

Case study 7: Formal and Informal Seed Systems in Africa

AGRA Theme 3: Quality Seed Production

Executive Summary:

Formal seed systems account for under 20% of planted seed in Africa and are regulated to ensure seed retains its varietal identity and purity for optimal physical, physiological, and sanitary quality. Informal seed systems dominate most African farming systems and are farmer-produced seed or grain that is selected for use in subsequent plantings and exchanged or sold to other farmers through local market systems that are not regulated or monitored by government agencies (McGuire and Sperling 2016). While the two systems are different in their regulation and dissemination mechanisms, there is scope for leveraging the strength of each system to accelerate the dissemination of improved crop genetics to farmers. This is already recognized in some countries such as Ethiopia that has a Pluralistic Seed System Development strategy to scale improved varieties through both formal and informal seed channels.

Context:

The formal seed system is a deliberately constructed and regulated system that involves a chain of activities leading to genetically improved products: certified seed of registered varieties. It starts with a documented variety improvement program that is connected to a formal and regulated variety release and seed maintenance system to maintain varietal identity and purity and to produce seed of optimal physical, physiological, and sanitary quality. Certified seed is marketed through registered and regulated seed channels for sale and distribution to farmers. Formal systems provide a clear distinction between "seed" that is regulated for propagation and "grain" that is for consumption (Nickerson, 2020).

The informal seed system is based on farmer-produced and saved grain that is used for future planting material or for consumption as grain. Informal seed systems result in farmer exchanged of saved grain with neighbors or exchanged in local grain markets. Informal seed systems do not maintain variety purity as in the formal sector and may contain genetics from surrounding varieties and land races. Variety identity, genetic purity, or seed quality are not monitored nor guaranteed. Farmers integrate their seed and grain production that is not monitored or controlled by government regulations or inspections (Nickerson, 2020).

Quality Declared Seed (QDS) sits between formal and informal seed systems as a seed-producer implemented system for production of seed that meets at least a minimum standard of quality but does not entail formal inspection by the official seed certification system. The intent behind the QDS system is to provide farmers with the assurance of seed quality while reducing the burden on government agencies responsible for seed certification and is intended to complement the formal seed system to ensure farmers have greater access to quality seed (Mbatia, 2022). QDS does increase farmer productivity provided foundation seed is used to generate QDS and production tends to be under variable rainfed conditions. McGuire and Sperling (2016) reported that "farmers access 90.2% of their seed from informal systems with 50.9% of that deriving from local markets." This conclusion came from a database of 9,660 observations across six countries (Haiti, Zimbabwe, South Sudan, Kenya, Malawi, and the Democratic Republic of Congo) and covering 40 crops. There was great variability across crop clusters with maize accounting for the highest percentage of seed sourced from the formal seed sector, ranging from 17-31%. Seed of self-pollinating or vegetatively propagated crops account for only 1% to 2.9% from the formal seed sector within the study. Self-pollinated and vegetatively propagated crops seldom generate sufficient profit to seed companies for several reasons:

- Uncertain and fluctuating demand caused by competition from the informal seed sector (e.g., grain legumes)
- Low multiplication rates (e.g., grain legumes)
- Transportation and storage difficulties (e.g., root, and tuber crops)
- Strong regional preferences for unique traits limit the variety extent (grain legumes, indigenous vegetables).

Seed producer cooperatives in Ethiopia were able to improve seed availability and access for farmers (Sisay et al., 2017). Smallholder seed production can borrow from production practices of the formal seed sector to improve seed quality and extend the reach of formal seed systems and accelerate the dissemination of improved genetics to farmers.

Challenges and Objectives:

Despite formal seed systems being critical in modern agriculture production systems to ensure the products of modern breeding programs reach farmers, they have not enjoyed the wide reach of other regions. It is through a regulated chain of variety characterization, registration, seed production, certification, and registered sale that gives farmers confidence in certified seed being true to its label and guarantee of germination. However, this comes at a cost in the form of higher seed prices for farmers. Informal seed sector prices are often 25 to 50% higher for farmer-produced seed over grain prices that does fluctuate over time and increases as the planting season approaches (Sperling et al. 2020). In some areas, farmer produced seed can be marketed at Quality Declared Seed (QDS) that labels the seed bag with the variety name and germination rate to provides a moderate level of assurance to farmers (see Case Study 13 for more details). In most cases, informal seed sales offer assurances through known and trusted relationships (farmer-to-farmer) or by informal seed traders who track the providence and select seed from grain that is then communicated to and sold in local grain markets (Sperling et al., 2020). at best or just visual assurance in the case of grain purchased in the market.

