

**Topical Synthesis Paper**

# **Accelerating early generation seed supply in sub-Saharan Africa**



## **ISSD Africa Topical Synthesis Paper**

**Title:** Accelerating early generation seed supply in sub-Saharan Africa

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This report synthesises learning from the action research and dialogue activities conducted under the Integrated Seed Sector Development in Africa (ISSD Africa) programme, 2019-2023.

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Under the ISSD Africa topic “Effective seed insecurity response” the Alliance of Bioversity & CIAT and partners conducted activities in Uganda, but with consultations and inclusion in studies from many countries across sub-Saharan Africa.

### **Cover photo:**

A technician inspecting a foundation seed multiplication field of NAROSORG1 at NaSARRI, May 2022, Uganda.

**Credit:** Helen Opie (NARO Uganda)

## 1. Background

The central role of improved varieties for farmers to increase productivity and production in sub-Saharan Africa (SSA) is widely reported and acknowledged. Nonetheless, access to quality seed of improved varieties in most countries in SSA remains a major challenge. The insufficiency or non-availability of early generation seed (EGS) is one of the main factors hampering the production and delivery of quality seed of improved varieties to farmers, particularly those in remote areas.

The overwhelming majority of about 80% of smallholder farmers have no or limited access to quality seed of improved varieties (McGuire and Sperling, 2016). Among the causal factors are the no or limited amounts of EGS that are available especially in the case of semi-commercial crops like grain legumes and dryland cereals (GLDC), e.g., chickpea, pigeonpea, groundnut, sorghum, millets. In addition to the disadvantage of being mainly open pollinated and with seed majorly sourced from grain markets, GLDC are also disadvantaged by very limited government support which is at odd compared to crops like maize and rice.

Yet, GLDC crops are valuable nutritious, climate-smart resources, suitable for production in arid and semi-arid environments where the poorest smallholder farmers live (Akpo et al. 2020). There is a consistent disconnect between demand and supply of EGS. For sustainable production and supply of EGS of GLDC, their demand forecast is an imperative. The poor enabling environment makes it difficult to have a sustainable seed production and delivery systems, particularly EGS where the bulk part of their production comes from public sector agencies through donor supports. This calls for action to enhance the current situation of EGS production and delivery systems.

In this lens and to come up with tailored solutions and sustainably address the systemic EGS challenge, ISSD-Africa has documented past and present experiences across SSA to learn from their successes and pitfalls. More importantly, the enabling mechanisms were investigated to understand how they drive successes. Taking stock of the existing knowledge and experiences, it appears that seed market security played important role in many successful cases documented (Opie et al. 2022a; Opie et al. 2022a; Akpo et al. 2022). Taking different forms (e.g., pre-orders, demand forecasting, pre-aggregation of demand), pre-securing market brings confidence to EGS producers to continuously invest in business and make it profitable. The critical role of market assurance in seed business and particularly EGS production and delivery is similar to key drivers of most commercial goods and services.

## 2. Approach and ambition of the topic

Three lead questions guided the topic team interventions: (i) How can EGS production and supply be sustained? (ii) What can we learn from past EGS business model experiences? (iii) What are promising options for viable, sustainable commercial provision of EGS for dryland cereals and grain legumes?

Answering these questions helped to provide practical evidence on what works well looking at past and current experiences for developing a sustainable early generation seed supply. Critical issues around the enabling environment, the seed value chain, business models and production were explored to support seed sector development in sub-Saharan Africa.

For the sake of answering the lead questions, the following key activities were implemented: (a) Desk study on successful EGS business models and level of implementation of previous EGS recommendations; (b) Strengthen existing EGS initiatives in the country; (c) Design and pilot innovative EGS business model; (d) Bring together value chain actors through memoranda of understanding (MoU) under piloted model; (e) Produce various seed classes under the signed MoUs; (f) Periodic progress report, validation and capacity building meetings. We conducted stakeholders' meetings for drafting a strategy for guiding EGS production.

Led by ICRISAT, and jointly with AGRA, KIT, ISSD-Uganda, and NARO the topic team interventions were primarily conducted in Uganda but also in other SSA countries where we sought relevant and successful experiences on EGS business models.

### 3. Outcomes and lessons learned

#### 3.1 Business models documented and their characteristics

We documented sixteen cases of EGS business models that can be categorized into three major groups: public organization-led, private sector-led, and joint public-private entities-led models. The crop involved, the type of EGS produced, the geographical coverage of the produced EGS, subsidized vs. financially independent, seed production approach, pre-ordering system in place or not, cash flow strategy and the legal status of the business model are mapped (Opie et al. 2022a). Table 1 presents fifteen of the sixteen cases documented.

