then issues an import approval letter, which the applicant forwards to the NAQS. If favorably evaluated, the NAQS issues an import permit. There were no seed imports for the four crops in 2021.

Seed exports are also regulated by the NASC. In 2021, there was only one case of maize seed exports. The seed company exported a total of 300 MT of maize seed to Ghana. According to the seed exporter, the seed export process took 28 days. According to NASC, the reason for the low documentation of imports and exports is a lack of clarity on the procedures and roles of the actors involved. In addition, the fees regime for import and export permits of the NAQS is not standardized. This lack of standardization discouraged actors from approaching the agency for import permits. The seed exporters' satisfaction level for the export process was considered "good" at a 60% rating.

¹⁹ The International Orange Certificate is issued by a laboratory accredited by the International Seed Testing Association (ISTA) when both sampling from the seed lot and testing of the sample are carried out by the same laboratory.

SEED POLICY AND REGULATIONS

LENGTH OF VARIETY RELEASE PROCESS

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

Both public and private organizations can only nominate a new variety for release to the designated national focal institution for the crop, that is, the NCRI for rice and sorghum, and the IAR for maize and soya bean. The nominations are submitted by the breeders to the NVRC. For a variety of any crop to be regarded as a new variety, the Guidelines for Release and Registration of New Crop Varieties in Nigeria specify that it must pass the DUS and VCU tests, must have traits that are superior to those of existing varieties, and the grown plant must not be detrimental to human and animal health or the environment.

A single location trial is required for DUS for two to three seasons, in accordance with International Union for the Protection of New Varieties of Plants (UPOV) guidelines. For VCU requirements, a crop variety undergoes three types of trials:

1. On-station trials, conducted by the breeder responsible for the development of the candidate variety within the premises of the research institute.
2. Multi-location trials carried out for at least two years on at least 10 testing sites per year across different agro-ecological zones in Nigeria, or at several appropriate locations if the variety is bred for a particular agro-ecology. These tests involve detailed examinations of the variety's adaptability, stability, agronomic performance, and resistance to biotic and abiotic stresses.
3. On-farm trials on farmers' fields for a year to assess farmers' perceptions of the candidate variety. The assessment considers whether the variety will be accepted or not, whether it is better than what is currently being produced, and whether it can adapt to the recommended target areas.

All data from these trials are analyzed and presented in the form of tables and figures and submitted along with other relevant documents to the technical committee for registration and release.

The variety release process was reported to take about 30 months in 2021, compared to 50 months in 2019 and 43 months in 2017 (Figure 6). The reduction from 2019 to 2021 is primarily due to the fact that the variety release committee was able to meet and deliberate over the applications. However, often the costs related to the meetings were covered by the applicants themselves, as the variety release committee does not have sufficient funding. This approach is not sustainable in the long run; indeed, as of November 2022, the committee was yet to meet for the year.

Recognizing the challenge, the "implementation of a state-of-the-art system that supports and fast-tracks varietal development, registration and release of crop varieties as well as the rapid multiplication of released varieties" (FMARD 2021) is one of the main goals of the draft 2021 National Agricultural Seed Policy.

Another issue to address is the conflict of interest presented by the situation that seed companies are required to release varieties through the mandated research institutions, which themselves produce varieties that compete with privately-owned varieties. Moving forward, the Federal Ministry of Agriculture and Rural Development plans to transfer the responsibility for variety release and registration to the newly established National Biotechnology Development Agency (NABDA). NABDA reports to the Federal Ministry of Science and Technology and its mandate is to conduct research and promote, coordinate and develop biotechnology in Nigeria. The discussions to implement these reforms are still ongoing.

Despite the reduction in the length of variety release between 2017 and 2021, the satisfaction rating with the process remained "good" since 2017 and improved slightly between 2019 and 2021. Although the length of the variety release process in Nigeria was relatively short in 2021 (30 months), it was significantly longer than in many countries surveyed by TASAI, such as 18 months in Uganda, 13 months in Zimbabwe, and 11 months in Ghana in the same period (Figure 7).



