A REVIEW OF THE NIGERIAN SEED SYSTEM

Chibuzo Uzoma Izuogu1*, Jephther Chukwuebuka Orji1, Ikechukwu Chiemena Chinaka1, Emmanuel Ankrumah1, Joachim Njoku2

Abstract

Food insecurity is a major challenge to many households in Nigeria. Many of these households depend on farming to meet their nutritional needs. Seed is an essential input in agricultural production. High-quality seed is essential for improved agricultural productivity, amelioration of food insecurity and improvement in the living standard of farming households. This study is a qualitative investigation of the Nigerian seed system. The National Agricultural Seed Council is responsible for seed certification, distribution, quality control and utilization. Access to certified seeds by farmers in Nigeria is very low because of the high cost of improved seed varieties. Notwithstanding the advances made in the production of improved seeds, quality is a serious challenge as a result of an increase in the distribution of adulterated seeds. Farmers’ seed preference affects their choice of certified seed variety. Insufficient access to farmers’ preferred seed is limiting their choices and invariably limits their ability to be resilient to agricultural production risk. This has also made it difficult for farmers to meet up with the dynamics of market preferences. Among the challenges of the Nigerian seed system are poor distribution channels, lack of infrastructure, lack of trust in the quality of improved seed, and negative perception of the effects of certified seed on health among others. The study recommends that the national seed policy should be updated to combat counterfeit seeds and promote access for smallholder farmers. Farmers’ preferences should be considered while developing seed system policy.

Key words: certified seed, seed preference, seed access, seed quality

Introduction

Agriculture contributes 54% of the employment and about 15% of the Gross Domestic Product (GDP) of Sub-Saharan African economies (World Bank, 2019; African Union (AU), 2021). Climate change, increase in population and poor governance are among the variables that have exposed Africa to food insecurity (AU, 2021). With a yearly population growth rate of 2.5%, it is estimated that the population of Africa will double by 2050 and also grow larger than Asia by 2075 (Kaba, 2020). To prevent food scarcity, there is a need to increase productivity through the utilization of improved crop varieties.

Annual seed demand in several countries in Africa is higher than seed production. For instance, in West Africa, the seed demand for rice, maize, millet, beans, yam and sorghum in

---

1 Izuogu Chibuzo U, Orji Chukwuebuka J, Chinaka Chiemena I, Ankrumah E, Department of Agriculture, Alex Ekwueme Federal University, Ndufu Alike, P.M.B 1010, Abakaliki, Ebonyi State, Nigeria

2Njoku J, Department of Agricultural Extension and Rural Development, Michael Okpara University of Agriculture, Umudike, P.M.B 7267, Umuahia, Abia State, Nigeria

*e-mail: chibuzoizuogu@gmail.com
2016 was 1,193,876 Mt, yet only 268,454 Mt was produced (Konja et al., 2019). The trend of demand for improved seed varieties is unpredictable. Across the globe, the Alliance for a Green Revolution in Africa (AGRA) (2018) reported that sub-Saharan African smallholder farmers’ use of improved seed varieties is the lowest. In most cases around West and Central Africa, according to Konja et al. (2019), farmers only seek seeds during periods of disaster when they can no longer rely on their saved seeds or when they want to check the comparative advantages of new seeds over their old stock.

Agriculture is of key importance to Nigeria’s economy, contributing around 21% to the Gross Domestic Product (GDP) and employing more than one-third of the population (World Bank, 2019). Nigeria’s agricultural sector is not only the largest in the country, but it also contributes 14% of Africa’s agricultural GDP (PricewaterhouseCoopers (PwC), 2018; Koninklijk Instituut voor de Tropen (KIT), 2020). The crop sub-sector in Nigeria dominates the agricultural sector as it constitutes about 88% of the sector.

Nigeria is a net food importer with a trade shortfall which has increased from N549.3 billion in 2018 to N689.7 billion in 2019. Also, agricultural exports reduced from N302.2 billion in 2018 to N269.8 billion in 2019 while imports increased from N851.6 to N959.5 billion within the period under review (PricewaterhouseCoopers, 2018).