The informal sector provides a lower cost and a times more resilient means of distributing seed to farmers, especially to areas impacted by climate change and subsequent crop failures. Informal seed systems are also facilitated by traders who can effectively move farmer-produced seed within the informal sector and reach communities that are not well served by the formal sector, especially in zones of conflict and poor infrastructure (Sperling et al., 2020).

The challenge is that both seed systems – formal and informal – play an important role in African agriculture and serve different crop species and market segments. Despite the importance of both, the informal seed sector has not benefitted as much from investment, policy, and research. These tools could aid in understanding how it can complement and accelerate farmer access to improved crop genetics and access to seed in times of crisis, especially considering weather extremes due to climate change. Several case studies of conflict areas of Africa have shown the important of coupling formal and informal seed systems to respond to the need for climate resilience crops within post-conflict and natural disaster areas (Nagarajan et al., 2021).

Seed production and distribution models to extend the reach of seed systems in Africa.

SCALE and ISSD (2022) provide a synthesis of how different seed system models can serve communities coming out of a climate crisis or conflict to respond to farmer and market demand for seed. These models were based on case studies in Sudan (sorghum), Burundi (certified seed including potato), Mozambique (certified seed access for conservation agriculture programs), Niger (market-based approach for local seed systems). Key takeaways to scale seed delivery included:

1. Engage at the local level - decentralize points of sale and mobile sales agents can reach last mile producers and consumers. Building local capacity of seed producers to set up micro-demonstration plots in remote areas to promote their products
2. Ensure adapted varieties are promoted - both local and modern varieties should be considered for promotion, especially in stressed environments
3. Couple seed with other non-seed agricultural products and services – for example, bundling weather insurance with high quality seed in fluctuating weather environments, or mechanical ripping services with improved input packages for land preparation
4. Leverage informal seed systems to increase access to quality seeds that shorten supply chains, strengthen the local market system, and decrease dependency on international and regional markets.

Models that integrate formal and informal seed systems across Africa have been synthesized by Nagarajan et al. (2021). Quality Declared Seed (QDS) was also considered as an important option between formal and informal seed systems that is more flexible for farmers without compromising basic standards of seed quality and productivity (Mbatia, 2022).

Commodity Traders - source of seed in informal African markets, especially for grain legumes like beans and cowpeas (Sperling et al., 2013). Market-sourced seed, especially for self-pollinated crops, is key to food security for vulnerable farm families (Sperling, 2016).

Community-Based Seed Producers (CBSP) – adopt some of the practices of the formal seed system that result in higher quality seed, with most being classified as QDS producers. CBSP can increase farmer access to varieties and provide variety maintenance, selection, handling and storage to preserve seed quality.

Public Institution Based Models – NARI-produced breeder and foundation seed are taken up by government parastatal and commercial seed companies to produce certified seed, especially for self-pollinated crops. Voucher schemes are often associated with this model to enable farmers to exchange a voucher for inputs such as seed, often during an input trade fair. Once varieties are released into the system the seed is maintained within the community through farmer-to-farmer exchanges (FAO, 2006).

State Owned Corporations – have an independent management and financial structure and are supported by the government that often influences pricing through policy with a goal to achieve full cost recovery. This model poses the challenge of limited distribution outlets resulting in farmers traveling long distances to purchase seed.

Relief-based Models – NGOs are engaged in this model to provide relief during humanitarian emergencies, development in response to failure of formal sector to reach isolated communities and advocacy to support communities to maintain seed and to strengthen farmers' rights to plant genetic resources.

Private Sector Agro-dealer Model – this is driven by agrodealers as the main link in the farm input supply chain for communities and can effectively reduce the distance farmers travel to purchase inputs.

Seed Agents – can partner with agrodealers and resemble village-based advisors who facilitate the trade between farmers and agro-dealers and seed companies. Seed agents tend to concentrate on higher value seeds such as hybrid maize.