Figure 6: Average length and satisfaction rating of variety release process

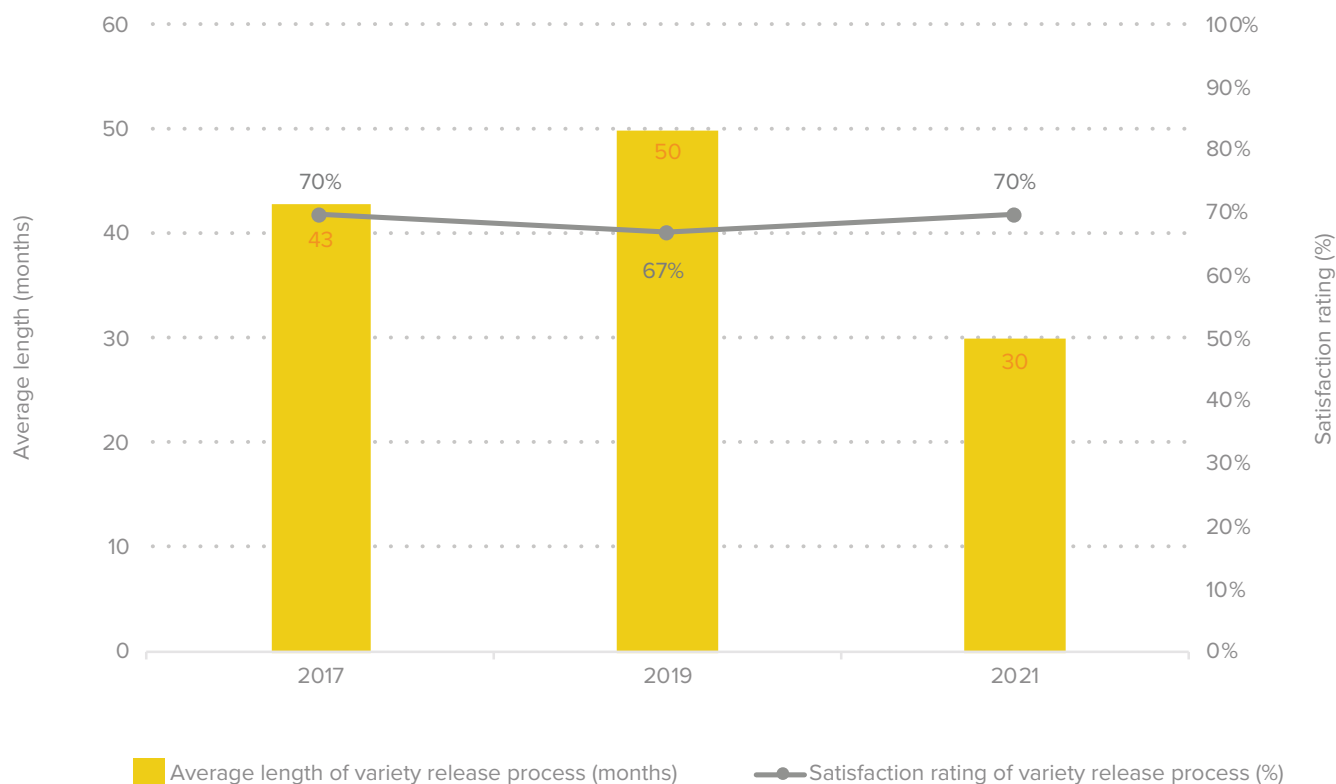
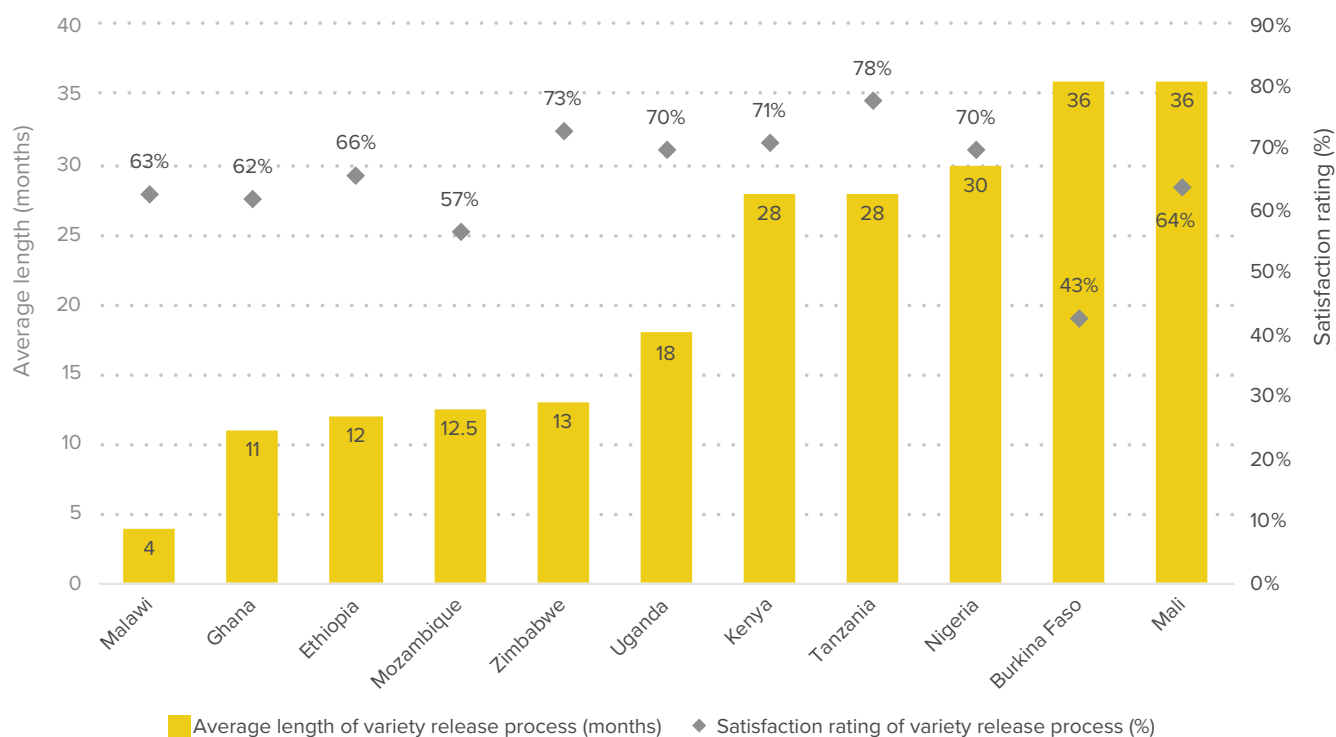


Figure 7: Length and satisfaction rating of variety release process in countries studied by TASAI



COST OF VARIETY RELEASE PROCESS

In well-functioning seed systems, the costs of releasing a variety should not be so high as to disincentivize variety releases altogether.

According to seed companies, the estimated cost of the variety release process in 2021 was US\$ 47,605 for maize varieties and US\$ 36,124 for soya bean varieties (Table 13). However, public breeders reported incurring a much smaller amount - US\$ 18,063 - to release maize varieties. The companies complained that the cost was too high, especially considering that public breeders are charged much less for the same service. Public research institutions conduct mandatory trials for both seed companies and their own breeding programs; however in the case of the latter,

the trials are considered regular activities and are not costed separately. Further, as mentioned earlier, seed companies pay for the meeting costs of the Variety Release Committee to hasten the release process. Commenting on the overall high cost of variety releases in the country, NACGRAB expressed concerns that multinational seed companies may choose to release varieties in other ECOWAS countries and then import the seed into Nigeria. The cost of variety release in Nigeria is high because the variety development and release processes are not clearly separated.