Countries that have invested in the establishment of a wider horizon of access to farm technologies like certified seeds and the use of fertilizers have been very effective in increasing agricultural production. Abay et al. (2018) and Oyekale (2014) identified seed, fertilizer and irrigation as the three most essential agricultural inputs for improving crop production in developing nations. Of these three, AGRA (2018) emphasized that seed is the easiest and cheapest approach to utilize for an effective green revolution. In a survey of farmers in selected countries in Africa, AGRA found out that the majority of farmers who invested in improved crop varieties had yields of 50-100% above the local variety (Konja et al., 2019). The Agricultural seed sector in Nigeria has developed in the last 30 years when we consider its scientific and commercial productivity (Ajuka, 2021). Notwithstanding, Oyekale (2014) noted that the sector has not performed optimally in satisfying the agricultural seed demand of farmers in the nation.

Overview of the Nigerian Seed System

Seed systems in Nigeria are grouped into two: formal and informal (AU, 2021). Even though these systems are different, a particular farmer may access both for diverse needs. The target of the formal seed sector is the breeding and assessment of improved cultivars as well as the sale of certified seeds of high varietal purity and quality under government regulations. Seed marketing in this sub-system is executed through official seed companies. Under the informal seed sector, agricultural seeds are produced, obtained, maintained and distributed over farming seasons by farmers (Mabaya et al., 2021). Seed distribution is done with neighbours, friends and families through community markets. A large proportion of farmers in Nigeria rely on the informal seed sector. The standards of operation in the informal seed sector depend significantly on indigenous knowledge (Mabaya et al., 2021; Nigerian Economic Summit Group (NESG), 2019; Federal Ministry of Agriculture and Rural Development (FMARD), 2019).
National seed policy

Protocols are essential in allowing an equal field of operation for all the active participants in the seed industry by encouraging private-public-partnership in the seed sector while facilitating the development of enhanced varieties by institutions. These policies should encourage amalgamated seed transfer processes that connect seed systems with domestic and international markets. When this is done, recipients will have the pulling force and incentive required for higher productivity (Ajukan, 2021).

There are several deals and protocols that control seed laws at international, regional and national levels. Seed policies in Africa are designed to accommodate the special attributes and conditions of small-scale farmers given that the accomplishment of farmer prerogative is of foremost concern for sustainable agriculture and a flexible food and seed system in any nation (Munyi, 2022). Seed law covers seed testing, authentication, listing and variety protection. The method through which any of these actions is organized within the legal framework has an extreme consequence on the outcome of seed production, accessibility and availability and these affect how the agricultural system is structured.

A well-performing official seed sector usually has active institutions that coordinate the activities in line with established protocols which must be well defined and updated as the need arises. Originally, the advancement of the seed sector in Nigeria was within the jurisdiction of the Federal Ministry of Agriculture and Rural Development (FMARD) before the inauguration of the National Agricultural Seed Council (NASC) in 2009. The implication of this was that the NASC was saddled with the responsibility of seed evaluation, documentation, circulation, quality control and utilization etc. (KIT, 2020). The Nigerian Seed Sector Policy is embedded in the National Seed Policy that was promulgated in 2015. This provides wholesome guidance for the development of the agricultural seed sector. Having assigned NASC as the coordinating institution for its implementation, the policy provides a framework for the various stages of the seed value chain including plant research, production of seed, quality evaluation and assurance and seed circulation and marketing.

