WORKING PAPER

Seed Policy Harmonization in ECOWAS: The Case of Nigeria

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This Case Study is part of a series of research and policy publications co-authored by the Syngenta Foundation for Sustainable Agriculture (SFSA) and New Markets Lab (NML) on regional seed policy harmonization in Africa, designed to assess the process for implementing seed regulatory systems that can better deliver improved seed varieties to farmers. It is part of the Syngenta Foundation's Seeds2B initiative.

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Executive Summary

The government of Nigeria is increasing focus on the legal and regulatory environment to encourage a thriving market for high-quality seed; over time, these actions will be fundamental to enhancing agricultural productivity, increasing food security, and improving rural livelihoods. Nigeria's efforts are part of a broader movement to address the legal and regulatory environment, both within countries and regionally, as a significant factor impacting the availability and accessibility of improved seed. Within Nigeria and elsewhere, much work is being done at the national and regional levels to build these systems. Yet, as this case study and others by the authors have indicated, implementing these frameworks remains an ongoing challenge and will require sustained focus and different interventions over time.

This case study on Nigeria and the Economic Community of West African States (ECOWAS) is one of a series by SFSA and NML designed to evaluate the process for implementing regional seed regulatory initiatives at the national level in a way that can better deliver improved seed varieties to farmers. These case studies are part of a larger project on regional seed harmonization launched by the partner organizations in 2014, which includes an assessment of regional harmonization efforts for seed regulation focused on ECOWAS, the East African Community (EAC), the Common Market for Eastern and Southern Africa (COMESA), and the Southern African Development Community (SADC). Other case studies in this series cover Kenya (a member of both the EAC and COMESA), Ghana (a member of ECOWAS), Zimbabwe (a member of both COMESA and SADC), and Zambia (a member of both COMESA and SADC). The partners have also conducted test cases to work through the regulatory process for variety release and registration in several of Africa's regions.

This case study, as do all in this series, will highlight challenges and opportunities arising from the alignment of countries' national seed systems with regional seed frameworks and regulations. While regional harmonization is intended to streamline regulatory processes and establish common approaches and systems along the seed value chain, the case studies in this series have highlighted the significance of national seed systems in the context of regional harmonization. At this stage, all regional harmonization initiatives have seen significant initial progress, but notable differences remain in national approaches that will require further assessment. Each case study in this series is designed to stand alone, but the series was also created to enable comparison of regulatory practices across several countries. Over time, an in-depth, comparative approach will strengthen understanding of how the implementation of regional seed initiatives can contribute

to a well-functioning seed regulatory system. In addition to the Case Studies, the project partners have developed a regulatory toolkit under the Seeds2B initiative, which includes an ongoing set of Test Cases with companies and research institutes to work through the regulatory process for regional variety release and registration step-by-step and document progress and challenges.

Based on the authors' findings, Nigeria has made notable strides recently, which are aimed at improving the seed sector. However, Nigeria's seed regulatory system still has gaps that should be addressed in order to meet farmers' needs and create broader domestic and regional markets within ECOWAS. Unlocking this potential will require progress with regulatory changes, several of which are underway, to strengthen Nigeria's seed system and align Nigeria's local seed law with the ECOWAS Seed Regulation. It will also require mechanisms within Nigeria to better implement laws and regulations in practice. Further, field consultations conducted in the development of this case study suggest that several aspects of Nigeria's seed system will require additional steps to implement the regulatory system going forward. The authors highlight several key recommendations to strengthen Nigeria's seed system and address remaining implementation gaps:

- ***Incorporate Clear References to Regional Protocols*** in national legislation as a good regulatory practice to facilitate harmonization with the ECOWAS regional seed framework.

- ***Streamline and Increase Transparency Around Regulatory Processes for Seed*** along the entire seed value chain. Consultations highlighted possible improvements to the variety registration and certification processes for example, including clear and consistent procedures and fees.

- ***Put in Place a Plant Variety Protection System*** which could motivate the private sector to more actively engage in the development of new and relevant seed varieties for the market. This process is underway in Nigeria and will require additional effort on the part of both government and the private sector.

- ***Implement National Laws and Regulations to Align with the ECOWAS Seed System***, working in close collaboration with stakeholders along the entire seed value chain to ensure those systems are well understood and work well in practice.

- ***Adopt African and Global Good Practices to Improve Quality and Build Capacity Within the Seed Sector***, including accreditation of private seed

inspectors (which Nigeria is moving towards), enhancing the capacity of public laboratories, and considering alternatives to formal seed certification.

- ***Strengthen Enforcement of Counterfeit Seed***, including through increased collaboration with private sector stakeholders (around labeling, for example) and adoption of good practices to combat fake seed.

- ***Increase Regional Regulatory Collaboration and Mutual Recognition*** to enhance cooperation among regulators and improve mutual recognition of each other's procedures and results.

- ***Improve Knowledge of National and Regional Rules Related to Seed*** and enhance the ability of diverse stakeholders to benefit from the formal seed system.

Overview of the Nigerian Seed System

Nigeria is the most populous country in Africa, with more than 177.5 million people (World Bank, 2016). The agricultural sector plays an important role in Nigeria's economy and in food security for the large population. Agriculture accounts for 20 percent of the country's GDP, employing more than 70 percent of its labor force, and accounting for 48 percent of the country's exports (World Bank, 2016). Nigeria has five agro-ecological zones suitable for growing a wide range of crops and diverse cropping systems across regions (Second Schedule, Agricultural Seeds Act, 1992). The climatic conditions in these zones largely reflect the presence of rainfall, with the wet southern zones bordered by the Atlantic Ocean and dry northern zones bordered by the Republic of Niger on the edge of the Sahara Desert.

Cassava represents the largest crop by area and production and is an important crop for smallholder farmers, with more than 90 percent of Nigeria's cassava production sourced from over five million smallholder farmers (World Bank, 2016). Yam is Nigeria's second largest crop in production terms; it is also a key crop for smallholder farmers (approximately 80 percent of production comes from smallholder farmers) and food security (Balogun, 2014). While Nigeria is the global leader in the production of both cassava and yam, cassava production has grown faster, receiving more attention from the government and private sector due to its versatile uses, which include food, starch, ethanol, and animal feed. High-quality cassava flour could also serve to lessen Nigeria's reliance on wheat imports, which were more than 4.5 million MT in 2013 (World Bank, 2016). Maize and rice are Nigeria's fastest-growing grain crops, which is partially a function of the government's efforts to decrease reliance on grain imports. With respect to legumes,

groundnut and cowpea are the two largest crops in Nigeria, but soybean has emerged as a crop targeted by the government to double in production, given its nutritional importance as a source of high protein for food and animal feed (World Bank, 2016).

In the 1960s, agriculture contributed 60 percent of GDP (Omorogiuwa et al., 2014), with groundnut alone representing about 70 percent of export earnings. However, after the oil boom in the 1970s, petroleum exports dramatically increased (and now account for more than 90 percent of export earnings), while agricultural exports plunged. Today, sesame seed and cashews are Nigeria's leading agricultural exports (National Bureau of Statistics, 2017). Destination markets for sesame seed are Japan, Korea, China, Turkey, and the Middle East, while cashew nuts primarily go to Vietnam and India. A 2015 European Union ban on food crops (which included beans, melon seeds, dried fish and meat, peanut chips, and palm oil) continues to impact the development of Nigeria's agricultural export sector. The ban resulted from cowpea exports that, upon analysis, had at least three times the acceptable limit of dichlorvos pesticide, which is considered dangerous to human health (World Bank, 2016).

The seed subsector of Nigeria's agricultural economy has undergone different stages of development since the 1960s. Initially, development of the seed industry was part of the mandate of the Nigeria Federal Ministry of Agriculture and Natural Resources (now the Federal Ministry of Agriculture and Rural Development). This was later taken up by National Seed Service (established in 1975 within the Ministry under the Department of Agriculture) to manage the seed industry over time, including the implementation of seed programs and projects to move the industry forward.

Under Decree No.33 of 1987, the National Crop Varieties and Livestock Breeds (Registration, Etc.) Act, the National Crop Varieties and Livestock Breeds Registration and Release Committee (NVRC)[2] was established and an office of a Registrar was created to oversee the variety release and registration process. The Registrar is the Director of the National Centre for Genetic Resources and Biotechnology (NACGRAB), which falls under the umbrella of the Federal Ministry of Science and Technology. The Registrar receives and verifies applications for variety release and registration, verifies that the new variety meets the Distinctiveness, Uniformity, and Stability (DUS) and Value for Cultivation and Use (VCU) requirements, organizes the national and technical meetings of the NVRC, which decide whether to release a variety or not, notifies the applicant of rejection or

[2] The NVRC is also known as the Crop Variety Registration and Release Committee under section 3 of the National Agricultural Seeds Decree of 1992.

acceptance of the application, and publishes the registration in the official, among other duties.

Enactment of the Nigeria Agricultural Seed Decree, No.72 of 1992 (Seed Act) led to the establishment of the National Agricultural Seeds Council (NASC), which not only took over the functions of the National Seed Service but also expanded the scope of administration of the entire subsector. The implementation of the National Agricultural Seed Decree is directly coordinated by the NASC, as the principal institution under the Federal Ministry of Agriculture and Rural Development. The objectives of NASC include support for varietal development, registration and release of new crop varieties, rapid multiplication of released varieties, promotion of improved quality of seeds sold to farmers for higher yields and better income, and private sector participation in seed operations through appropriate policies and promotional activities/incentives, among others (National Agricultural Seed Decree, 1992).

The NASC is comprised of the Minister of Agriculture and Rural Development as Chairperson, the Directors-General of the Federal Ministry of Agriculture and Rural Development, and the International Institute of Tropical Agriculture (IITA) (Sections 1 and 2 of the Decree No. 72 of 1992). The Minister of Agriculture and Rural Development appoints members of NASC, which also include:

- Directors of the Federal Department of Agriculture and the Department of Agricultural Science of the Federal National Agency for Science and Engineering Infrastructure;
- Four persons to be selected from each zone to represent State Ministries of Agriculture and Rural Development of Seed Co-ordination Committees;
- Four persons to represent the Nigeria seed industry;
- One person each from the Seed Growers Association, the Co-operative Societies of Nigeria, the Federal Ministry of Finance, and a private financial lending institution;
- Representatives of the Department of Plant Breeding and Seed Technology from a Nigerian University; and
- Head of the National Seed Service Unit of the Federal Ministry of Agriculture and Rural Development (serves as Secretary to the Council).

The NASC is required by law to propose and analyze seed development policies, actions, and programs. Actions include conducting research and analysis on legislation and other issues related to seed testing, registration, release, quality control, and supply and use of seed, as well as the development of regulations concerning quarantine measures, importation, and exportation of seed, among others (Section 3, Decree No. 72 of 1992).