**Table 1:** Characteristics of the EGS Business Models from selected countries in ESA, WCA and South Asia

Organization / Company	Crops handled	Seed type	Country / Coverage	Production approach	Pre-order system	Cash flow strategy	Financial status	Legal status of institutions involved
The INRAN Seed Unit	Pearl millet, sorghum, cowpea, groundnut	Breeder seed, Foundation seed	Niger	Own production	Yes	Own resources	Subsidized	Public institution
Ethiopia Institute of Agricultural Research	Chickpeas, common bean	Breeder and Foundation seed	Ethiopia	Own production,	Yes	Own resources	Subsidized	Public institution
	Malt-barley	Breeder and Foundation seed	Ethiopia	Seed Enterprise farms	Yes	Grant received from private partner	Subsidized	Public-Private
KALRO Seed Unit	Common bean, mungbean, soy bean, OPV maize, wheat, sorghum, finger millet	Breeder and Foundation seed	Kenya	Own production, Out-growers	Partly Yes	Own resources/ revolving fund	Partially Subsidized	Public institution
Pre-Order Seed model, ISABU	Common bean, rice, maize, wheat	Breeder and Foundation seed	Burundi	Own production	Yes	Advances from buyers	Partially Subsidized	Public institution
ICAR India	Rice	Breeder, Foundation	India	Own production,	Yes	Own resources	Subsidized	Public institution
Legacy Crop Improvement Centre (LCIC)	Maize, cowpea	Breeder and Foundation seed	Ghana, COMESA region	Own production,	Not always	Own resources/ grants	Partially Subsidized	Private company
SOPROSA-Sarl	Sorghum, Pearl millet, Groundnut	Foundation seed	Mali	Own production, Out-growers	Not clearly defined	Own resources	Independent	Private company
Premier Seed Ltd	Maize, cowpea, sorghum	Foundation seed	Nigeria, COMESA region	Own production, Out-growers	Not clearly defined	Own resources	Independent	Private company
ICRISAT- Seed Revolving Fund	Groundnut	Foundation seed	Malawi	Out-growers	Not clearly defined	Revolving fund	subsidized	Public-Private
ICRISAT SRF Youth Engagement and Gender Inclusion	Groundnut, sorghum	Foundation seed	Tanzania	Out-growers	Yes	Revolving fund	subsidized	Public-Private
IITA GOSeed	Banana, rice, cassava, cowpea, maize, plantain, soybean and yam	Foundation seed	Nigeria, COMESA	Own production, Out-growers	Yes	Own resources	subsidized	Public-Private
Seed for Seeds Ltd- NARO Holdings	Common beans, groundnut, rice	Foundation seed	Uganda	Own production, Out-growers	Yes	Revolving fund	Subsidized	Public-Private
Highland beans-Egerton University	common bean	Breeder and Foundation seed	Kenya	Own production, License agreements	Yes	Royalties	Subsidized	Public-Private
QualiBasic Seeds Ltd	Maize, common bean	Foundation seed	East and Southern Africa	Out-growers	No	Own resources	Subsidized	Public-Private

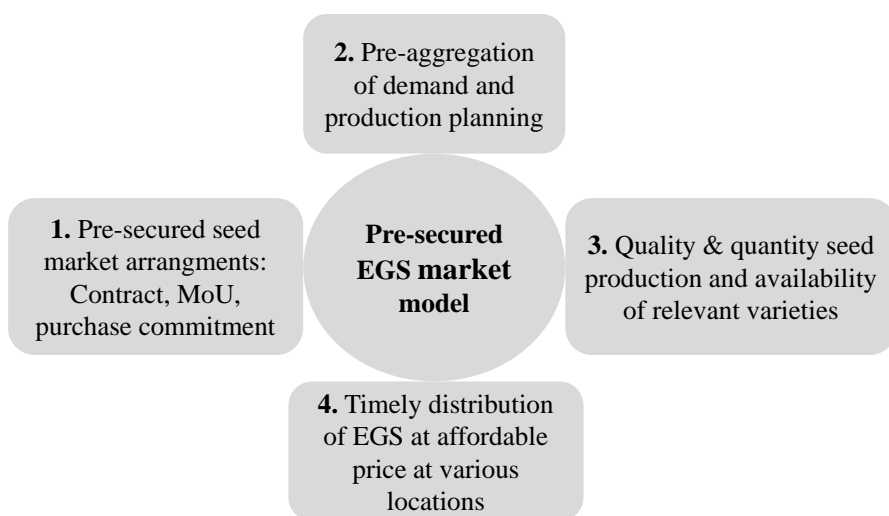
### 3.2 Identified success factors sustaining EGS production and supply