Village-Based Advisors (VBA) Model – help disseminate information to farmers and run demonstration plots to create awareness and facilitate the sale of improved varieties to farmers within their community. VBAs receive a commission for the sale of commercial seed from seed companies. This has addressed a critical gap in the public extension system by leveraging lead farmers within communities as trusted knowledge brokers to encourage the adoption of new varieties.

Access to Finance Driven Models – are emerging with innovative products to penetrate the seed and farm input markets by improving access to finance for quality inputs such as the model offered by One Acre Fund in East Africa.

Aggregation Based Models and Collective Producers Models – both are based on organization of producers into coops or member-based groups to address collective production and marketing needs to increase market access, demand-driven services, bargaining power for better prices and cost savings due to higher trade volumes.

Off-Taker Models – rely on aggregation to increase the value of production from geographically dispersed farmers. This model depends on anchoring contracts with large buyers at the top of the supply chain, offering value-added services and inputs to farmers, and creating clusters of farmers to amortize the purchase of equipment.

Models for Roots and Tuber crops – are challenging given the absence of formal seed systems (except potato), weak phytosanitary measures leading to inconsistent supply of quality planting material, bulkiness and perishability of planting material, and mixture of varieties. Growers' associations that are self-regulating to maintain quality control seed potato and cuttings who may be linked with regional research stations to access clean seed and cuttings. Seed systems for vegetatively propagated crops are dominated by farmers and traders, highly dependent on public research and less formally regulated. Most of the delivery models tilt towards a decentralized multiplication process to increase availability of disease-free planting material to farmers. Due to the bulkiness and highly perishable nature of the seeds, agro-dealers shy away from dealing with any of the vegetatively propagated crops.

Forage Seeds Delivery Model – few seed companies sell certified fodder seed despite the projected increase in demand for livestock products and emerging fodder markets. The informal system mainly uses vegetative propagation such as for Napier grass, sweet potato vines, vetch, lupin Desmodium and Lablab.

Results:

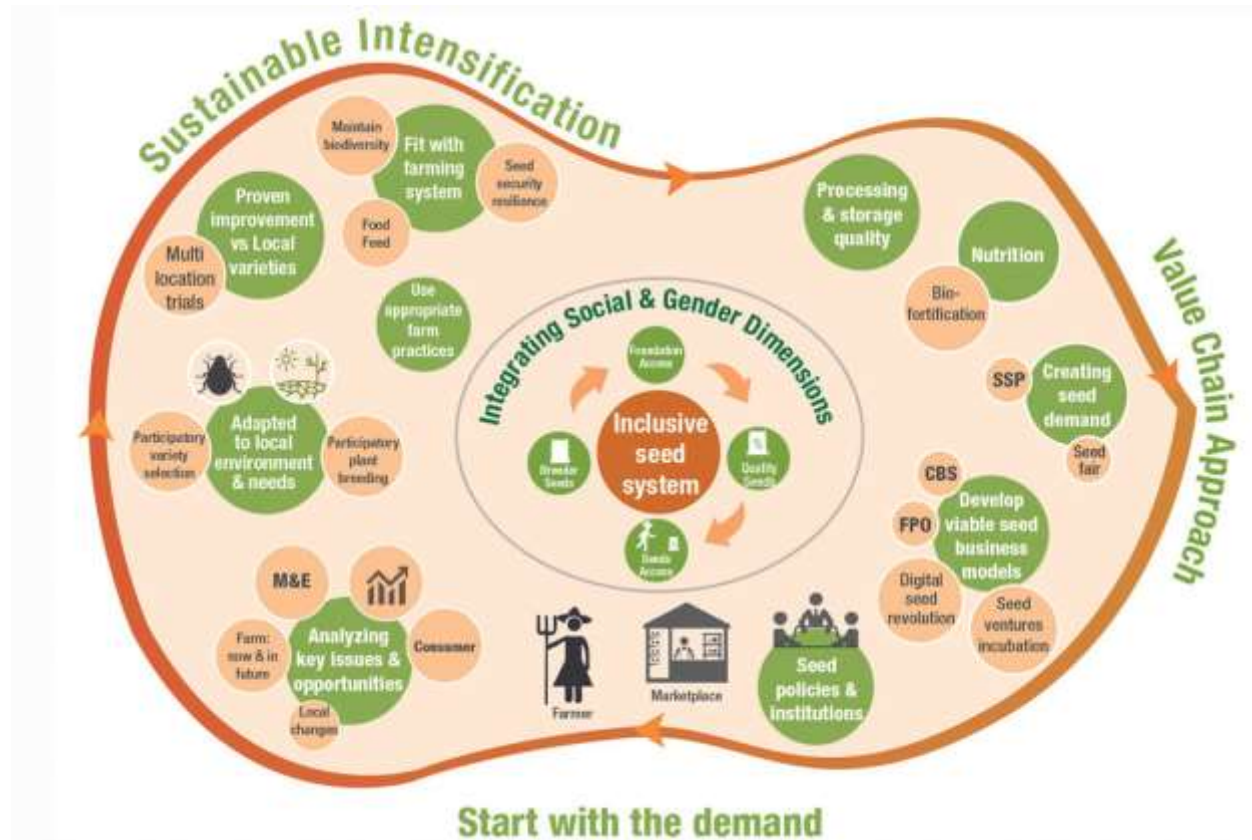
While seeking solutions to seed delivery through both formal and informal channels, it is important to understand the needs of farmers. These include:

1. Right seed – seed of the crop and variety as desired by the farmer.
2. Right quantity – number of seed required by the farmer in relation to the area that they plan to cultivate during that particular season.
3. Right time – seed is accessible in time for planting.
4. Right place – sales and distribution location within the farmer's mobility.
5. Right condition – verifiable high seed quality in all attributes.
6. Right price – price the farmer can afford and is willing to pay.

7. Right planting information – correct agronomic practice for that crop variety, e.g., spacing, weeding, pest and disease control (Nagarajan et al., 2021)

Supporting Visuals or Quotes:

“It all starts with the seed – and the purer the seed and the cleaner the cultivation, the better the plant.” Alfred Vogel



Source: ICRISAT - <https://www.icrisat.org/seed-systems-models-lessons-learned/>

Future Plans:

Informal and formal seed systems need to leverage their comparative advantages to accelerate variety replacement rate (VRR) so farmers can keep pace with weather shifts due to climate change and respond to market opportunities while diversifying production systems and diets for a resilient and nutritious African food system. This can only be achieved by understanding the requirements and context for seed systems to effectively service different crops, geographics and markets. African agriculture needs to embrace all tools at its disposal to ensure sustainable and nutritious food systems to feed Africa’s economic growth over the coming decades. It all starts with the seed.

Call to Action/Key Takeaways:

CESSA can foster knowledge exchange within the informal and formal sectors to accelerate the delivery of improved crop varieties to African farmers. The informal sector is particularly important for self-pollinated, open-pollinated, and vegetatively propagated varieties with many of these crops being critically important for adaptation to climate change and increased nutritional diversity.

References:

- Mbatia, A. 2022. Quality Declared Seed: Addressing Challenges in Access to Quality Seed for Smallholder Farmers Learning from Farm Africa Projects. Farm Africa.
<https://www.farmafrica.org/downloads/2022/Quality-Declared-Seed.pdf>
- McGuire, S.J.; Sperling, L. Seed systems smallholder farmers use. Food Secur. 2016, 8, 179–195.
- Nagarajan, L., Musembi, T. Fernando, A. 2021. Review of Existing Last Mile Seed Delivery Models and Approaches. A Feed the Future Global Supporting Seed Systems for Development activity (S34D) report. https://pdf.usaid.gov/pdf_docs/PA00ZDF5.pdf
- Nickerson, J. Seed System Definitions. Agrilinks March 13, 2020. <https://www.agrilinks.org/post/seed-system-definitions>
- SCALE and ISSD. 2022. Models for Strengthening Last Mile Seed Production and Distribution in Fragile Contexts. Mercy Corps Publication. https://www.fsnnetwork.org/sites/default/files/2022-05/Models_for_Strengthening_Last_Mile_Seed_Production_and_Distribution_in_Fragile_Contexts.pdf
- Sperling, L. Gallagher, P., McGuire, S., March, J., and Templer, N. 2020. Informal Seed Traders: The Backbone of Seed Business and African Smallholder Seed Supply. Sustainability 12, 7074; doi:10.3390/su12177074