To assist the NASC, the following five bodies were established: (1) Crop Variety Registration and Release Committee, (2) National Seed Service Unit, (3) Seeds Standards Committee, (4) Seed Industry and Skill Development Committee, and (5) Department of Training Information and Seed Extension. The Crop Variety Registration and Release Committee is responsible for making recommendations to the NASC on matters related to the registration and release of any crop variety and for declaring notification of a crop variety.

The National Seed Service Unit is responsible for the development, certification and quality control of seeds. These functions include technology development, technical support services, seed industry development, coordination of breeder and foundation seed production, and distribution and monitoring of certified seed. The Unit also plans and monitors the national seed program and publishes the list of registered, released, or notified seed varieties approved for commercialization in Nigeria.

The Seeds Standards Committee makes recommendations to the NASC on matters pertaining to seed standards and procedures. The Seed Industry and Skill Development Committee also makes recommendations to the NASC on seed industry and skill development. Finally, the Department of Training Information and Seed Extension has oversight of training and information sharing in the seed sector.

The roles of the key stakeholders involved in Nigeria's seed sector are summarized in Table 1 below.

Table 1: Key Institutional Roles In The Nigerian Seed Sector

Key Participant	Role
National Agriculture Research Institutes (NARIs)	Produce foundation and breeder seed (under the National Seed Service) and develop new varieties
National Agricultural Seed Council (NASC)	Responsible for the development, certification, and quality control of seeds as well as the licensing of private seed companies that produce foundation seed

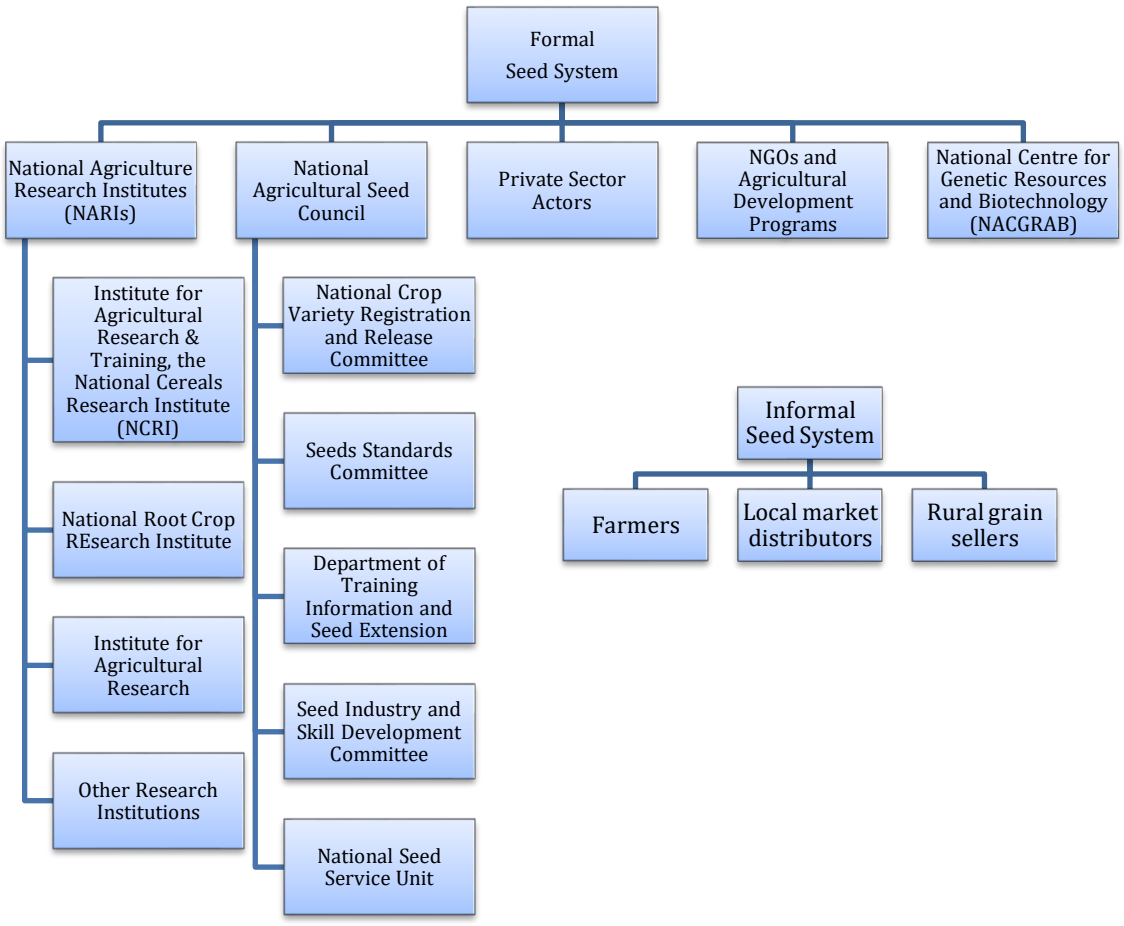
The National Crop Varieties and Livestock Breeds Registration and Release Committee	Responsible for the evaluation, release, and withdrawal of varieties
National Centre for Genetic Resources and Biotechnology (NACGRAB)	Responsible convening and organizing the National and Technical meetings for Crop Varieties, Livestock Breeds and Fish Strains Registration and Release; receiving and verifying applications for variety release and registration; verifying that the new varieties fulfill the Distinctiveness, Uniformity, and Stability (DUS) and Value for Cultivation and Use (VCU) requirements; notifying applicants of rejection or acceptance; and publishing variety registration in the official national Catalogue.
National Seed Service Unit	Responsible for the development, certification and quality control of seeds; planning and monitoring of the national seed program and publication of the list of registered, released or notified seed varieties that are approved for commercialization in Nigeria.
Seeds Standards Committee	Makes recommendations to the NASC on matters pertaining to seed standards and procedures.
Seed Industry and Skill Development Committee	Oversees training and information sharing in the seed industry.
The Department of Training Information and Seed Extension	Makes recommendations to the NASC on seed industry and skill development.
Non-Governmental Organizations (NGOs) and Agricultural Development Programs (ADPs)	Distribute certified seeds under community seed intervention programs
Farmers, local market distributors, rural grain sellers	Supply farmer-saved seed through the informal market
Private Sector Actors	Lead production of certified seed
Seed Entrepreneurs Association of Nigeria (SEEDAN)	The primary seed association in Nigeria, SEEDAN connects many private sector seed producers and serves as a liaison between both the national government and regional industry associations

Source: New Markets Lab, 2018.

There are two parallel seed systems in Nigeria: a formal system established by the State, and an informal or traditional system (World Bank, 2016). The formal system is characterized by the production and purchase of commercial certified seed while the informal sector is based on seed production and exchange among farmers at the local level (Lyon, 1998). In general, there are four types of seed: 1) farmer-saved

seed, 2) public-private seed development, with breeding done by the National Agriculture Research Institutes (NARIs) with private seed company involvement in certified seed production, 3) public-led seed development, and 4) private-led seed development, which is dominated by local seed companies. (FAO, 2016; World Bank, 2016). Farmer-saved seed represents the majority of seed volume. The public and private sectors produce the largest proportion of early generation seed volume, while farmer-saved seeds and farmer-to-farmer seed exchanges dominate the informal seed sector. The different primary actors for both the formal and informal seed sectors are diagrammed in Figure 1 below.

Figure 1: Key Regulatory Institutions and Stakeholders in the Nigerian Seed Sector



Source: New Markets Lab (2018).

The private sector's role in Nigeria's seed system is increasing, with private companies actively involved in seed multiplication and sale, including varietal development. Overall, the level of awareness and adoption of new seed varieties appears to be low, most likely due to inadequate delivery systems (CORAF, 2013). As is true throughout sub- Saharan Africa, many farmers continue to obtain their seeds from informal sources. These may include seed exchanges with other farmers, purchases from local markets, and seed saving. The majority of smallholder farmers recycle seeds of improved varieties. For instance, in 2016, only 30 percent of farmers' plots used seeds that were purchased (Olomola, 2018). That said, some farmers do buy improved seeds, while others depend upon free seeds acquired from donor- or NGO-funded input intervention programs.

Adoption of improved varieties is higher for some crops than others, with farmers tending to adopt improved varieties of grains more than improved varieties of root and tuber crops because root and tuber planting material is easily recyclable. Accordingly, there has been little demand for, or development of, root and tuber varieties. Among grain crops, improved varieties of maize, specifically hybrid maize, are adopted more than other grain cereals or legumes, perhaps due to development initiatives focused on maize (World Bank 2016).

Nigeria's Agriculture Promotion Policy (2016-2020), which was released in 2016, serves as a comprehensive implementation strategy for achieving four priorities, the first of which is food security. The implementation strategy envisioned by the Agriculture Promotion Policy highlights the importance of providing a conducive legislative and agricultural knowledge framework for enhancing access to adequate inputs such as seed, as well as institutional mechanisms for coordination of the seed sector. It also encourages facilitating a shift in leadership in the commercial aspects of the seed industry to the private sector and the need for a strong government role in the provision of support services important for the effective development of the seed industry (Agriculture Promotion Policy, 2016-2020).

Variety Maintenance and Early Generation Seed Multiplication

Quality seed breeders must keep nucleus seed, or very high-quality seed, in order to produce and multiply seed that maintains its varietal characteristics throughout generations. Early generations of seed are called breeder and foundation seed (or sometimes pre-basic and basic seed). To multiply early generation seed, the producer must have a high degree of technical expertise as well as the right equipment and infrastructure. Seed multiplication can also require large tracts of land. The breeder often oversees the multiplication of early generations of seed.

Research organizations primarily produce and distribute foundation seed for new crop varieties and depend upon the private sector or registered seed companies to multiply and market seed (Kuhlmann, 2015). Varietal maintenance can be a challenge when sufficient infrastructure, such as gene banks, is lacking.

Nigeria has a three-tiered system of seed production and multiplication: breeder seed, foundation seed, and commercial or certified seed under the seed certification scheme (Agricultural Seed Decree). While development of early generation seed systems and specific roles and responsibilities vary across crops, some general observations apply. The NARIs are generally responsible for breeder seed production. Appointed NARIs include the Institute for Agricultural Research & Training, the National Cereals Research Institute (NCRI),[3] the National Root Crop Research Institute, and the Institute for Agricultural Research. Depending upon the crop, private seed companies also produce foundation seed along with the seed production units of the NARIs.

Agricultural Development Programs (ADPs) and private seed companies are the key actors involved in commercial seed production, but private companies willing to produce both foundation and certified seeds must do so under separate trade names. Historically, the National Seed Service under NASC was responsible for foundation seed production, but under Nigeria's current National Seed Law, foundation and certified seed production is led by the private sector.