TASAI findings from other countries show that the costs of variety release in Nigeria are significantly higher than these costs in other African countries studied between 2020 and 2022. For example, in 2022, the cost of releasing a variety averaged US\$ 3,000 in Kenya and US\$ 28,710 in Ghana while in 2021, it was US\$ 7,031 in Mali.

Table 13: Cost of the variety release process (2022)

Crop	Average costs incurred by seed companies in US\$				Average costs incurred by public breeders in US\$			
	DUS	VCU	Other	Total	DUS	VCU	Other	Total
 Maize (n=3)	13,808	21,755	12,042	47,605	6,021	12,042	N/A	18,063
 Rice (n=0)	N/A ^a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
 Sorghum (n=0)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
 Soya bean (n=1)	7,225	16,858	12,041	36,124	N/A	N/A	N/A	N/A

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

STATUS AND IMPLEMENTATION OF NATIONAL SEED POLICY FRAMEWORK

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

The National Agricultural Seed Council Act of 2019 is the main law governing the seed sector in Nigeria. Other key policy instruments are the newly formulated National Agricultural Seed Policy (2021) (FMARD 2021), approved in Aug 2021, the National Agricultural Technology and Innovation Policy (NATIP), approved in August 2022 (Plant Variety Protection Act 2021), and the Plant Variety Protection Act, passed in 2021. Table 14 provides a summary of the seed policy instruments in the country.





Table 14: Key seed instruments in Nigeria

Instrument	Description
Policies	
National Agricultural Technology and Innovation Policy (2022)	Issued by the Federal Ministry of Agriculture and Rural Development, the goal of the National Agricultural Technology and Innovation Policy (NATIP) is to modernize the Nigerian agricultural sector and bring it in line with changing global food systems and supply chains. Approved by the Federal Executive Council in May 2022, NATIP will operate alongside other policies and strategies of relevant government agencies to ensure synergy and better coordination.
National Seed Policy (2021)	Published in 2021, this policy replaced the 2015 seed policy. The new seed policy seeks to eliminate shortcomings of the old policy and introduce innovations to optimize the operations of the NASC in its regulatory, promotional and protection roles in the seed industry. The innovations include the liberalization of foundation seed production and marketing by accredited private enterprises, introducing the quality authentication tool SeedCodex, facilitate the accreditation of third-party seed inspectors in quality assurance, establish satellite and private seed testing laboratories, set up the National Strategic Seed Bank for reserve and buffer stock, and promote the participation of women and youth in the seed value chain.
Acts	
National Agricultural Seeds Council Act (2019)	The National Agricultural Seeds Council Act of 2019 is the main law for the seed sector. The Act established the National Agricultural Seed Council as the body in charge of seed sector development in Nigeria. It also established the governance structure of the NASC along with procedures for seed certification and quality control, among other seed services. The Act also established the NASC Fund. The fund is in partnership with public, private and development partners and is expected to bridge the gaps that may exist in the NASC's funding
Plant Variety Protection Act (2021)	The Plant Variety Protection Act of 2021 protects plant breeders' intellectual property, thus encouraging investment in plant breeding. It established the Plant Variety Protection Office. Through this Act, the Director General NASC recommends to the Board of NASC a registrar to manage the office. This law also outlines procedures for the application of plant variety protection rights and establishes the Plant Breeders' Rights Fund.



QUALITY AND ENFORCEMENT OF SEED REGULATIONS

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

Implementation of the Seed Regulations/Decrees: The NASC has been strengthened through several recently enacted policy instruments to improve its capacity to enforce its mandate. The Collaborative Seed Programme (CSP), funded by the government of the Netherlands and AGRA, has provided support in the development of regulations that will assist in the implementation of the NASC and PVP Acts in consultation with stakeholders. To meet ISTA accreditation standards in the country, AGRA has also funded new seed quality assurance infrastructure towards the development of two new laboratories.

Implementation of the ECOWAS Regional Seed Regulations: The TASAI study assessed four key aspects of seed sector regulations that are required for complete harmonization with ECOWAS regulations: i) setting up a national seed committee; ii) instituting a decree for seed import and export; iii) updating the national variety catalogue, and the recognition of the West Africa Catalogue of Plants and Species as the repository of all varieties approved in the ECOWAS region; and iv) the creation of a seed sector support fund.

Regarding the institution of a decree for seed import and export, seed can move freely within the ECOWAS region as long as the varieties are registered in the ECOWAS Variety Catalogue. However, the NASC has yet to draft specific steps for the import and export of seed, as these measures are expected to be part of the NASC Regulations, which are yet to be developed. The ECOWAS Catalogue is recognized by the NASC. Seed companies can import varieties into Nigeria if they are listed on the ECOWAS Catalogue, and varieties in Nigeria's national catalogue are regularly added to the ECOWAS Catalogue. Lastly, a national seed fund has been established. However, it does not yet have an operational governance and management structure. Seed companies considered the government's enforcement of the Nigerian seed regulations to be "good" at a 76% satisfaction rating. This was a slight decline from the 79% rating in 2019.

EFFORTS TO ERADICATE COUNTERFEIT SEED

Counterfeit seed (also known as fake seed) threatens the seed sector in two important ways: first, it reduces farmers' confidence in certified seed after farmers unknowingly plant inferior quality grain labeled as certified seed. Second, it threatens the success of efforts to increase the adoption of

improved varieties. TASAI tracks the number of cases of counterfeit seed reported by seed companies, and if available, by the government in the data collection year. The figure is likely to be an underestimate, as most cases of counterfeit seed sales are not officially reported since the trade is illegal. In addition, seed companies report their level of satisfaction with government efforts to eliminate counterfeit seed.