The following mechanisms made it possible to sustain EGS production over time:

- (i) Joint planning: Holding annual meetings to plan and make strategies to improve its performance. Projections of seed demand are made during these meetings and are based on the number of clients demanding seed. Seed pricing is also agreed upon during these meetings;
- (ii) Revolving fund: Provisions of up to 80% of the proceeds is injected back into seed production and development of relevant infrastructures such as seed processing and storage facilities;
- (iii) Licensing private seed companies: Large companies with the capacity to produce EGS are licensed to produce seeds of certain crops through payment of royalties to the research institute to further facilitate seed production activities;
- (iv) Incentives for farmer seed producers: Seed production being a restrictive and costly enterprise, mechanisms are put in place to encourage farmers to take up contracts to produce seed and build on their trust and integrity to work together. Contract farmers are given seed loans which are recovered when they deliver the produced seed. Premium price up to 30% are also given to outgrowers;
- (v) Infrastructure: Cold storage warehouse facilities, irrigation facilities enables offseason production and cope with climate change effects;
- (vi) Partnerships: Works closely with partners from CGIAR centers (CIAT, CIMMYT and ICRISAT), private seed companies, farmer organizations;
- (vii) Access to regional market: e.g., ECOWAS has a seed regulation that allows for regional marketing of seed released in two member countries;
- (viii) Exclusive rights on varieties: ownership of varieties against financial support to facilitate parent seed;
- (ix) Pre-secured seed and grain markets: a ready market for the basic seeds;
- (x) Capacity building of Seed producers: The foundation seed producers are trained on seed production, management and group dynamics;
- (xi) Contract seed production arrangements: Farmer groups and individual farmers with a proven track record in seed production are given contracts to produce foundation seed;
- (xii) Seed grants: The seed producers initially receive seed loans and following successful payback they are given more seed to produce on a contractual basis;
- (xiii) EGS Demand Forecasting: "bottom-up" approach gathering EGS need from community to national level, taking into account certified seed production and various categories of seed producers, agro-dealers.

### 3.3 Pilot of an EGS delivery model

A business model that operates on the principle of pre-secured market of seeds was piloted in Uganda. The model relies on pre-securing of seed markets for the EGS and entailed the advance signing of Memoranda of Understanding with companies to secure upcoming EGS demand. The project targeted market actors who are in seed production but also double as grain off-takers. The figure 1 illustrates the design of the piloted model for supply of EGS.



**Figure 1. The Pre-secured Market Option for Self-sustaining EGS Systems (PMO-EGSS)**

Under the pilot, four MoU's were signed involving research institute (parent seed supplier), private seed companies, grain agregators. About 50 tons of foundation seed (Figure 2) were produced involving five varieties NAROSORG1, NAROSORG2 NAROSORGH4, SESO1 and Seso3, and supplied to partners for the production of certified seed in Uganda (Table2).

Table 2. Amount of different seed classes produced under EGS pilot

Sorghum Variety	Seed classes produced (Tons)			Total
	Breeder seed	Foundation seed	Certified/QDS	
Narosorg1	0.4	9		9.4
Narossorg2	0.3	12	62	74.3
Narosorgh4	0.3	3.8		4.1
Seso1	0.4	7	240	247.4
Seso3	1.1	17	140	158.1
Total	2.5	48.8	442	493.3

Through consultative and multi-stakeholder approach, an EGS strategy document drafted for Uganda to fit into the overall seed strategy of the country (Figure 3).



Figure 3. Group works of participants at the stakeholders meeting to develop EGS strategy for Uganda, July 2022, Opie H.

### 3.4 Enabling policy environment

Most countries have to a large extent implemented most of the recommendations from the EGS studies. A lot of emphasis was placed on addressing the creation of enabling environment aspects such as the enactment of seed acts, the plant variety protection bill and policies in Nigeria, Uganda, Ghana as well as harmonization between the national and regional seed laws (Opie et al. 2022b).

There was also emphasis towards capacity building for seed regulation and certification services through training of human resources and enabling private sector participation in seed inspection in addition to accreditation by the international bodies ISTA and OECD (E.g. Tanzania). Private sector responsibilities in the seed sector has been enhanced through public private partnerships (PPPs) established.