Production of foundation seed is decentralized, with NASC focused on supervision, certification, and licensing of private seed companies that produce foundation seeds (Agricultural Seed Decree). NASC has access to national, regional, and international gene banks for the development of new varieties. The breeder seeds are given to seed units of institutes, seed companies, and ADPs for multiplication as foundation seed. NARIs, are mandated to distribute breeder seed free of charge. Foundation seed for crops like rice is sometimes produced by NARIs; for instance, the seed production unit of NCRI is registered as a private seed enterprise.[4]

Formal and Informal Seed Delivery Systems

The private sector dominates certified seed production in Nigeria. Increasingly, commercial seed companies are employing out growers to produce certified seed. In

[3] NCRI is responsible for genetic improvement, varietal maintenance, and breeder seed production of rice in Nigeria.
[4] In 2014, the WAAPP seed intervention program contracted NCRI to produce breeder and foundation seeds of rice for distribution to seed companies at 40 percent price support. (NASC 2014 Annual Report)

2014, 99 private seed companies and three community-based organizations produced certified rice seed (NASC 2014 Annual Report). The bulk of certified seed produced is marketed and distributed by agro-dealers, while ADPs and NGOs also distribute certified seeds under community seed intervention programs. Organized farmer groups or cooperatives also buy certified seeds in bulk from seed companies and agro-dealers to be distributed among individual farmers within the group, which increases smallholder farmers' access to certified seeds.

The informal system also plays a large and important role in seed distribution because the formal system cannot meet current early generation and certified seed demand. As with many other crops, the informal system is dominated by farmer-saved seed. However, farmers also obtain seeds from grain sellers in rural open markets and neighboring farmers when their saved seeds are not sufficient for planting. In addition, farmers fall back on saved seeds and grains from local markets when donor- supported community-based intervention programs that distribute free seeds through ADPs are not available (World Bank, 2016). This is particularly common in the north. Through the efforts of seed companies and their out growers, there has been a gradual increase in awareness among farmers about the benefits of using new seeds every season.

Regional Harmonization

Harmonization of seed laws and regulations to conform to regional and international best practices is regarded as an important factor in promoting a modern and competitive seed industry (See, e.g. Gisselquist, 2001, Kuhlmann, 2015). A common regulatory framework is expected to reduce the cost of trading seed and encourage economies of scale in seed production. A resultant effect of this can be the expansion of commercial seed production, which provides farmers with better access to new and improved seed varieties and stimulation of productivity and growth (Rohrbach, 2003). While progress in harmonizing seed regulations can be seen across regional economic communities (RECs), including ECOWAS, effective implementation of regional harmonization will require further action at the national level as well as mutual recognition of rules and regulatory systems between countries (Kuhlmann, 2015).

In May 2008, Ministers of the ECOWAS Countries [5] approved Regulation C/REG.4/05/2008 on Harmonization of the Rules Governing Quality Control,

[5] The ECOWAS countries are Benin, Burkina Faso, Cape Verde, Chad, Côte D'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

Certification and Marketing of Plant Seeds and Seedlings in the ECOWAS Region (ECOWAS Seed Regulation). The ECOWAS Seed Regulation covers eleven major crops that are important to food security and trade within the region: maize, pearl millet, rice, sorghum, cassava, Irish potato, yam, cowpea, groundnut, onion, and tomato. Following the determination to adopt regulations on the administration of the seed system, ECOWAS adopted enabling regulations on the roles, organization, and functions of the West Africa Seed Committee (WASC) in June 2012 (Keyser, 2015). The WASC had been created under the ECOWAS Seed Regulation to implement rules on seed quality control, certification, and marketing. A summary of the ECOWAS Seed Regulation of 2008 and the Enabling Regulation of 2012 is included in Figure 2 below.

In West Africa, the West and Central African Council for Agricultural Research (CORAF) has been a significant partner in regional harmonization efforts and has been tasked with implementation of the ECOWAS Seed Regulation. CORAF was formerly the Conference of the African and French Leaders of Agricultural Research Institutes and Conference of the Agricultural Research Leaders in West and Central Africa (CORAF/WECARD). CORAF's implementation efforts are focused through the West African Seed Program (WASP) funded by the U.S. Agency for International Development (USAID). CORAF recently issued an official release to ECOWAS, the West African Economic and Monetary Union (UEMOA),[6] and the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) Member States, based on Article 88 of the ECOWAS Seed Regulations, requesting publication of the ECOWAS regulations in countries' official national Gazettes, which would allow the enforcement of the ECOWAS seed regulation across regions, although there are some notable differences in legal systems across ECOWAS as this Case Study and others in the series highlight.

In ECOWAS, any variety entered into the national catalog of a member state should become part of the West African Catalogue for Plant Species and Varieties (West Africa Seed Catalogue). The first edition of the catalogue was published in 2018. As discussed below, the West Africa Seed Catalogue operates differently from the catalogues in other regions, since new varieties only need to be registered in one member country in order to be eligible for entry in the regional catalogue; both

[6] Established in January 1994, the West African Economic and Monetary Union (UEMOA) consists of eight member states: Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. In addition to a shared regional currency, the CFA franc (underwritten by France through a guaranteed conversion ratio to euros of one to .0015), WAEMU pursues regional integration into a single market with measures such as a common external tariff and periodic reviews of member states' macroeconomic policies based on convergence criteria (IMF Online Survey, 2012).

COMESA and SADC require registration in two countries in order to be eligible for entry in the regional catalogue (See Kuhlmann & Zhou, 2016). In practice, the West Africa Seed Catalogue has reportedly functioned as a compilation of the national catalogues of individual countries (Keyser, 2013). However, of the over 600 varieties from 38 crop species released in Nigeria, in 2016 NACGRAB reported that only 166 varieties from 10 crop species had been entered into the ECOWAS Regional Catalogue (2016 NACGRAB Guidelines for Registration and Release of New Crop Varieties in Nigeria). This indicates that the process for including varieties in the West Africa Seed Catalogue is not automatic and may hinge upon approval by the WASC.

Institutional capacities differ among countries within the region, and some have made strides in bringing different aspects of their legal frameworks in line with ECOWAS rules (See Figure 2). At present, a number of ECOWAS countries have yet to establish structures that fully comply with the ECOWAS Seed Regulation. While some countries have passed domestic seed laws, these may not fully align with the regional standards. Further, many countries continue to adhere to their own laws, notwithstanding these divergences. Nigeria, as is discussed in the following section is one example, as are Burkina Faso, Mali, and Ghana (Keyser, 2015; Kuhlmann and Zhou, 2016).

Figure 2: Scorecard of Compliance with ECOWAS Seed Regulations, As of April 2016.

Additional Measures to be undertaken by Member States (MS) for the implementation	Targeted Countries	Benin	Burkina Faso	Capo-Verde	Chad	Côte d'Ivoire	Gambia (The)	Ghana	Guinea	Guinea Bissau	Liberia	Mali	Mauritania	Niger	Nigeria	Senegal	Sierra Leone	Togo	%
• Publication in MS' Official Gazette (2.1)		Y	Y	N	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	71
• Review of Seed Regulatory Frameworks (2.2):																			
✓ National Seed Law		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
✓ Decree instituting a National Catalogue		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
✓ Decree establishing a National Seed Committee (NSC)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
✓ Decree creating Seed Sector Support Fund (SSSF)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
✓ Decree on Enabling Technical Regulations (ETRs)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
• Adaptation of Procedures Manuals for (2.3):																			
✓ Variety Release		Y	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	N	Y	76
✓ Seed Quality Control and Certification		Y	Y	N	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	N	Y	71
✓ Phytosanitary Certification		Y	Y	N	N	Y	Y	N	N	N	N	Y	N	N	Y	Y	N	N	41
• Capacity Strengthening on (2.4):																			
✓ Human Resources		Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	82
✓ Material Resources		Y	Y	N	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	71
✓ Financial Resources		Y	Y	N	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	76
❖ State in country (%)		100	100	50	66	100	100	92	83	66	58	100	75	92	100	100	67	92	

Source: WASP, 2017 (Ernest Asiedu)

In addition to the West Africa Seed Catalogue, the ECOWAS Seed Regulation covers a number of areas (See Figure 3).

Figure 3: Key Provisions of the ECOWAS 2008 Seed Regulation and 2012 Regulations

- **Requirements for variety registration:** For an improved variety to be released in any country, it must have produced satisfactory DUS and VCU test results from trials carried out under the supervision of the country's national seed committee. The DUS tests may be carried out in a single location while the VCU tests must be conducted in several locations and include at least one set of farmer field trials. The criteria to be used for evaluating DUS and VCU data are based on international standards set by UPOV where they exist.
- **Regional variety catalog:** A variety that has been tested according to agreed DUS and VCU procedures and duly registered in one country's national variety catalog will be entitled to entry in the "West Africa Catalog of Plant Species and Varieties" after which it can be multiplied and traded anywhere in the region. The listing of a new variety in the regional catalog will be valid for 10 years, renewable for periods of five years thereafter.
- **Three seed categories:** For the 11 species covered, national catalogs and the regional catalog will group the varieties under three lists including **List A** for improved varieties whose seeds may be multiplied and traded within the region; **List B** for improved varieties whose seeds may be multiplied within the region for export outside the region; and **List C** (or "special list") for indigenous varieties or landraces that have been described/characterized by a country's NARI. Vegetables included in List A are exempt from VCU trials and crops in List B only require DUS tests.
- **Requirements for seed certification:** Every seed lot intended for domestic or international sale in ECOWAS shall be certified in accordance with international standards set by the OECD for field inspection and ISTA for laboratory analysis or other OECD/ISTA-based rules adopted by ECOWAS.
- **Mutual recognition of variety lists and seed certificates:** Each country must permit the importation and sale of varieties registered in the regional catalog that are certified in accordance with the harmonized rules. Licensed traders shall only be required to submit an advance declaration to the importing country's quality control and certification service.
- **Seed sector actors to be licensed professionals:** Licenses are compulsory for all sector participants, and must be renewed every three years by the quality control and certification service of each member state. Criteria and fees for licensing are defined by each member state. At the discretion of the member state, production licenses may be issued to private companies for any seed category including breeder seed and foundation seed.
- **Access to information:** Member states are required to ensure the full participation of seed sector participants in the process of public decision making on seed related matters and organize public access to seed related information available to public authorities.
- **Harmonized definitions and labeling standards:** Countries shall observe standard definitions of seed terms and ensure that standard labels with a minimum set of information are affixed to all seed packs.
- **Oversight and administration:** The West Africa Seed Committee (WASC), funded by the ECOWAS Commission, will serve to monitor and facilitate implementation of the regulations and support development of national seed sectors.
- **Right to appeal and confidentiality:** Licensed seed professionals have the right to appeal any decision against them by the national seed authority and to have their information treated confidentially.