The number of counterfeit cases reported in 2021 was 25, a decrease from the 36 cases reported in 2019 (Table 15). Seed companies' level of satisfaction with government efforts to address the problem of counterfeit seed was rated "good" (71%) in 2021 and has consistently been "good" since 2017. The main intervention by the government is the SeedCodex, an electronic verification system for certified seed, which allows buyers to authenticate their purchase through a scratch-off label attached to each seed package. According to the Director General of the NASC, seed companies have expressed their support for the SeedCodex initiative.^{20,21,22}

Table 15: Industry satisfaction rating of government efforts to address counterfeit seed

Indicators	2017	2019	2021
Number of cases of counterfeit seed (seed companies)	34	36	25
Seed industry satisfaction with government efforts to address counterfeit seed (out of 100%)	70%	74%	71%

extremely poor
poor
fair
good
excellent

USE OF GOVERNMENT SUBSIDIES

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

Nigeria had no subsidy in 2021, but provision has been made for "targeted fiscal subsidies for the use of improved seeds" in the newly unveiled NATIP for 2022-2027 by the Federal Ministry of Agriculture and Rural Development.

- 20 "Interview with Dr. Olusegun Ojo, Director-General, Nigeria National Agricultural Seed Council," Youtube video, "CORAF," March 22, 2021, accessed on January 30, 2023, https://www.youtube.com/watch?v=s9M_MO_jMVk
- 21 "SEEDCODEX is boosting crop productivity by tackling counterfeit seeds in Nigeria," AGRA, June 16, 2020, accessed on January 30, 2023, <https://agra.org/seedcodex-is-boosting-crop-productivity-by-tackling-counterfeit-seeds-in-nigeria/>
- 22 "Checking fake, substandard seeds through Codex," Blueprint, March 15, 2020, Accessed on January 30, 2023, <https://www.blueprint.ng/checking-fake-substandard-seeds-through-codex/>

INSTITUTIONAL SUPPORT

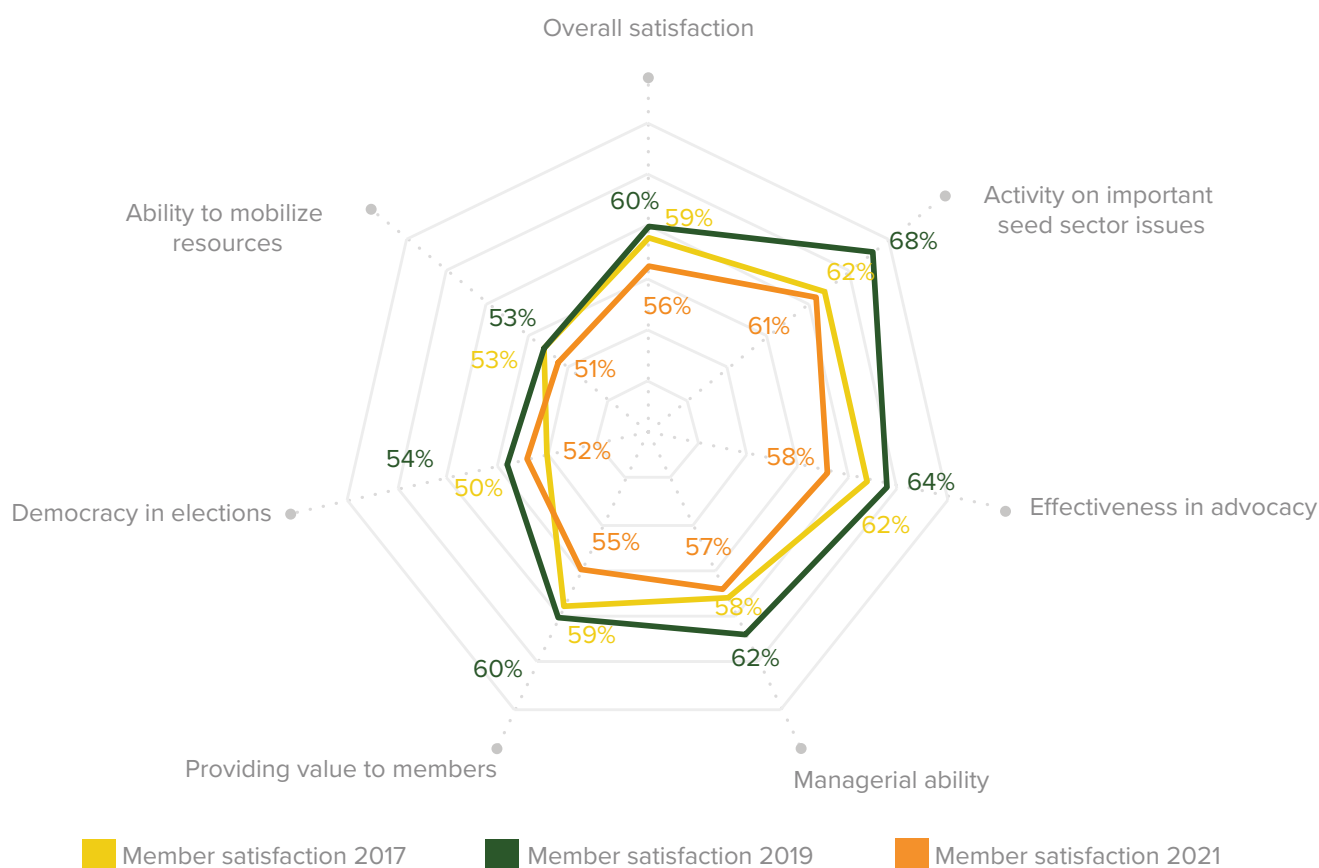
QUALITY OF THE NATIONAL SEED TRADE ASSOCIATION

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

The Seed Entrepreneurs' Association of Nigeria (SEEDAN) is an umbrella association of seed companies. SEEDAN was formed in 1992 and received its official certificate of registration in 2012. In 2022, the association had 73 members. As part of the TASAI study, 30 of the 62 seed companies surveyed were members of the association. Members were asked to rate the association's performance

on seven performance indicators, presented in Figure 8. Seed companies considered the overall performance of SEEDAN to be "fair" at 56%, a slight drop from the rating of 60% in 2019 and 59% in 2017. Indeed, its members rated SEEDAN slightly worse in 2021 than in 2019 for all six service areas, with ratings ranging from 51% to 61%. The two service areas that received the lowest ratings were the ability to mobilize resources (51%) and democracy in elections (52%). Members gave several reasons for the low scores. Some expressed that the association did not focus on important seed sector issues and that the leadership had not changed since 2013. Other members questioned how the 15-member Technical Committee was selected. Some also believed that the association was not transparent about its implemented projects or its use of funds. The growing discontent with SEEDAN among seed companies has led to the formation, recognition and registration of another association, the Association for Registered Seed Companies of Nigeria (ARSCON), with the Corporate Affairs Commission on 29 November 2021. At the time of data collection, ARSCON was not yet active.