In 2019, Nigeria signed the Agricultural Seeds Council Bill into law as a replacement for the National Agricultural Seeds Act of 2005. The seed bill improves the oversight function of the National Agricultural Seed Council by saddling the NASC with the responsibility of administering and implementing all the National Seed policies, especially in the areas of market regulation and quality assurance in the industry. The council was therefore mandated to ensure the production and circulation of adequate quantities of high-quality seeds of improved varieties of every crop that is of importance to Nigerian farmers. The Seed Council Bill specified certain violations of the law including the sales of uncertified seeds and non-licensed seed vendors, as well as the mutilation of seed package labels. The target of this is to protect farmers from poor-quality seeds (NASC, 2019; Mabaya et al., 2021). Regarding crop variety protection, the bill provides that the Minister of Agriculture and Rural Development shall support strategies to facilitate the documentation of new crop varieties, as well as the protection of the rights of farmers (NESG, 2019). Stakeholders expect that the new legislation will improve the availability and affordability of quality seeds to smallholder farmers by encouraging investments in seed production and enabling the private sector to perform its expected functions of meeting quality seed requirements by farmers (KIT 2020).
Plant breeding, seed trade and distribution

Ajuka (2021) affirmed that one of the core indicators of the health of a national plant breeding and seed production scheme is the number of breeders. Data show that Nigeria has 23 active plant breeders when compared to Ethiopia (74) and South Africa (53). This has affected the total variety released between 2010 and 2019 which stood at 194 in Nigeria, Egypt 890 and Kenya 457. The average trial period for new varieties in Nigeria is 43 months after which the seed of the new variety will be available for farmers. This is because the new variety will be assessed for four cropping seasons (Waithaka et al., 2019; KIT, 2020; Ajuka, 2021)

There is no significant presence of international seed trade in Nigeria despite the scarcity of breeder seed, foundation and certified seed (Konja et al., 2019). With efficient seed importation and export procedures, national seed markets grow beyond the country's borders and seed firms gain from the broader market making it easier for farmers to secure an increased range of crop varieties from different countries. The growth of international seed trade in Nigeria is currently constrained by burdensome import rules without any crop variety laws. (NESG, 2019; KIT 2020). From 2005 to 2010, the percentage of certified seeds imported into Nigeria was 10 percent (for rice, maize and wheat). Konja et al. (2019) disclosed that the lengthy period spent on the evaluation of varieties and the difficult documentation which takes about two years could be responsible for the limited involvement of the Nigeria seed sector in international seed trade. Also, KIT (2020) revealed that Nigeria's domestic seed laws are not organized in line with Economic Community of West African States (ECOWAS) seed regulations which include major plants for sub-regional trade and food security. Several plant varieties that are gazetted in Nigeria are yet to be integrated into the ECOWAS regional seed inventory and this forbids international trading in the ECOWAS region. Because of this, shortfalls in seed supply cannot be bridged and this increases the seed prices and dissuades farmers from adopting certified seed (Access to Seeds Index, 2019; Mghweno et al., 2020).

KIT (2020) identified four areas of seed monitoring and evaluation that Nigeria must implement to guarantee harmonization with the ECOWAS seed protocol. These include:

i. the inauguration of the national seed committee,
ii. establishment of laws for seed importation and export,
iii. bringing the national variety catalogue to par with that of ECOWAS, and
iv. the implementation of the seed sector support fund

The Nigerian government has not complied with the inauguration of the national seed committee. Efforts are currently on for the institution of a law for seed imports and exports. Reports from the National Centre for Genetic Resource and Biotechnology (NACGRAB) website show that the Nigerian seed catalogue is updated every three years and the NASC Act of 2019 also acknowledges the crop varieties from the West African Catalogue. Also captured in the NASC Act of 2019 is the inauguration and administration of a seed sector fund through a Public-private partnership. Unfortunately, the fund is not yet operational (NASC, 2019).