Source: ECOWAS Regulations. (Keyser, 2015)

The ECOWAS Seed Regulation differs from the regional regulations in other sub-Saharan African regional economic communities (RECs) in several respects. One is with respect to how the ECOWAS rules are implemented. In some countries, notably Nigeria and Ghana, national constitutional structures require parliamentary ratification in addition to publication in the Gazette (Kuhlmann & Zhou, 2016). Most ECOWAS countries follow a Civil Code legal system and do not require this additional step for domestication (Kuhlmann & Zhou, 2016), making domestication more automatic, but Nigeria and Ghana are Common Law jurisdictions which require parliamentary ratification (in Nigeria, this means that the National Assembly must act to domestic any treaty or regional regulation). This aspect of implementation highlights differences in legal systems within ECOWAS, where divergences between Common Law and Civil Code systems may continue to present challenges as the implementation of the 2008 ECOWAS Seed Regulation moves forward (Kuhlmann & Zhou, 2016).

Another difference relates to the regional catalogue. In COMESA and SADC, for example, a variety must be registered in two member countries in order to be eligible for entry into the region's seed catalog. The West Africa Seed Catalogue also requires prior entry in two member states but additionally mandates affirmative entry into the COMESA and SADC regional catalogues. The process established through the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), which is followed by most of the members of the EAC, allows that a variety registered in one country's national catalogue can be registered in another country following a streamlined domestic testing procedure with only one season of VCU trials, which essentially serves as a "confirmation" test;[7] COMESA's rules include a similar process for "fast-tracking" varieties already registered in one member country.

Once in the West Africa Seed Catalogue, a variety should be able to be freely traded and allowed for multiplication throughout the region without any further registration requirements. As this case study and other work has shown, however,

[7] The existing seed regulation harmonization arrangement in East Africa is based on an agreement on variety release and registration, which was reached between Uganda, Kenya, and Tanzania and is based on the work of ASARECA, the Eastern and Central Africa Program for Agricultural Policy Analysis (ECAPAPA), and the Eastern Africa Seed Committee (EASCOM). It is currently being implemented under the ASARECA/ECAPAPA Agreement, Monograph Series No. 4. The ASARECA/ECAPAPA work also includes harmonization of seed certification procedures, SPS regulation, plant variety protection, and seed law and regulations (New Markets Lab, 2015). Rwanda has also shown interest in joining the arrangement. The East African Community is in the process of developing harmonized rules, which will likely both incorporate and supplant the ASARECA/ECAPAPA Agreement.

this process is not automatic, and the requirements of the ECOWAS system sometimes conflict with countries' national practices.

In addition to the launch of the West Africa Seed Catalogue, other developments are underway within ECOWAS. In August 2015, the ECOWAS Regional Seed Committee was launched and a plan of action developed which lays out strategies on the implementation of the ECOWAS seed regulations and the operationalization of the National Seed Committees. In collaboration with member countries of UEMOA as well as Mauritania and Chad, ECOWAS is also putting in place other measures (including the development of additional implementing regulations) that will give effect to the 2008 ECOWAS Seed Regulation. The first of these regulations meant to specify how practical implementation will work was the Enabling Regulation 01/06/12 on the West African Seed Committee, discussed above. CORAF was given responsibility by ECOWAS for the establishment and execution of the committee's mandate.

Notably, Nigeria is also a member of the African Regional Intellectual Property Organization (ARIPO); a regional organization focused on intellectual property rights (IPR). In July 2015 ARIPO adopted the Arusha Protocol for the Protection of New Varieties of Plants, which created a regional framework for plant variety protection (PVP). While the draft ARIPO PVP Protocol conformed to the International Union for the Protection of New Varieties of Plants (UPOV) Convention, the final Arusha Protocol that was adopted contained amendments that precluded full compliance with UPOV. In particular, the final Protocol recognizes a system of national-level PVP rather than a unitary system for the entire territory (New Markets Lab, 2015). Nigeria is currently working to become a full member of UPOV (as with all treaties Nigeria signs, UPOV membership will need to be formalized by the National Assembly) and has a draft PVP bill before the Nigerian House of Assembly which will bring Nigeria's law in line with ARIPO, the WTO Agreement on Trade-Related Intellectual Property (TRIPS Agreement) and ECOWAS, which also call upon countries to legislation establishing an IPR system for seed.

Nigeria's Legal and Regulatory Framework

Policies, laws, regulations, and guidelines govern Nigeria's seed sector, and the National Agricultural Seeds Decree, No.72 of 1992 is the main governing law. The 1992 Act is divided into four parts, including provisions on rules and processes for variety release and registration, seed certification, and import and export of seed. To accompany overarching laws or acts, most legal systems include regulatory

frameworks that provide specific rules for the implementation and enforcement of laws. The 1992 Act has not been fully implemented, partly because of the absence of regulations to provide more detailed guidance on its application. Nigeria's 1992 Seed Act is, however, undergoing revision and is expected to be repealed by the National Agricultural Seeds Council Bill, which had passed both the House of Assembly and Senate of Nigeria as of the time of publication of this case study. The NASC Bill, among other things, makes changes to the composition of NASC; harmonizes with the regional regulations on variety release and registration; makes provision for farmers' rights and plant breeders' rights; and includes stricter penalties for offenses, such as the sale of counterfeit seed.

Other key policies, laws, and guidelines are the National Crop Varieties and Livestock Breeds (Registration etc.) Act, No.33 of 1987, the National Biosafety Management Agency Act of 2015, Agriculture (Control of Importation) Act of 1964, the 2016 NACGRAB Guidelines for Registration and Release of New Crop Varieties in Nigeria, and the 2017 NASC *Guidelines for Registration of Seed Producers or Companies and Seed Fields in Nigeria.*

Nigeria does not currently have a legal framework for plant variety protection. However, the Industrial Property Commission (IPC) Bill, 2016, which was before the Nigerian House of Assembly as of December 2018, includes plant variety protection provisions in Part D. Nigeria has also been in contact with the UPOV office to ask for assistance with developing its plant variety protection laws based on UPOV guidelines. NASC is responsible for stakeholder outreach and convening related to the draft PVP law and other relevant rules and regulations.

Variety Release and Registration

From the launch in 1989 of the NVRC through 2016, 600 varieties of 38 crop species had been released and registered in Nigeria (2016 NACGRAB Guidelines for Registration and Release of New Crop Varieties in Nigeria). Based on information available through NACGRAB at the time of publication, 608 varieties have been registered in the Nigerian National Seed Catalogue.[8] At the most recent meeting of the NVRC in July 2018, seventeen new crop varieties were released. At that meeting, two genetically modified (GMO) crop varieties (transgenic hybrid cotton) were also released, marking the first GMO varieties registered in Nigeria. The World Bank's

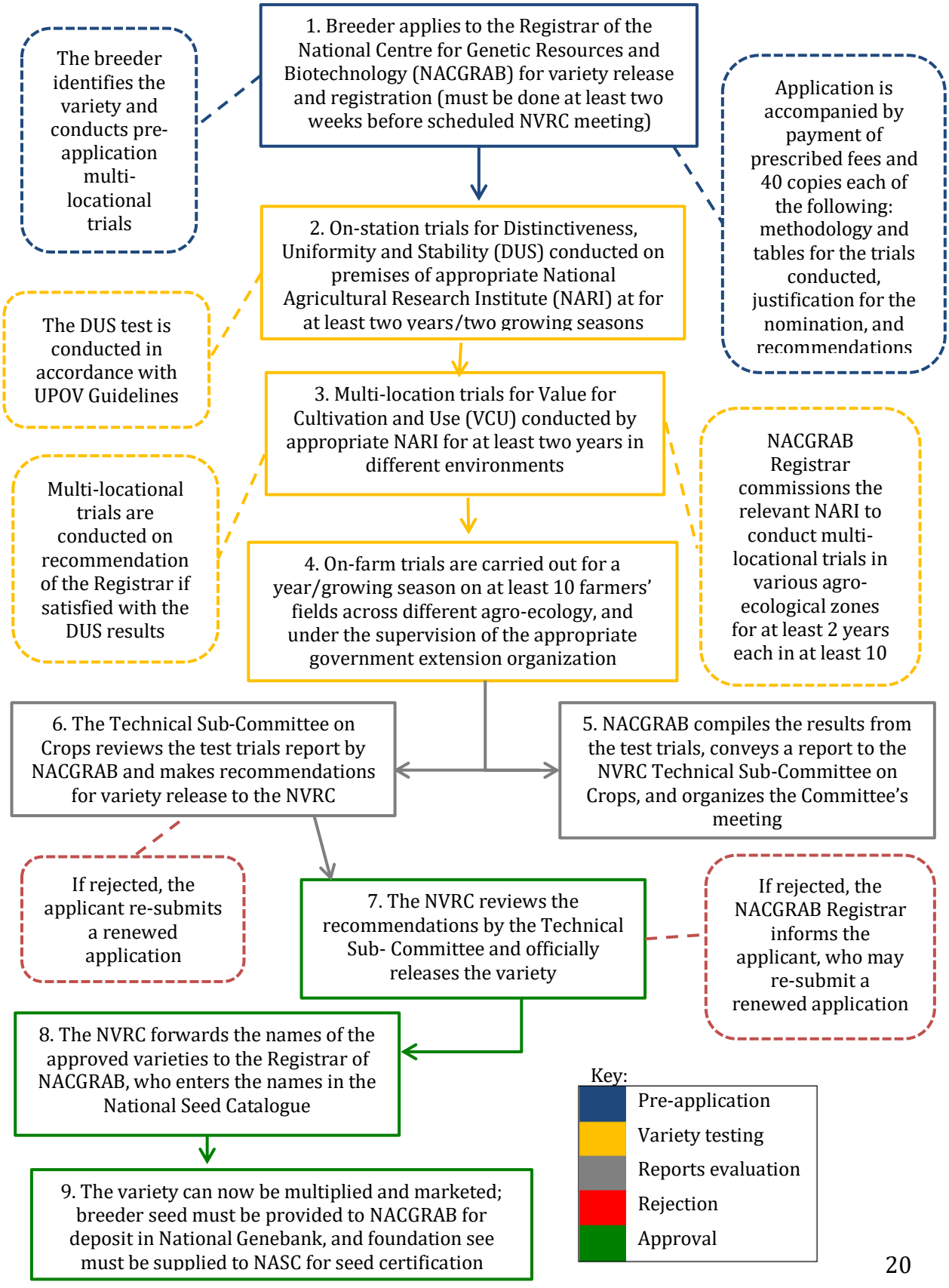
[8] See http://www.nacgrab.gov.ng/images/Varieties_Released_Catalogue.pdf

Enabling the Business of Agriculture Report for 2017 states that the time required to release a new seed variety in Nigeria is 367 days (registration of a maize variety is used as the baseline); this timeframe is reportedly sometimes twice as long for crops like cassava and yam. As noted above, NACGRAB and the NVRC are the main institutional bodies involved in seed variety release and registration, and NACGRAB's 2016 *Guidelines for Registration and Release of New Crop Varieties in Nigeria 2016* were passed to assist the relevant actors in variety release and registration. (See Figure 4 for Variety Release and Registration Process).