Figure 8: Members' opinion of SEEDAN



ADEQUACY OF SEED INSPECTORS

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

In Nigeria, seed inspection is the mandate of the NASC, which employed 80 seed inspectors (13 females, 67 males) in 2021, and increased from the 60 inspectors (7 women, 53 men) in 2019 (Table 16). While the number of inspectors is not sufficient given the size of the country, seed companies' satisfaction with the adequacy of the seed inspection services was "good" at 76%, an increase from 73% in 2020. However, it is important to note that there are known cases of seed inspectors colluding with seed companies on the inspection and the high ratings may in part reflect this reality. Recognizing the need for additional inspectors, as part of the Collaborative Seed Program, the NASC has initiated a process of licensing independent private seed inspectors, as provided for in the 2021 seed policy.

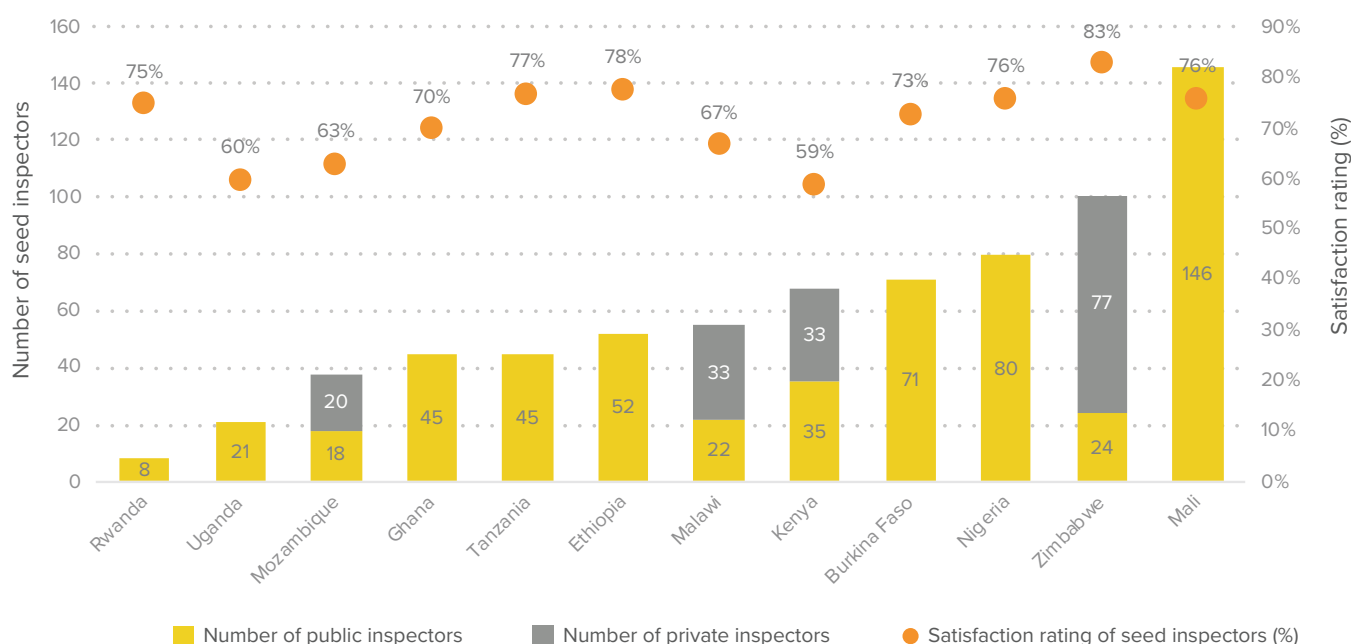
Table 16: Number and rating of the adequacy of seed inspectors

Indicators	2018	2020	2022
Number of public seed inspectors (NASC)	50	60	80
Seed industry satisfaction with seed inspectors (out of 100%)	84%	73%	76%

extremely poor
poor
fair
good
excellent

Figure 9 shows the comparison of the number of seed inspectors in countries studied by TASAI between 2020 and 2022. Nigeria follows Mali and Zimbabwe with the highest number of seed inspectors. The satisfaction rating with the adequacy of seed inspectors is also among the highest.

Figure 9: Comparison of number of seed inspectors and industry satisfaction by countries studied by TASAI



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.

The agricultural extension service is the mandate of the Federal Department of Agricultural Extension in the Federal Ministry of Agriculture and Rural Development. However, the extension service at the federal level does not function well and the number of active agricultural extension officers is unknown to the Ministry. A few states have stepped in to fill

the gap (e.g., Kaduna State) and have developed their own extension services.

Previous TASAI studies have estimated the number of extension agents based on secondary data. In 2020, there were an estimated 14,000 extension officers, of whom 6,000 were from the public sector and the remaining 8,000 were privately employed (Mabaya et al. 2021).²³ Surveyed seed companies reported employing an average of 97 private extension officers (Table 17); this figure has been on the decline since 2017. The inadequacy of extension services has led the country's president to issue a directive to the Ministry of Agriculture in August 2022 to address the situation and revive the service.²⁴

²³Note that, in the absence of available updates figures, data 2019 (also an estimate) is also used in 2021.