Several private seed companies support the government-owned Agricultural Development Programmes (ADPs) which were initiated for seed multiplication using advanced technologies (KIT, 2020). The ADPs rely on funding from donor agencies and are believed to be non-regular actors in the seed production chain, they have also introduced unfair competition serving as a source of market alterations for private seed firms that should sell their seed at regular market prices (KIT 2020; NESG, 2019). It has been established that competition gives rise to excellence. Where there are many active seed companies, there will be competition for the adoption of innovation
and improvement in service delivery (Konja et al., 2019). NASC reported an increase in the number of seed companies from 5 in 2000 to 314 in 2018, 106 of these companies were active in the production and sales of improved varieties of seed with most of them producing less than 1,000 metric tons of seeds annually (Ajuka, 2021; Boluwade, 2021). Despite this improvement, the perception of seed companies towards the national seed regulation has declined from ‘excellent’ (84%) in 2017 to ‘good’ (79%) in 2019. This may be attributed to the streamlining of the Seed Act which punishes defaulters. In 2019, the number of seed companies reduced to 92 due to the deregistration of companies that were dormant or did not meet quality standards (KIT, 2020).

**Seed availability**

The availability of improved varieties of seeds is at the centre of the innovative packages that are necessary for increasing agricultural production, nutrition and improving the living standard of rural households (Katrin and Yuan, 2016). Studies show that Nigerian farmers are aware of improved seed varieties (Izuogu, 2023; Raheem et al., 2023; Kalsa, 2019). Though Mabaya et al. (2021) revealed that the informal seed sector is not thriving in Nigeria as a result of insufficient dissemination of ideal crop production practices; even when farmers do not have adequate information on improved varieties of seeds, it does not affect their utilization of these seeds (Astrid et al., 2021).

Sources of formal seeds in Nigeria include government agencies such as agricultural research institutes, universities, extension services etc., seed dealers, farmers’ cooperatives and Non-Governmental Organizations (NGOs) projects, (Kansiime and Astrid, 2016; Bassa et al., 2018; Kalsa, 2019; Ilangathilaka et al., 2021). Thijssen (2022) highlighted that notwithstanding the 50 years of investments in crop variety improvement and development of the seed sector in Africa, more than 90% of farmers in Sub-Saharan Africa obtain their seeds from informal sources. These seeds are sourced from neighbours and fellow farmers, farmer’s saved seeds and local markets (Ilangathilaka et al., 2021; KIT, 2020; Kansiime and Astrid, 2016; Bassa et al., 2018; Ibrahim et al., 2018). Ilangathilaka et al. (2021) reported that farmers resort to neighbour’s seeds due to their perception that regular use of their own seeds reduces productivity.

**Seed Access**

The challenge of distinguishing between the challenge of seed availability and seed access is yet to be thoroughly evaluated given that the problem of seed access is much harder to answer. The target of improving farmer’s access to certified seed is on the front burner in national and international strategic discussions. Most international aid activities that target an increase in agricultural production have made this their central focus. The argument has remained that farmers’ seed system is often informal, lacks quality and results in low productivity. Because of this, there has been an increase in the use of improved varieties seed across the county in recent years. However, seed of improved varieties are costly for smallholder farmers and subsequently inaccessible (Izuogu et al., 2023).

Farmers’ access to many seed sources influences the type of seed variety they use. If farmers are able to access seed of improved varieties, they would likely prefer to use them more than their own seed. Of all the challenges to improved agricultural production, access to quality planting materials is the most with many farmers planting low-quality seeds from unverified sources (Mwangi, 2020). The level of access to formal seeds among farmers in Nigeria is low (less than 10 percent). This has given rise to low adoption of seeds of im-
proved varieties (Mabaya et al., 2021; Waithaka, 2019). An increase in seed availability will increase access to seed (McEwan et al., 2020). Bassa et al. (2018) identified the level of education, household size, extension services and availability of market information among the factors that affect access to seeds of improved varieties. Increased awareness, training and capacity building are among the approaches recommended to facilitate farmers’ access to seeds of improved varieties.