NACGRAB and the NVRC are the main institutional bodies involved in seed variety release and registration. A breeder from a licensed seed company or recognized research center may present a crop variety for registration and release (See Figure 4 above). An application for variety registration and release is made to the Registrar of NACGRAB, with payment of prescribed fees and 40 copies each of all required documents (methodology and tables for the trials conducted, justification for the nomination, and recommendations and references).

All crops cultivated in Nigeria have corresponding national agricultural research institutes (NARIs) established under the Institute of Agricultural Research (IAR) and listed in Appendix I of the 2016 NACGRAB Guidelines on Release and Registration of New Crop Varieties. NVRC and the Registrar of NACGRAB ensure that new varieties pass the Distinctiveness, Uniformity, and Stability (DUS) and Value for Cultivation and Use (VCU) tests, which are done with the involvement of the NARIs. A new variety must undergo two seasons of testing for Distinctiveness, Uniformity, and Stability (DUS) and Value for Cultivation and Use (VCU) in order for it to be eligible for release by the NVRC. Under the NACGRAB 2016 Guidelines on the Release and Registration of New Plant Varieties, on-station DUS trials of the candidate variety must be done within the premises of the relevant NARI for at least two years and in accordance with UPOV guidelines. Multi-locational VCU trials are also required for at least two years and in at least 10 locations. In addition, on-farm field trials must be conducted for a year or growing season on at least ten different farmers' fields to determine whether the variety will be accepted by farmers.

Figure 4: New Markets Lab Regulatory Systems Map for Nigeria Variety Release and Registration Process



Source: New Markets Lab, 2018

The Technical Sub-Committee on Crops of the NVRC also plays a crucial role in the registration and release process. Section 5(6) of Decree No. 3 of 1987 spells out its functions, which include the provision of guidelines for the determination of superiority, homogeneity, distinctiveness, and stability of materials to be released; determination of guidelines for testing and describing new crop varieties; establishment of a variety naming system and recommendation of names for new varieties to the Release and Registration Committee; and nomination of new varieties into the National Accelerated Food Production Project and Research Institute for field testing to develop production packages.

Industry representatives consulted in the development of this Case Study noted differing fees for variety registration, which may be as a result of the different institutions involved depending upon the crop. Stakeholders consulted in the development of this case study also highlighted that the 2016 NACGRAB Guidelines should be updated to add the crop and research institutes, which could perhaps help make the charges for conducting trails more consistent.

Following the field tests, the Registrar of NACGRAB compiles the trial tests results report, convenes the meeting of the Technical Sub-Committee on Crops, and conveys to it the application together with the trial tests results report. The Technical Sub-Committee on Crops reviews and deliberates on applications and makes recommendations to the NVRC for final deliberation and approval. If approved, five kilograms (kg) of breeder's seed is given to NACGRAB for safekeeping in the National Genebank, and 50 kg of foundation seed is given to the NASC for seed certification (NACGRAB, 2016). If the NVRC declines to release the variety, the Registrar of NACGRAB notifies the applicant, who may then present a renewed application for variety release and registration.

It is worth noting that the NVRC meets only once or twice a year depending upon funding. Prior to the meeting, the Registrar provides six weeks' notice of the varieties to be discussed, and a four-week window is given for nominations to the NVRC. Any nominations presented two weeks or fewer prior to the meeting will be tabled for a subsequent meeting. The National Variety Release Catalogue includes all varieties registered; it is published by NACGRAB and can be found online.[9]

[9] Available at http://www.nacgrab.gov.ng/index.php/varietal-release/88-crop-varieties-release-catalogue.

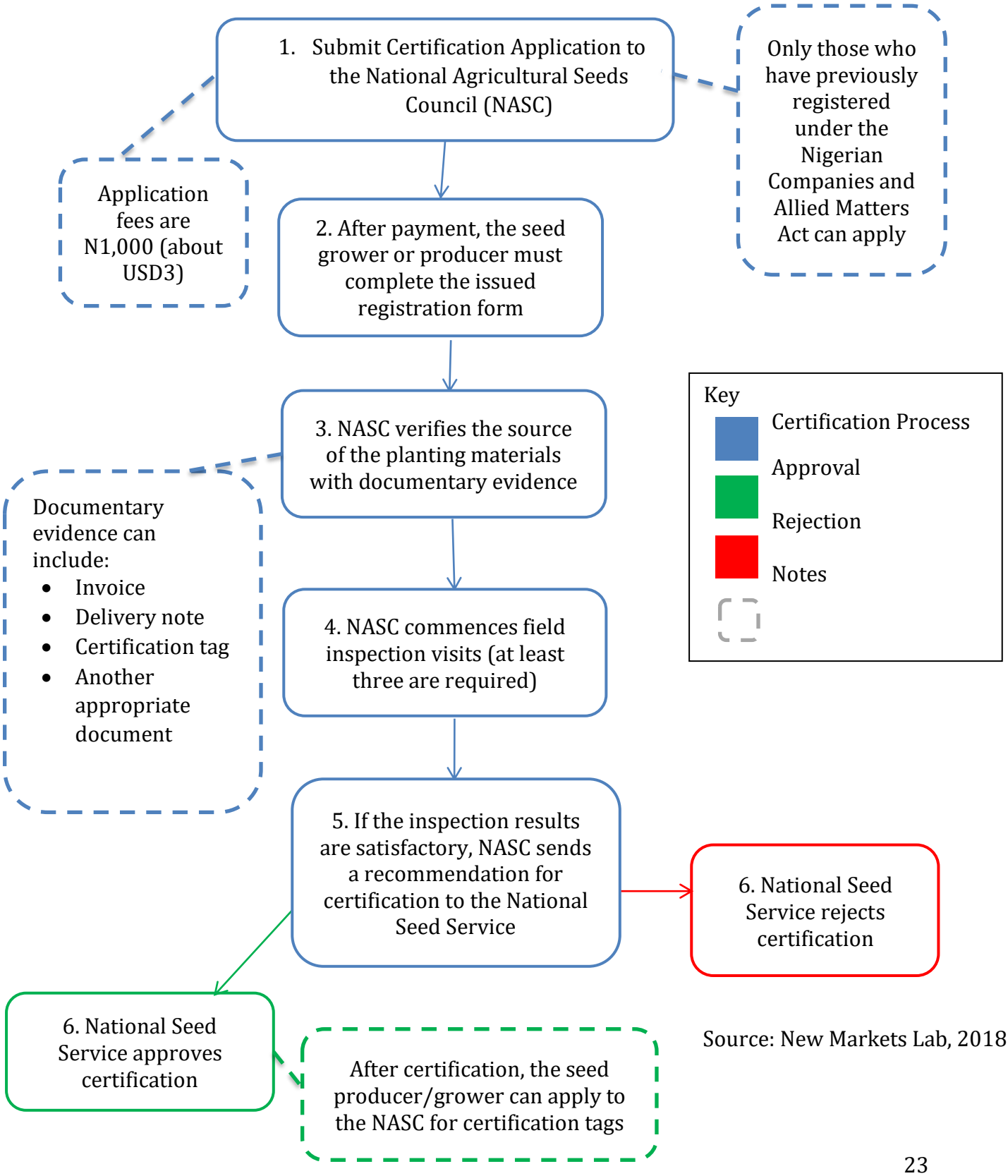
The NASC mandates local testing of all varieties intended for sale to farmers in Nigeria, asserting that recognition in the West Africa Seed Catalog under ECOWAS covers only those varieties that are imported for direct use on farm and does not apply to seed intended for commercial sale to farmers (Kuhlmann & Zhou, 2015).

Seed Certification

Like most other countries in sub-Saharan Africa, Nigeria maintains a centralized seed certification system. This practice is based on the underlying assumption that the government is responsible for the protection of seed consumers (Venkatesan, 1994). Seed certification in Nigeria is provided for under the National Agricultural Seeds Decree No. 72of 1992. NASC is mandated with analyzing and proposing programs, policies, and actions for seed certification in Nigeria (section 3a). Within NASC, the Seed Certification, Quality Control, Crop Registration and Release Department oversees seed certification.

In Nigeria, not all seed is eligible for certification; seed can only be certified if it has gone through the prescribed procedures for inspection, sampling, and laboratory testing by an accredited person authorized by the NASC (See Figure 5). NASC operates the National Seed Testing Laboratory, which carries out seed sampling and laboratory quality tests to verify moisture content, purity, germination and health of the seeds before the seeds are certified for distribution and sale. While Nigeria does not yet have an International Seed Testing Association (ISTA) accredited laboratory, NASC does have registered members with the ISTA, and a Nigerian lab is in the process of becoming ISTA-accredited. Further, NASC has released guidelines on fee schedules and testing procedures on its website that state that ISTA standards are preferred throughout the testing process. The ECOWAS Seed Regulations also follow ISTA standards, further demonstrating Nigeria's efforts to link its procedures to good practices within the region and internationally.

Figure 5: New Markets Lab Regulatory Systems Map for Seed Certification Process in Nigeria



Source: New Markets Lab, 2018

In March of 2017, NASC passed guidelines for registration of seed producers or companies and seed fields in Nigeria, which also include a procedure for seed certification (Figure 5). Under the NASC guidelines, The Seed Service Unit under NASC develops, certifies, and controls the quality of seeds under the Decree (section 6(1)a) of the National Agricultural Seeds Decree or 1992 Seed Act).

Under the rules, a seed grower or producer must make an application for certification to the NASC accompanied by payment of the necessary fees of N1,000 (just under USD3). Only a registered seed producer or grower can apply (all companies must also be registered under the Nigerian Companies and Allied Matters Act, Cap 59).

After payment, the seed grower or producer is then issued with a registration form, which has to be returned and filled. NASC then verifies the source of the planting materials to be used for further multiplication with documentary evidence provided by the producer or grower (including invoice, delivery note, certification tag, or any other appropriate documents from the source of the planting materials). NASC will them conduct inspection visits, done by a certification officer, and collect necessary inspection fees.

NASC requires that seed fields be inspected at least three times by NASC certification officers. If the certification officer is satisfied with the results, a recommendation for certification shall be made to National Seed Service, which may then issue a certification certificate. Under the National Agricultural Seeds Decree, Nigeria follows a system of Minimum Standards Certification that includes the setting of mandatory minimum standards for the different classes of specific crops.

After certification, the seed producer or grower then applies to NASC for certification tags, which can be printed and issued within 24 hours. The seed producer/grower can then label the seeds. The label has information such as variety name, weight, percentage of purity and information about variety registration. Figure 5 above depicts this process.

Despite having a robust mandate, limitations on NASC's resources impact its productivity. These capacity challenges include limited mobility, ill-equipped laboratories, and a limited number of trained personnel to undertake various quality assurance activities (Oyekale, 2015; World Bank, 2016). Nigeria is a vast country, and currently, only ninety-five-certification officers cover the entire country, which can cause delays in the certification process. Nigeria plans to address

this by authorizing private seed inspectors, a practice that other countries (including Zambia, Zimbabwe, Kenya, South Africa, and Ghana) have also adopted to build capacity for certified seed.