### 3.5 Key lessons learned

- (i) EGS production in most of 16 cases analyzed not comprehensively informed by market needs hence the shortfalls in production (existing gap between EGS and commercial seed producers).
- (ii) EGS delivery tends to work well where seed and grain markets are pre-secured, emphasizing need for strong value chain actor linkage and integration.
- (iii) Market assurance is a key factor to sustain EGS production and delivery.
- (iv) Contract agreements and MoUs enabled seed producers gain trust from seed and grain market actors stemming from the associated quality assurance mechanisms.
- (v) Signed agreements or MoUs can facilitate community-based seed producers' to competitively access funds to support seed production activities, e.g., MasterCard Foundation grant in Uganda.
- (vi) Solving EGS equation requires collective action of multi-stakeholders along the crop value chain with seed business informed by grain market intelligence.

## 4. Conclusion and next steps

The sustainable production and delivery of EGS involves developing innovative and viable business models and commercialization pathways. Overall, EGS production remained a major challenge in sub-Saharan Africa. In most cases, EGS production is poorly informed by market needs leading to the shortfalls in production and distribution. The wide gap between EGS and commercial seed producers needed to be addressed.

Addressing such gaps would require value chain approach as seed does not stand alone; so EGS issue cannot be resolved without due consideration of the entire commodity value chain. EGS delivery works well where seed and grain markets are pre-secured. The pre-secured market can provide incentive for private sector seed actors to invest in the production of grain legumes and dryland cereals (GLDC) seeds often perceived as not so economically attractive. This emphasizes the need for strong value chain actor linkage.

Market assurance is therefore a critical factor for self-sustaining EGS production and delivery, especially for strong engagement and investments by the private sector. The private sector risks where there is enough security to recover and multiply investment.

For the future, ISSD Africa would take a value chain approach integration and building the seed value chain along the grain market demand; seed does not stand alone but respond to a certain grain market demand. It can also serve as incentive for private sector companies to invest in the non-hybrid legumes and cereal seeds.

We therefore make the following recommendations for future actions.:

- (i) Released variety must be tied to a certain market segment or niche market or defined purpose, driving (seed) business contracts among partners along commodity value chains
- (ii) Guaranteeing EGS start with product developer whereby seed regulation makes provision for availability of minimum volume needed to accelerate multiplication at scale without waiting for years to bulk
- (iii) Pre-booking of seed by the next user must become the practice. Securing the seed market in advance calls for actual seed producer commitment and proper planning
- (iv) User-friendly (digital) tools supporting seed demand forecast will play a major role.

## 5. Acknowledgements

We acknowledge the active participation of colleagues from various organizations including ICRISAT, AGRA, KIT, ISSD-Uganda and NARO for the fruitful collaboration and guidance in this project implementation. Seed companies, and farmer organizations and resource people from various organization where we documented EGS business models. We extend our gratitude to grain aggregators in Uganda for their valuable contributions.

## 6. References

- Akpo E., Muricho S.G., Alex G., Opie H., Ojiewo O.C., Varshney R.K. 2020. Legume seed production for sustainable seed supply and crop productivity: case of groundnut in Tanzania and Uganda. *Journal of Crop Improvement* 34: 4, 518-539. <https://www.tandfonline.com/doi/full/10.1080/15427528.2020.1740368?scroll=top&needAccess=true>
- Akpo E., Opie H., Ojiewo C.O., Desmae H., Muricho G., Midingoyi S., Ntare B., Aga A.A., Ininda J., Mourik van T., Schagen van B., Okori P. 2022. Designing self-sustaining early generation seed supply systems: the must-dos. *ISSD Africa Policy Brief* 2022 - - <https://doi.org/10.18174/579985>
- MCGuire S. and Sperling L. 2016. Seed systems smallholder farmers use. *Food Security*. 8, 179–195
- Opie H., Akpo E., Desmae H., Okori P., Ininda J., Ojiewo C.O. 2022a. Business models for early generation seed production and marketing. *ISSD Africa Working Paper* 2022 - <https://doi.org/10.18174/579986>
- Opie H., Akpo E., Desmae H., Okori P., Ininda J., Ojiewo C.O. 2022b. Scoping the implementation of recommendations from previous early generation seed studies in sub-Saharan Africa. *ISSD Africa Working Paper* 2022 - <https://doi.org/10.18174/579987>