Seed Quality

Seed quality exerts a significant influence on agricultural productivity. Ajuka (2021) opined that good quality seed contributes to the continuity of farming systems. Seed quality assurance is an orderly and methodical proceeding for guaranteeing the genetic, physical and physiological integrity of the seeds to be sold to users. Sustaining seed quality is essential for seed stocks to match farmer’s prospects. The national Seed Quality Guarantee Programme in Nigeria institutes seed quality monitoring criteria that include both management specifications and technical operations of the seed system and conservation of seed quality. These procedures give measures for certification and execution of rules and regulations. The procedures are prepared for variety release, appropriate land selection, field assessment, seed evaluation, conditioning, packaging and preservation (Olisa et al., 2022). Even with the production of improved seeds, quality is a serious concern amidst the obvious spreading of adulterated seeds. This has been worsened by the wide capacity gap of the NASC, the agency saddled with quality control (KIT, 2020). Poor seed quality has led to poor utilization of certified seeds among Nigerian farmers. These challenges are evident in the poor genetic, morphological, health and physiological state of these seeds. This has led to low productivity, an increase in farm household poverty and a lack of interest in agriculture.

It is of utmost importance that farmers have access to well-adapted quality seeds in adequate quantities when needed to ensure sustainability in their agricultural production activities. Data show that some of the seeds that are available to farmers are adulterated and costly. This has raised the pertinent question of what must be done to guarantee the availability, access and utilization of affordable quality seeds by farmers in Nigeria (Oyekale, 2014). Atieno et al. (2022) reported that farmers relate ‘good’ seed varieties to seeds that sprout very well or of a popular variety, certified and without damage.

Adulterated seeds pose a severe danger to the Nigerian seed sector. On one hand, it does not boost farmers’ confidence in seeds of improved varieties as farmers may unknowingly plant low-quality grain that came with the label of certified seed. Secondly, it endangers the achievements of the attempt to multiply the use of improved varieties as farmers may not easily ascertain the difference between fake and original. Of the 56 companies that were surveyed by The African Seed Index (TASAI), 34 reported cases of fake seed. Seed companies disclosed that the foremost source of fake seed were agro-dealers and to a lower degree, seed companies. Of the 34 cases of fake seed identified in this survey, only one was brought to the knowledge of NASC (Mabaya et al., 2021). Seed companies rarely report incidences of counterfeit seeds given that in many situations, they are the source of the counterfeit seed. Many of these seed companies revert to marketing grain as seed if they lack an adequate supply of certified seeds to satisfy the demand for seed of improved varieties (NASC, 2019; Kansiime and Astrid, 2016). Aside from the intentional counterfeiting of seeds, inappropriate preservation and management of seeds by agro-dealers and other allied seed companies has been reported as a source of poor-quality seed. KIT (2020) reported that many agro-dealers are not well trained, hence they store seeds under unhealthy conditions. This also discourages farmers and reduces the demand for certified seed.
One of the approaches to counter certified seed adulteration is through seed inspection as it ensures that commercial seeds satisfy regulatory quality standards. To realize this, an adequate number of well-trained seed inspectors is needed. In 2019/2020, Nigeria had 60 public seed inspectors from 50 inspectors in 2018 (KIT, 2020). NASC in an effort to mitigate against seed counterfeiting in the Nigerian seed sector established the Seed Inspectorate Unit. Also, it introduced the SeedCodex and Seed Tracking tools to check the activities of fraudsters in the seed value chain. While the SeedCodex involves the digital coding of certified seeds which becomes visible when scratched, the Seed Tracker monitors the certified seeds from production to harvesting (Mabaya et al., 2021; Izuogu et al., 2022).

**Seed Preference**

Farmers’ preferences and tastes influence their choice of seed of improved varieties; the seed variety they plant as well as where they purchase certified seeds. Farmers have often decided to use unofficial seeds which irrespective of unreliable quality, satisfy household and market requirements for desired agricultural and nourishment qualities (Izuogu et al., 2023). Otieno et al. (2016) consented that among the preference criteria for farmers’ seeds are the texture of planting material, good taste, marketability, adaptability to climate change, nature of planting material and nutritional benefits. According to Atieno et al. (2022), the most preferred qualities in seed are those qualities that will increase yield and invariably lead to more farm income which will enable the farmers to attain their desired improvement in standard of living. Izuogu et al. (2023), Akanbi et al. (2022) and Kalsa (2019) identified some of the preference criteria for certified seeds among farmers in Nigeria to include early maturing, high yield, better cooking quality, tolerant to submergence, resistance to diseases and drought.