In addition, as part of its duties, NASC is required to oversee the inspection of seed growers' fields. In practice, however, staffing and budgetary shortfalls make it difficult to oversee the approximately 30,000 hectares of certified seed. Gaps in Nigeria's quality assurance system in breeder seed production affect foundation seed production as well (World Bank, 2016). NASC is aware of these challenges, however, and is actively working to increase the capacity for certified seed inspection and production (the number of licensed seed producing agents, for example, is reportedly expected to double with some of the contemplated changes). It is also increasingly looking at ways in which to ensure traceability, including through barcodes and e-certification.

Access to genuinely certified seed continues to be a challenge for smallholder farmers in Nigeria. Farmers, especially those in rural areas are underserved with respect to functional agro-dealers because they tend to concentrate in cities that are far away from farmers (AGRA, 2017). Nigeria has also struggled with counterfeit seed production, as have other countries in sub-Saharan Africa. The absence of regulations or guidelines on labeling of certified seed in Nigeria exacerbates the situation. To address this challenge, at the end of 2017, NASC introduced an e-certification system, which is also operational in other countries like Kenya, India, and the United Kingdom. The e-certification software is Global Positioning System (GPS)-based and allows every seed certified by NASC to be electronically traced back to the producer. The objective is to ensure that farmers can easily authenticate certified seed via text message from anywhere within the country using the unique PIN on certification tags. The system is aimed at eliminating counterfeit and fake seed from the market.

ECOWAS rules are meant to harmonize certification across the region. Common practices include accreditation of inspectors; standardized qualification requirements (including staff and equipment); establishment of common seed classes and labels; and common practices for field inspections, laboratories, packaging, and processing and storage. Nigeria follows the ECOWAS harmonized seed regulations on seed quality standards. ECOWAS also requires member states to adopt the Organisation for Economic Co-operation and Development (OECD) standards for field inspection and ISTA standards for laboratory analysis. The OECD Schemes for the Varietal Certification or the Control of Seed Moving in International Trade ("OECD Seed Schemes") establish common practices for varietal certification

across participating countries and cover seven seed species. A total of 58 countries, including seven African countries, formally participate in the OECD Seed Schemes, but Nigeria is not yet a formal participant.

The ECOWAS Seed Regulation recognizes four seed classes, namely: parent material (G0), pre-basic seed (G1, G2, G3), basic seed (G4), and certified seed. These seed classes differ slightly from Nigeria's allowed seed classes (see Table 2).

Table 2: Comparison of Nigerian Seed Classes with ECOWAS Seed Classes

Nigerian Seed Classes	Breeder Seed	Foundation/Inbred Lines		*Certified Seed*
ECOWAS Seed Classes	Parent Material	Pre-basic Seed	Basic Seed	Certified Seed

Nigeria's National Agricultural Seed Decree sets out three seed classes in section 14, namely: breeder seed, foundation/inbred lines, and certified seed. The Nigerian seed certification system does not recognize any other seed classes, nor does it allow for Quality Declared Seed (QDS) (ISSD Africa, 2017). QDS is typically used in areas where centralized certification might not be feasible, such as local production of seed by smallholder farmers or for particular crops. QDS can provide a viable alternative to formal certification, and QDS systems often set crop-specific requirements for field standards, facilities, field inspections, and seed quality, including those that follow the guidelines set by the Food and Agriculture Organization of the United Nations (FAO) (Kuhlmann, 2013).

ECOWAS also requires the harmonization of labeling systems for different generations of seed based on ISTA Standards in relation to such variables as isolation distance, number of inspections, germination tests, and moisture content. Although not all countries within the ECOWAS region have enacted laws to regulate seed quality and certification, an even smaller number of countries have issued procedural manuals for seed certification. Seed inspectors are required to conduct a minimum of four visits during the cropping cycle: a preliminary inspection before cropping and inspections during the pre-flowering phase, flowering phase, and pre-harvest phase. The minimum number of inspections is subject to factors such as crop condition, the seed farm environment, and cropping history (ECOWAS, 2008). Seeds proposed for certification would then undergo laboratory analysis in accordance with ISTA rules to verify that seed conforms to the agreed specifications.

Seed crops that pass the field and laboratory inspections are labeled by the official quality control and certification institution to ensure the inviolability of the package.

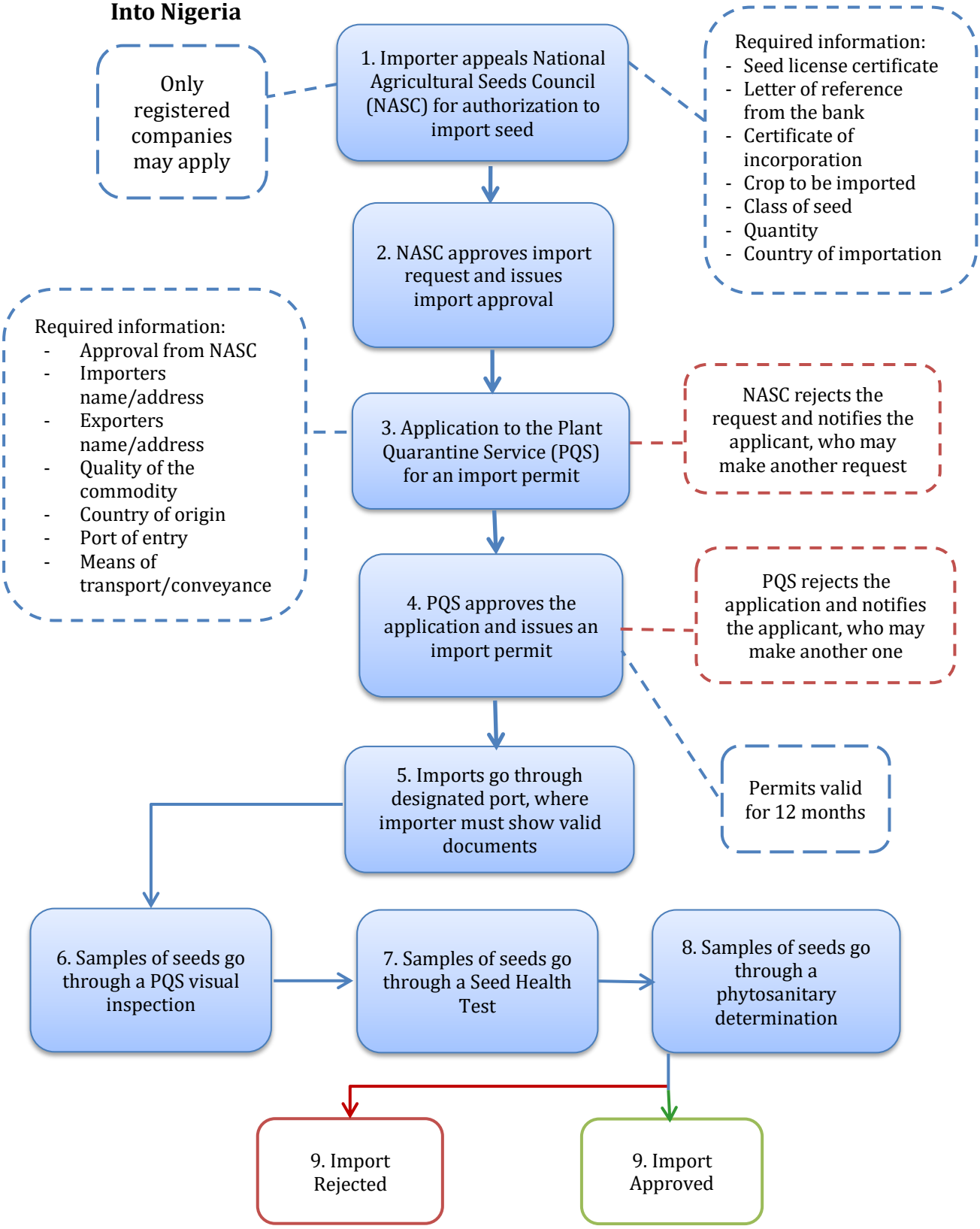
Article 69 of the ECOWAS Seed Regulation requires that seed certified by an authorized service in a member state be recognized as such by all other member states. Nigeria, however, still follows its 1992 Seed Act which requires that all seed goes through the seed certification process in Nigeria before it can be sold on the market. This raises an important question of whether Nigeria's certification system complies with the ECOWAS Regulation.

Cross-border Trade

Part Two of Nigeria's National Agricultural Seeds Decree (1992 Seed Act) regulates and monitors imports, exports, and commercial transactions in seeds. The NASC Guidelines for Registration of Seed Producers/Companies and Seed Fields in Nigeria require that all seed entrepreneurs, including importers and exporters, must be registered, as must companies engaged in other activities in the seed sector such as retail and distribution. The registered importer or exporter must then seek authorization from NASC to import or export seed, with payment of the prescribed approval fee (Section 3(a), National Agricultural Seeds Decree; NASC, 2018). NASC requires that the applicant accompany the request with a seed license certificate, a letter of reference from the bank, certificate of incorporation, and information on the crop to be imported or exported (class of seeds, quantity, and country of importation or exportation).

The 1992 Agricultural Seed Decree prohibits the importation, exportation, and sale of seeds of a variety that is not approved by the National Seed Services Unit. Under the Decree, applications for a license to import and export seed are made to the Seed Services Unit, and a copy of the same must be forwarded to the Plant Quarantine Service (section 16(1), National Agricultural Seeds Decree). In practice, however, applications for an import or export permit are made directly to the Plant Quarantine Service, accompanied by an approval letter from NASC (NASC, 2018; See Figure 6). Nigeria has a Single Window for Trade, where the applicant can make the application using a Tax Identifier Number (TIN) and username. The Plant/Agricultural Quarantine Service is a regulatory agency under the Federal Ministry of Agriculture and Rural Development, which works at all official entry points and maintains records of plant imports and exports, importers and exporters, and pests and diseases of quarantine importance.

Figure 6: New Markets Lab Regulatory Systems Map for Importation of Seed Into Nigeria



Source: New Markets Lab, 2018

The Agricultural Seeds Act of 1992 and the Agriculture/Plant (Control of Importation) Act of 1964 prohibit the importation of plants, plant material or conveyance materials without an import permit and a phytosanitary (plant health) certificate. Import permits are required for the importation of seeds for cultivation and propagation (whether for personal use or not). To obtain an import permit, an applicant is required to submit an application to the Plant Quarantine Services and pay the required fee. Regulation 3 of the Plants (Control of Importation) Regulations requires that the application contains specific information, including the name and address of importer, name, and address of exporter, quantity of plant commodity to be imported, country of origin of the commodity, indication of the port of entry, and means of transport or conveyance.