²⁴"Buhari Directs Revitalisation of Agric Extension Services in Nigeria," This Day Live, August 24, 2022, accessed on February 1, 2023, <https://www.thisdaylive.com/index.php/2022/08/24/buhari-directs-revitalisation-of-agric-extension-services-in-nigeria/>

Table 17: Number and adequacy of agricultural extension officers

Indicators	2017	2019	2021
Number of seed companies with extension officers	34	25	28
Number of public extension officers employed by the government	7,000	6,000	6,000
Number of private extension officers employed by seed companies	366	188	97
Number of private extension officers (from other private sector)	- ^a	8,000	8,000
Total number of extension officers	7,360	14,188	14,097
Ratio of extension officers to agricultural households	-	1:7,500	1:7,500
Seed industry satisfaction with extension officers (out of 100%)	59%	55%	52%

^a Data for these points was not collected in 2017.

extremely poor poor fair good excellent



CONCENTRATION OF THE AGRO-DEALER NETWORK

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

According to the NASC, 30 agro-dealers were registered in 2022, a modest increase from the 21 registered in 2020 (Table 18). Although registration is required by law, most active agro-dealers are not registered with the NASC. This is partly due to the NASC's inability to enforce the law, especially when agro-dealers are in remote locations. Seed companies reported that, on average, they each work with 60 agro-dealers, an increase from the average of 27 reported in 2019. The increase is due to seed companies' establishing and strengthening their networks with agro-dealers, as these are key sales points to farmers. Despite reporting an increase in the average number of agro-dealers they worked with, seed companies reported low satisfaction ratings with the network of rural agro-dealers: the rating measured in 2022 was 56% ("fair"), an increase of 5% over the previous rating in 2020.

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

Indicator	2018	2020	2022
Number of agro-dealers registered with NASC	20	21	30
Average number of agro-dealers working with each seed company	- ^a	27	60
Seed industry satisfaction with agro-dealer network (out of 100%)	-	51%	56%

extremely poor poor fair good excellent

^a Data for these points was not collected in 2018.

AVAILABILITY OF SEED IN SMALL PACKAGES

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

In 2021, 47% of all maize seed, 51% of sorghum seed and 36% of soya bean seed were sold in small packages of 2 kg or less (Figure 10). In contrast, the most commonly sold package size for rice was between 10 kg and 25 kg. This is because rice seed is purchased mainly by large-scale producers, who sell directly to rice millers. The proportion of seed sold in small packages increased remarkably for sorghum, soya bean and maize between 2017 and 2021 (Figure 11) as a result of several ongoing projects, like the Korea-Africa Agriculture and Food Cooperation Initiative (KAFACI), CORIS, and the CSP, that aim to strengthen seed distribution systems and seed companies' direct engagement with farmers. Specifically, through these programs, seed companies are selling more seed through agro-dealers. Seed companies are also packaging more of their seed in smaller packages in response to farmers' needs.



Figure 10: Percentage of seed sold in different package sizes (2021)