Lack of access to preferred seeds may have several effects on agricultural production systems including limiting farmers’ choices which invariably reduces their ability to adjust to production disasters such as climate change. It also hinders the capacity of the farmer to attend to the dynamics of market preferences. This will negatively affect farmers’ capability to gain more stable yield and revenue with its attendant negative consequences on food security (Otieno et al., 2016). Akanbi et al. (2022) noted that farmers who adopted preferred varieties had higher revenues than their other counterparts. The level of poverty among farmers who accessed seeds of improved varieties would have increased by 6% but for the adoption of certified seeds (Abdoulaye et al., 2018)

**Challenges**

Several challenges are retarding the growth of the Nigerian seed sector. The poor seed distribution channel that characterises the Nigerian seed sector is a severe challenge. According to KIT (2020), within the Kaduna consortium, out of the demand for 35, 350 MT of certified seeds, only 14, 883MT were produced. Thijsjen et al. (2022) reported the absence of an official payment process for seed confirmation and seed law that didn’t consider the need for post-control evaluation. Also, the lack of active engagement of the Nigerian seed sector in cross-border trade has narrowed the space for robust seed distribution (NESG, 2019). KIT (2020) also reported that Nigeria lacks operational laws on crop variety protection.

Ilangathilaka et al. (2021) and Simtowe et al. (2019) disclosed that the majority of farmers who use informal seeds do so as a result of the unavailability and unreliability of formal seeds within their farming communities. The price of certified seed and the distance to the source from the farm households influence the utilization of certified seeds. Most formal seed adopters travel further distances to purchase seeds when compared to informal seed users.
Oftentimes, farmers are not willing to travel such distances and pay more for certified seeds (Akanbi et al., 2022). Hunga (2023) and KIT (2020) identified a lack of infrastructure such as electricity and feeder roads, an absence of political will and media endorsement, and a lack of human capital for the execution of policies among the challenges of the Nigerian seed sector. Other constraints are the weak connection between actors in the seed value chain and the market; the absence of trust in the quality of certified seeds, the risk involved in cultivating certified seeds, and certain wrong notions about certified seeds (Akanbi et al., 2022).

**Conclusion**

The Nigerian seed system is currently transforming with the expectation of meeting farmers’ needs and broadening its horizon. Certain challenges are making it difficult to unlock the full potential of the system. Some of these challenges include the weak execution of recommended minimum seed authentication standards, low level of conformity with national seed certification standards by seed manufacturers and distributors, unsuitable treatment facilities and unfitting storage equipment. The target of the Nigerian seed industry should focus on eradicating the challenges in meeting the different demands for the production and distribution of quality seed. There is a need to improve and update the national seed policy to combat counterfeit seeds and promote access to seed among smallholder farmers. Farmers’ preferences as it concerns seed and seed sources and the reasons they prefer some sources of seed to others should be factored into the seed system policy strategy.

**References**


Atieno EO, Kilwinger FBM, Almekinders CJM, Struik PC (2022): How Kenyan Potato Farmers Evaluate the Seed: Implications


McEwan MA, Spielman DJ, Okello JJ, Hareau G, Bartle B, Mbiri, D, Atieno EO, Omondi BA, Wossen T, Cortada L, Abdoulaye T, Maredia MK (2020): Exploring the regula-


PREGLED ORGANIZACIJE SEMENARSKOG SISTEMA U NIGERIJI

Chibuzo Uzoma Izuogu, Jephther Chukwuebuka Orji, Ikechukwu Chiemena Chinaka, Emmanuel Ankrumah, Joachim Njoku

Sažetak


Ključne reči: sertifikovano seme, poželjno seme, dostupnost semena, kvalitet semena