The Agricultural Seed Act makes a distinction between the importation of seeds for the purpose of production for "experimental or research purposes" and importation of seeds for "direct and commercial distribution to farmers for production." Seed imported for research purposes is duty-free, but the Seed Service Unit must register the importing research organization or person (Agricultural Seed Act, section 6(3)).

Special permits are also required for the importation of GMOs, which are allowed for research purposes only. An import permit is valid for 12 months from the date of issue and valid for only one shipment of consignment from a country of origin. To facilitate compliance with requirements prescribed on the import permit, the importer should forward a copy of the import permit to the exporter in advance of the shipment.

All imports must go through a designated port, and an importer is required to submit evidence of the declaration of the imported materials at the port as well as the import permit and phytosanitary certificate. Samples of seeds and other propagative materials undergo a seed health test after visual inspection, and a phytosanitary decision is made on the basis of the test results. Any plant, plant material, or other item that may contain pests must, upon its importation, be inspected by the Plant Quarantine Service.

Section 4(1) of the Plants (Control of Importation) Act requires that a prospective exporter of plants or plant material for which a phytosanitary certificate is required requests from the Plant Quarantine Service a pre-export examination or other inspection or test required by the country of destination. The designated Plant Quarantine Service officer will examine each consignment and, if satisfied that the requirements are met, issue a phytosanitary certificate.

Regional harmonization is particularly critical in areas of international trade. Cross-border movement of seed requires careful implementation of standards, regional rules relate to the application of sanitary and phytosanitary (SPS) measures aimed at preventing the spread of plant and animal diseases and pests across borders in a way that achieves policy goals without unduly restricting seed trade. Safety controls applied in cross-border trade include border tests, requirements for phytosanitary certificates, and post-entry quarantine measures (Kuhlmann, 2015). Under the ECOWAS Seed Regulation, import and export of conventional seed is subject to declaration of the official quality control and certification institution, and all cross-border seed trade shall be accompanied by a phytosanitary certificate issued by the relevant national agency of the country of origin of the seed (ECOWAS, 2008).

In line with the regional standards, the 1992 Agriculture Seed Act of Nigeria prevents the importation of plants and plant material into Nigeria without a phytosanitary certificate issued by an authorized person in the exporting country. This also applies to exports from Nigeria to a country that requires a phytosanitary certificate in relation to the export of seeds. In addition, the exporter is to comply with all necessary requirements of the importing country.

A major distinction exists however between Nigeria's regulatory system and the ECOWAS rules, including the ECOWAS Seed Regulation and ECOWAS Trade Liberalization Scheme (ETLS), which bind countries to minimize barriers to regional trade of crop inputs. The ECOWAS Seed Regulation requires free movement of seeds in the region as soon as ECOWAS quality standards are met and establishes mutual recognition of certification based on ECOWAS standards (ECOWAS, 2008). In contrast, the Nigerian National Agricultural Seed Council (NASC) mandates local testing, registration, and certification of all varieties intended for sale to farmers in Nigeria, maintaining that recognition of varieties listed in the West Africa Seed Catalogue only apply to varieties imported for direct use on the importer's farm and not to seed intended for commercial sale to farmers. Reportedly, regional variety acceptance could expose Nigeria to "dumping" unless Nigerian officials conduct their own DUS and VCU tests and quality control procedures (Ayoola, 2014). Notably, one of the major changes of the NASC Bill, which is expected to repeal the 1992 Seed Act, is harmonization of Nigeria's seed system with the ECOWAS seed regulations. The harmonization process is anticipated to improve and widen both regional and Nigeria's seed markets.

Legal Framework for Genetically Modified Seeds

To date, biotechnology has not been fully accepted in Nigeria. In July of 2018, however, Nigeria approved its first commercially available GMO crops which offered farmers access to two new BT cotton seed varieties, genetically engineered to resist local pests (Nkechi Isaac, 2018; Abraham Isah, 2018). In January of 2019, Nigeria also approved release of the pod-borer resistant cowpea, which marks the first GMO food crop released in the country (Institute of Food Technologists, 2019). Other GMO crops are also under development in Nigeria and are likely to be commercialized within the next couple of years. These include, Bt Maize, Africa Biofortified sorghum, and Nitrogen Use Efficient, Water Use Efficient and Salt Tolerant (NEWEST) Rice (Abraham Isah, 2018).

The National Biosafety Management Agency, established under the National Biosafety Agency Act of 2015, is charged with regulating and overseeing the application of modern biotechnology in Nigeria (Explanatory Memorandum, National Biosafety Management Agency Act of 2015). Pursuant to this general function, the National Biosafety Agency has the power to take samples and carry out laboratory analysis of crops, products, or materials for the purpose of determining if they contain genetically modified material (section 3(h) of the National Biosafety Management Agency Act of 2015).

Under the National Biosafety Agency Act, any person who impedes an authorized officer from taking samples commits an offence and is liable on conviction to a minimum fine of N2,500,000 (just under USD7000), imprisonment for a term of not less than 3 years, or both a fine and an imprisonment term (Section 37 of the National Biosafety Management Agency Act of 2015). While the National Biosafety Management Act is silent on the definition of an authorized officer, based on the general purpose of the Act and the responsibility of Seed Inspector as outlined in the National Agricultural Seeds Act,[10] a Seed Inspector likely qualifies as an authorized officer. Therefore, obstructing a Seed Inspector from carrying out official functions under the National Agricultural Seeds Act could attract penalties for obstructing an authorized officer under the National Biosafety Management Act.

[10] Section 26 (1) (a) and (b) provides that a Seed Inspector may take samples of any seed (a notified kind or variety) from either the seller of such seed, a person delivering seeds to the purchaser, or a purchaser upon delivery of the seeds to him and further sends the seeds to the Seed Analyst for analysis.

The National Biosafety Agency Act and recent efforts to develop and field test different varieties of GMO crops in Nigeria may be a signal of greater acceptance of GMO crops within the broader ECOWAS region.

Industry Experience

In developing this case study, the authors conducted interviews with seed companies in Nigeria to understand their perspectives with respect to variety registration, seed certification, and cross-border trade. Their experiences are summarized below. It is notable that the companies consulted reported different procedures and costs for variety registration, signaling that the process may not be clear or consistently applied.

Company A sells maize hybrids and sorghum seeds. The maize seeds are imported. All the imported seed varieties must be registered in the national crop variety catalogue. For importation, the company must first apply to NASC for authorization to import seed. Once NASC approves the application, the company applies to the Plant Quarantine Service to get an import permit. In principle, for all staple crops, the company not allowed to import seeds for commercial sale. In practice, there are many waivers; some are officially documented while others not.

Maize hybrids cannot be produced locally at the moment for two reasons. First, there is no IP protection. Second, there is inadequate manpower to produce maize hybrids in the country.

The company has registered a few maize varieties in recent years. To register a maize variety, in the first year the DUS test must be conducted in eight locations. DUS testing has to be repeated for the second year. In the second year, three top-performing varieties were selected by the company and put into multi-location trials for the VCU test and were later subject to on-farm trials. For this company, it took about two to three years to complete the process. The results were then submitted to the National Variety Release Committee, and decisions were made. The company could register maize varieties within a time window of two to three years. This relatively short time frame is an achievement, which was due to a good relationship with the research institutes in charge of field trials, as well as the fact that this company had a dedicated person working alongside the institutes on the project. In the first year of DUS testing, the company also brought the members of the release committee to see the fields, where they could provide updates on any changes of rules regarding variety release. The company started with 14 different varieties in the first year and chose three varieties for second year on-farm trials.

The total cost per registered variety amounted to about 70k USD. The adoption rate of maize hybrids in Nigeria is very low, only less than 3 percent of the total market share.

Company B is only engaged in vegetable seeds and has experienced the variety registration process for a few tomato varieties. The process was a bit challenging because there is a lack of human capacity in some of the institutes responsible for running the field trials.

From **Company C**'s perspective, the variety release process does not seem to follow clear procedures. Different research institutes are in charge of multi-locational trials of different crops. Some of the results are of questionable quality, not necessarily in sync with reality.

The company has registered a number of maize varieties in the last few years. It costs on average about 150k USD to register a variety, taking all costs into account. The company commented that currently in Nigeria the majority of seed companies do not make money. There are IP issues as well as institutional challenges. Seed companies can import seeds after the variety is registered and seed has been commercialized in the country.

When asked about the ECOWAS regional seed catalogue, the view is that adaptation trials will be good and can be done with partners.

Company D produces, sells and markets vegetable seeds of various kinds and crop seeds of maize, soybean, rice, and cowpea. The company has registered two maize varieties in the past few years. The procedure is first to apply at NASC to arrange multi-locational trials. In this case, it was the Institute for Agricultural Research (IAR) that is in charge of the field trials. After DUS and VCU tests are done, results are sent to NACGRAB. The Technical Sub-Committee reviews the applications and makes recommendations to the National Variety Release Committee for final approval. If approved, the variety will be included in the National Crop Variety Release Catalogue. The NVRC meets twice a year. The process is quite clear according to the company. In terms of cost, the company needed to pay IAR 1 million Naira (2747 USD) to test a crop variety for two years. In addition, the company needed to contribute voluntarily to funds for supporting the NVRC meetings. The amount varied from 1 to 5 million Naira.

In terms of seed production, the company produces seeds with a seed lot of normally less than 10 hectares. Seed certification is done by different tags (1kg, 2kg,

and 100 kg). It costs about three Naira per tag. Depending on location and acreage, it costs 3000 Naira (8.3 USD) per ha for seed certification.

On average, cost of production of maize is 190,000 Naira (524 USD) per ha; it would be 50-100% more for hybrid maize production. For this company, about 70 percent of seed production is maize; followed by rice, soybean, sorghum, millet, cowpea.

For seed imports, the company cited new requirements for certification and lab tests for purity and non-GMO components. There is a 3-5 percent royalty for such seeds. The company calls for the legalization of foundation seeds. In other words, seed companies should be allowed to produce foundation seed.

Recommendations

Nigeria's seed sector holds great promise, and the seed regulatory system appears to be at a turning point. How this system develops over the next few years will determine whether Nigeria is able to emerge as a leading market within the ECOWAS region and African continent more broadly. A number of decision points, outlined below, will be a factor in the degree to which Nigeria's seed system takes off, possibly bringing dynamic change to the seed sector.

National Level

- ***Apply Global and Regional Good Regulatory Practices to Improve Quality and Build Capacity Within the Seed Sector***. Nigeria is already looking to adopt good regulatory practices, such as the accreditation of private seed inspectors, which would greatly augment existing quality control capacity, and we recommend accelerating the adoption of these practices. While Nigeria's existing legal framework does not clearly provide for the accreditation of private seed inspectors, amendments to the Seed Act currently under review could make a significant difference. Modifying the rules to include an accreditation process for private seed inspectors within and setting up a process for making private seed testing operational in practice will be an important step in becoming a leading, modern seed economy.