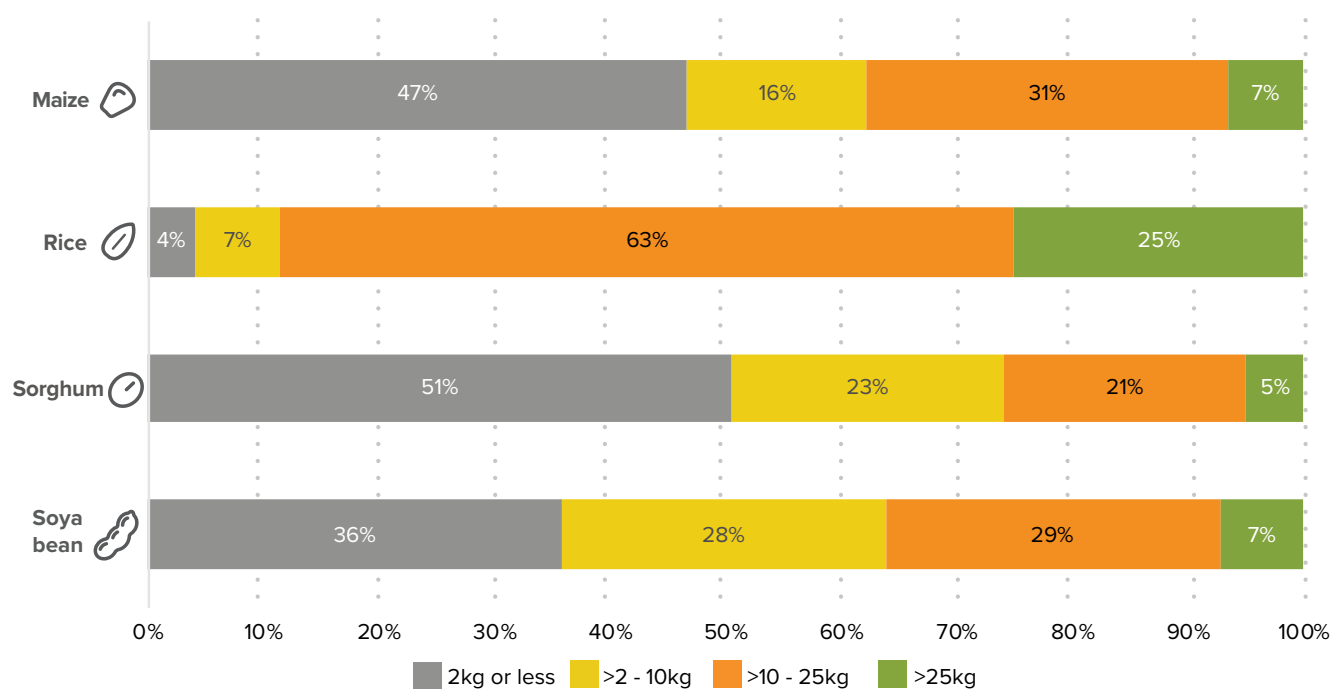
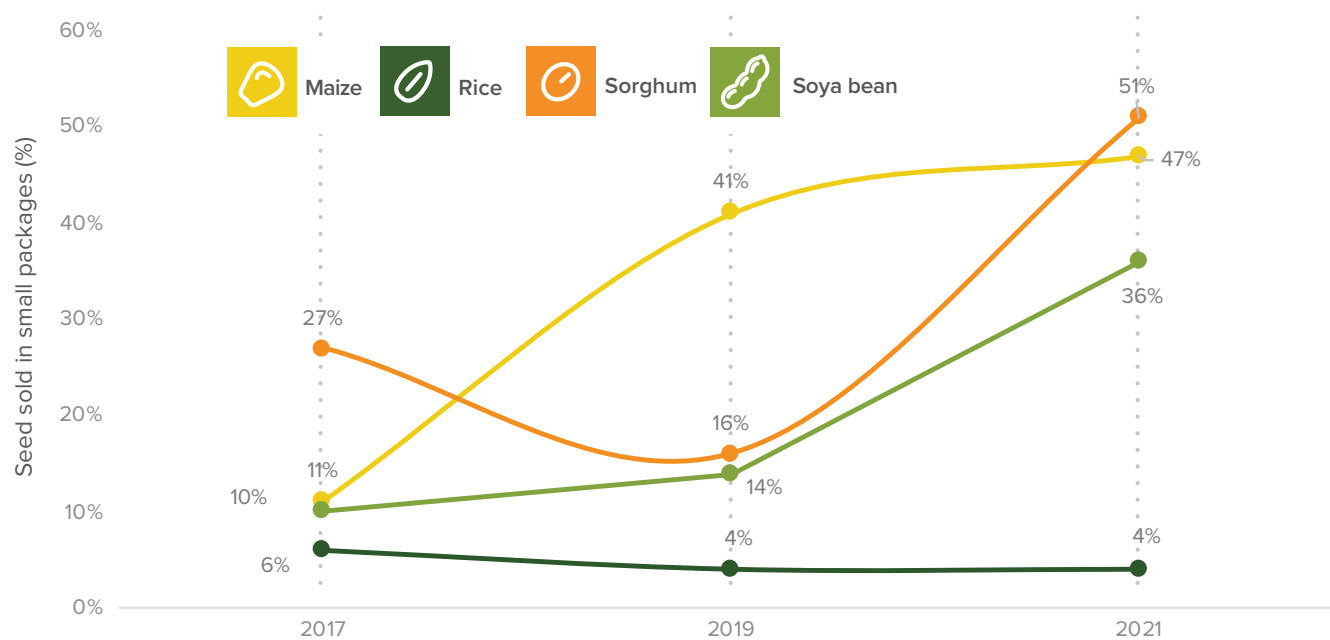


Figure 11: Trend in percentage of seed sold in small packages (2kg or less)



SEED AND GRAIN PRICES

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

The average seed prices have not changed significantly for sorghum and soya bean (Table 19). However, the price of maize hybrid seed has increased slightly. Hybrid maize seed production is largely carried out by multinational companies and large local seed companies. The seed are also usually purchased by large farm estates who in turn produce grain for agro-processing industries. In response, some seed companies provide agronomic support for farm estates that buy their hybrid seeds to ensure that they realize the expected yields.

Grain prices of all four focus crops increased since 2017. However, the increase between 2019 and 2021 was highest for soya bean (100%) and sorghum (72%). For maize, the increase was 38% while for rice it was 10%.

Table 19: Seed and grain prices

Crop	Average seed price (NGN ₦/kg)			Average grain price (NGN ₦/kg)		
	2017	2019	2021	2017	2019	2021
 Maize (hybrid)	325	560	628	65	141	195
 Maize (OPV)	375	495	398	65	141	195
 Rice	400	519	455	120	141	156
 Sorghum	400	417	417	60	133	229
 Soya bean	350	434	438	120	167	335





CONCLUSION



The seed industry in Nigeria is in the growth stage of development. The last few years leading up to 2021/2022 have been marked by a notable increase in the number of active seed companies as well as growth in seed production for key crops. During this period, seed companies' also reduced their dependence on the government as the main buyer of certified seed. Yet, the seed system is still facing stark challenges. The conclusions below outline positive developments and persisting challenges across the five categories of indicators studied by TASAI.

Under the **research and development** category, there were two main positive findings. First, seed companies reported an overall high level of satisfaction with the availability of basic seed for the four crops. This level of satisfaction was reported for three aspects of the TASAI study - the quality of basic seed received, the quantity received, and the timeliness of delivery. Second, seed companies sold more maize varieties in 2021 than in 2019. This increase is due to the fact that the demand for maize grain increased as farmers have transitioned back into farming after recovering from COVID-19 pandemic shocks. The demand for soya bean seed in Nigeria has been driven by both the food and feed industries.

A few challenges were also reported under this category. First, there has been a notable shortage of active breeders for sorghum and soya bean seed within the mandated research institutions (the NCRI and the IAR). While there were a number of sorghum breeders registered with the Plant Breeders' Association of Nigeria, these breeders were mainly employed in universities and were not engaged in breeding work. The shortage of breeders explains why only two varieties of sorghum and no varieties of soya bean were released between 2019 and 2021. Additionally, the IITA soya bean program, which was active in Nigeria and used to collaborate with the national programs, is set to relocate to Zambia.