  Nigeria could also strengthen aspects of its domestic regulatory structure, such as the issuance of updated guidelines for variety registration that includes the NARIs (which may explain the different costs reported) and clearer operating procedures for the NVRC.

In addition, while Nigeria is working to bring its system in line with international bodies including ISTA, OECD, and UPOV, gaps remain. For example, Nigeria currently lacks an ISTA-accredited laboratory, and Nigeria is not yet a UPOV member. For Nigeria, improving its own practices, such as increasing the number of available seed inspectors and improving the capacity of public laboratories, would help strengthen the country's seed system. In addition, Nigeria could look to other countries' practices, particularly with respect to allowing trade of seed for commercial use. This would be a significant step toward implementing ECOWAS rules and developing Nigeria's seed market. QDS is also often looked upon as a good practice that can help extend the benefits of seed certification and quality control to more rural areas, and Nigeria could consider introducing QDS, which is permitted as part of an OECD-aligned seed system.

- ***Put in Place a Plant Variety Protection System*** to motivate the private sector to more actively engage in the development of the Nigerian seed sector. Nigeria currently has no *sui generis* legal system aimed at protecting plant breeders' rights, although legislation has been developed and will be further vetted with stakeholders before final presentation to the National Assembly. A system for PVP was cited by stakeholders consulted in the development of this case study as a significant way in which Nigeria could improve its seed sector and advance its vision of creating a seed system that is market-driven and capable of producing and distributing high quality and improved planting materials that are available, accessible, and affordable to all farmers.

- ***Incorporate Clear References to Regional Protocols*** in national legislation. Often the connection between national legislation and regional rules is not completely clear to market stakeholders, and spelling out these links more clearly could send a positive signal to seed sector stakeholders and resolve differences between national practices and regional rules. Nigeria is in the process of aligning its regulatory system with ECOWAS regional rules and regulations on seed, although Nigeria's current legal framework does not explicitly reference ECOWAS rules. As a number of stakeholders noted, additional reforms will be needed to fully align with regional frameworks. These include changes to variety registration and certification procedures as well as modification of trade rules to align with the ECOWAS Seed Regulations. Most importantly, Nigeria's current seed law, which dates back to 1992, will have to be updated to more fully align with ECOWAS; amendments were in process at the time this case study was released.

- ***Implement National Laws and Regulations to Align with the ECOWAS Seed System***. Incorporating regional frameworks into national laws and regulations is only the first step towards alignment with regional obligations. Full implementation will require working closely with stakeholders along the entire seed value chain to ensure that the system works well in practice and participants in the seed industry are able to take advantage of opportunities in domestic markets as well as regional and international markets. The industry experience documented through this Case Study indicates that implementation challenges still exist and that current practices are not consistently applied in practice.

- ***Strengthen Enforcement of Counterfeit Seed.*** Both public and private sector stakeholders recognize that counterfeit seed remains a significant problem that hampers development of both an effective domestic seed market and cross-border seed trade. Several specific actions may be taken to address the issue of fake seed, such as increasing the role of the Seed Entrepreneurs Association of Nigeria (SEEDAN) in issuing certification tags to seed companies for labeling. This could potentially be done through regulatory change or issuance of guidelines or procedures for labeling, which would not require legislative change.[11] Increasing the number of trained, licensed agro-dealers could also increase the farmer-to-agro dealer ratio and reduce the distance a farmer must travel to purchase certified seed. Increasing awareness through agro-dealer training and farmers workshops could also build critical capacity and could be done in partnership with SEEDAN or other private sector actors to alleviate the resource burden on NASC. Finally, Nigeria could work with stakeholders and partners to identify successful approaches that other countries have used to reduce the incidence of counterfeit seed, such as the scratch-off seed labels in Kenya, as well as models for financing them.

Regional Level

- ***Increase Regional Regulatory Collaboration and Mutual Recognition*** to enhance cooperation among regulators and improve mutual recognition of countries' procedures and results. A significant challenge to effective regional harmonization is the degree to which regulators within a region are willing

[11] Note, the National Agricultural Seed Decree states: The Minister may, by notification in the Gazette, make regulations to carry out the purposes of this Decree…such regulations may provide for (37(2)c) the manner of marking or labelling the container of seed of any notified kind or variety under sections 17 and 18 of this Decree (including certified seed).

to work together and recognize each other's procedures and results. As Nigeria continues to take steps to harmonize its seed laws with ECOWAS seed regulations, this will become even more important in areas like certification, for example, where mutual recognition is explicitly required by ECOWAS. Regulatory collaboration may become a significant sticking point in effectively implementing regional harmonization, particularly if Nigeria continues to require domestic variety registration and certification.

- ***Facilitate Cross-Border Trade in Seed, Germplasm, and Test Data*.** Regional efforts cannot progress unless countries recognize each other's test results and trade more freely in both commercial seed and germplasm necessary for crop breeding. ECOWAS procedures are reliant on recognition of test results, data, and regulatory determinations from institutions other than a country's own, yet implementation challenges often arise due to differing national regulatory systems and policy objectives. From the industry perspective, cross-border trade can present a significant challenge in practice, particularly when it comes to trading seed for commercial use, a number of varieties are not freely traded or marketed even though they appear in the regional variety catalogue. Border inspectors should also be trained to identify seed and understand seed harmonization regulations and regional SPS rules.

- ***Improve Knowledge of National and Regional Rules Related to Seed*** and enhance the ability of diverse stakeholders to benefit from the formal seed system. Raising awareness of both national and regional frameworks can be done in a number of ways, and SEEDAN should play a central role as an in-country platform. For example, legal guides, such as those developed through the New Markets Lab, could be used to share regulatory requirements and approaches for implementing them in practice (creating a neutral tool for clarifying regulatory processes and the steps and costs involved); other regulatory tools such as the Test Cases currently being conducted by NML and SFSA could also be instructive. The authors also recommend issuing guidance on regional rules.

Conclusion

This Case Study highlights the current status of Nigeria's national-level seed system and its incorporation of the regional harmonization efforts for seed under ECOWAS. While some critical steps towards alignment with ECOWAS have been made, discrepancies between Nigeria's national system and the ECOWAS rules still exist

and focus on clearer and more consistent implementation in practice should accompany the legislative changes that are currently under review. Going forward, additional analysis of how regional harmonization is being carried out at the country level should be done and updated on an ongoing basis, and tools for measuring and sharing information and progress in some of the areas noted above will be critical.

All the recommendations outlined above could evolve into concrete initiatives, good practices, and regulatory guidance, and all will require a greater degree of private sector input to become operational (approaches should be tied to market demand and will vary to some degree with the particular crops and circumstances involved). Innovative models for advancing implementation of laws, regulations, and regional protocols can be taken from work in other countries and regions, such as corridors approaches, platforms focused on a particular seed sector or crop, and legal tools. The Case Studies in this series are intended to contribute to a comparative assessment as well, with good practices, successes, and challenges shared within and across regions.

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ANNEX 1: Summary of ECOWAS Seed Harmonization

ECOWAS Harmonization on Variety Release	
ECOWAS regional regulations are binding on member states and supersede national regulations, but countries must take further action at the national level to gazette ECOWAS Regulations and amend or enact laws.	
Regional Status	**National Implementation**
• 2008 Regulation on Harmonization of the Rules Governing Quality Control, Certification and Marketing of Plant Seeds and Seedlings approved (2008 ECOWAS Regulations also being adopted in UEMOA). • Regulations establish an ECOWAS Regional Seed Committee and the West African Catalogue of Plant Species and Varieties (WACPSV), which allows new varieties to be entered into the regional catalogue when registered in one member country. (CORAF to operationalize). • ECOWAS Protocols and Procedures for release and registration of new varieties and DUS/VCU guidelines for maize, rice, and sorghum are being	• ECOWAS regulations are binding and supersede national seed laws, but in practice, national laws and regulations will need to be changed to implement the 2008 Regulation, including with respect to establishing national seed catalogues. Countries are required to publish the ECOWAS regulation in their Official Gazette. • Most member states have national seed laws and regulations, decrees on national catalogues of plant species and varieties, and decrees on national seed committees, but often these laws and regulations are not in full compliance with the minimum requirements under the ECOWAS Regulation. Most countries have developed procedural manuals for variety release.[12] • In 2014, field trials, visits, and evaluations were conducted under ECOWAS Protocols (SFSA Seeds2B effort in collaboration with CORAF/WASP); the first set in field in July 2014, with registration and certification, started in 2016. • Nigeria has made variety registration automatic for vegetable seed (See Gisselquist, 2013 and Keyser, 2013).

[12] All ECOWAS member countries currently have seed laws. However, Cape Verde, Guinea Bissau, Liberia, and Sierra Leone. Do not have procedure manuals for variety release. Ernest Asiedu, Presentation during the AFSTA Congress, West Africa Seed Program (WASP), 2017. http://afsta.org/wp-content/uploads/2017/03/8-c-ERNEST-AFSTA-CONGRESS-2017.pdf. http://pages.au.int/sites/default/files/static/caadp/agpolicy/Tuesday/APEL%20Country%20presentations%20-%20Tuesday%20May%2014/ECOWAS%20Seed%20Regulation%20Implementation%20Synoptic%20Table.pdf.

rolled out. • ECOWAS Members must have a procedural manual for variety release.	
ECOWAS Harmonization on Certification	
Regional Status • 2008 Regulation on Harmonization of the Rules Governing Quality Control, Certification and Marketing of Plant Seeds and Seedlings. • ECOWAS recognizes four Seed Classes: Parent Material, Pre-basic Seed (three generations), Basic Seed, and Certified Seed (three generations and hybrid). • Harmonized labeling to be established based on ISTA standards. • Seed certified in one member country can be freely accessed in the market of another member, eliminating the need for a second certification. • Countries are required to develop procedural manuals for seed quality control & certification.	**National Implementation** • CORAF coordinating implementation support until 2018. • Most countries have regulations related to seed production, quality control, and certification. • Few countries have developed procedural manuals for seed quality control & certification to comply with ECOWAS standards.[13] • Certification following ISTA procedures, but no country within ECOWAS has an ISTA–accredited lab (Keyser, 2013)
ECOWAS Harmonization on SPS	
Regional Status • ECOWAS requires seeds	**National Implementation** • National agencies responsible for plant protection issue phytosanitary certificates for import and export, but

[13] Cape-Verde, Chad, Liberia, Mauritania, and Sierra Leone have not yet developed manuals on seed quality control and certification. Ernest Asiedu, Presentation during the AFSTA Congress, West Africa Seed Program (WASP), 2017. http://afsta.org/wp-content/uploads/2017/03/8-c-ERNEST-AFSTA-CONGRESS-2017.pdf.

imported to and exported from the region to be accompanied by a phytosanitary certificate issued by the Member State. • Countries are required to periodically review pest lists and exchange information on pests, but no universal pest quarantine list exists.	national regimes vary considerably.

Source: Kuhlmann, SFSA 2015 (updated by author).