There were several positive findings under the **industry competitiveness** category. First, there was a significant increase in the number of registered seed companies in 2021, signaling a potentially increasing private sector interest in the seed industry. However, the increase is also partly driven by the perception that the government seed subsidy initiative, the Growth and Enhancement Support Scheme (GESS), will be revived, creating a large market for seed. Second, the volume of seed produced for maize and rice (the two main crops in Nigeria) increased between 2019 and 2021. Third, most of the seed sales for the four crops were conducted by agro-dealers, signaling a shift away from overdependence on the government and NGOs as the main buyers of seed. Lastly, the number of women employed as top managers among the surveyed seed companies and the number of women in management positions has increased since 2019. These findings suggest that the seed industry is growing and that the private sector's performance is improving.



The main challenge registered under the industry competitiveness category lies in the growing number of small seed companies whose establishment is incentivized by the possible revival of the government seed subsidy program. These companies are not being formed to build sustainable seed production systems and private sector channels for seed sales.

The main gap in Nigeria's **seed policy** framework lies in the lack of regulations to implement two key laws, that is, the NASC Act of 2019 and the Plant Variety Protection Act of 2022. Furthermore, there is an urgent need to provide clarity and structure to the variety release process. Efforts to this end are ongoing, as the NASC, NACGRAB, and the newly formed National Biotechnology Development Agency (NABDA) are in discussions to address this challenge. In its current form, the variety release process is costly and takes a lot of time. Moreover, seed companies can only release varieties through mandated research institutions. This may present a conflict of interest, as these institutions also produce varieties that compete with privately-owned varieties. On the positive side, the FMARD has developed a new seed policy to replace the policy of 2015. The new policy provides further clarifications on the role of the NASC, liberalizes the production of basic seed, and encourages private sector participation in various seed services. These new developments bode well for the seed industry.

Under the **institutional support** category, SEEDAN's performance has not improved over the years. Members' overall level of satisfaction with the association declined in 2021. Similar to previous years, members reported weaknesses in governance, inadequate efforts in resource mobilization, and insufficient efforts to engage in important seed sector activities. These perceptions contributed to the formation and registration of a parallel national seed association - ARSCON - in November 2021.

In terms of **service to smallholder farmers**, the NASC has increased the human resource capacity of its seed inspection services over the last few years. This makes up part of the agency's overall efforts to strengthen seed certification. In addition, the NASC is taking steps towards introducing third-party seed inspection services to complement the existing public inspection services. Despite these positive steps, there is still an urgent need to strengthen public inspection services to ensure that seed companies effectively implement various requirements for quality control.

Evidence from the study shows that companies have been selling more maize, soya bean, and sorghum seed in small packages. This trend can be attributed to several ongoing initiatives to strengthen seed distribution systems and enhance seed companies' engagement with farmers. However, government investment in agricultural extension services has remained inadequate. In addition, most of Nigeria's active agro-dealers are not registered with the NASC, despite registration being required by law. These challenges are partly being addressed by some donor-funded projects. Despite working with seed companies, the NASC, as well as farmer groups and cooperatives, these projects are limited in scope and scale.

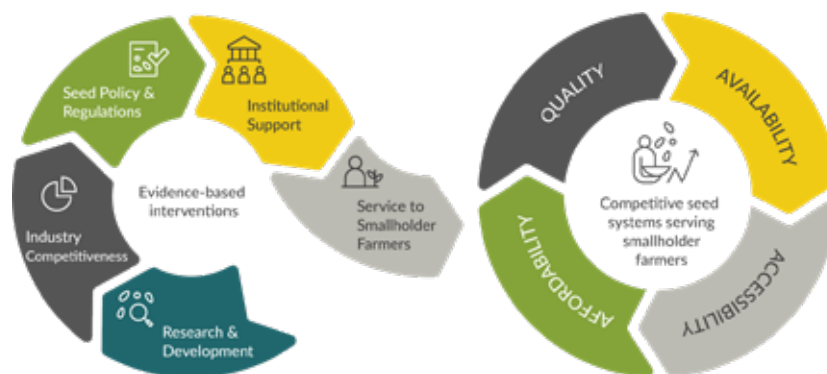
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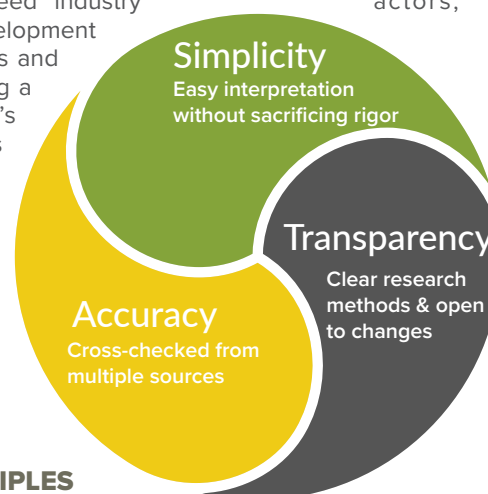
ABOUT TASAI



TASAI'S THEORY OF CHANGE

The African Seed Access Index (TASAI) is a seed industry research initiative that is coordinated by the nonprofit organization TASAI Inc. TASAI's goal is to encourage African governments and other seed industry players to create and maintain enabling environments that will accelerate the development of a vibrant private sector-led seed system serving smallholder farmers. It is this enabling environment that TASAI seeks to measure, track, and compare across African countries. The intended outcome of the index is improved access to locally adapted, affordable, and high-quality seed of improved varieties by smallholder farmers in Sub-Saharan Africa.

To assess the status of the seed industry value chain, TASAI tracks indicators in the following five categories: Research and Development, Industry Competitiveness, Policy and Regulations, Institutional Support and Service to Smallholder Farmers. By the end of 2022, TASAI studies will have been completed in 22 African countries: Burkina Faso, Burundi, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. In each country, TASAI works closely with local seed industry actors, government and international development agencies to share the TASAI findings and to identify the next steps for creating a vibrant national seed sector. TASAI's approach is guided by the principles of Simplicity, Transparency, and Accuracy.



TASAI PRINCIPLES

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For a comparison of TASAI Indicators across different countries and years, please visit the TASAI Dashboard online: <https://dashboard.tasai.org>

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TASAI

The African Seed Access Index



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