

ISSD Uganda



BRIEF 5 | 2015



Seeing Is Believing

Improving farmers' technical skills for quality seed production

Chris Tanansi Muwanika, seed expert
South Western Agro-Ecological Zone, ISSD Uganda

"Wamito wooto kodi ma tung-tung"

"We want to produce seed of very, very good quality".

This quote is from **Watembo Local Seed Business (LSB)** from early 2013 during the initial stages of working with ISSD Uganda. LSB members wanted to learn about seed production procedures to produce high quality seed. ISSD Uganda established a seed production demonstration site to showcase the appropriate seed production procedures in the first season of 2013 (2013A). Having observed and learned the best management practices for a seed crop, the group procured 50 kg of Sesame II basic seed in the second season of 2013 (2013B) from the National Semi Arid Resources Research Institute (NaSARRI). The LSB planted 20 acres at the right time following correct agronomic practices for quality seed production. The group harvested over 3.5 MT and cleaned the crop well, later sold it at a good price. This seed business success encouraged the group, which then planned to plant over 40 acres of Sesame II in subsequent seasons.

Integrated Seed Sector Development (ISSD) Uganda developed a participatory mentoring and coaching methodology to support farmers to become local seed businesses (LSBs). One important aspect of learning is creating an experience that makes it easier to remember good practices. This brief highlights several ways in which the ISSD team helped farmers to increase learning and apply the learned skills.

The need for quality seed

For a long time, farmers in Uganda have faced poor crop productivity. This was attributed to low quality of available seed in the market, low availability and utilisation of certified seed and poor farming practices as a result of inadequate extension services (Draft National Seed Policy, 2014). Additionally, the formal seed system has not been effective.

tive in providing timely and adequate access to quality seed of improved varieties, which forced farmers to use their own saved seed. To meet the growing demand for quality seed, it is important to increase production and productivity of seed. To contribute to improved availability, accessibility, adoption and use of quality seed by farmers in Uganda, the Integrated Seed Sector Development (ISSD) programme selected and built capacity of farmer groups to produce and deliver quality seed of superior varieties within their communities.

"We never knew that we farmers could also produce seed. We used to think that seed can only be produced by well-established entities like seed companies. We only learnt of this possibility when we started working with the ISSD programme. After undergoing training, we developed the confidence to produce seed because of the acquired knowledge and skills. We are even at an advantage because we have land, labour and, most importantly, a local market. The only thing we were lacking was knowledge!" said **Omutima Gwa Ruhiira Cooperative Society members in Isingiro district.**



The seed expert takes the lead in identifying and roguing off-types in LSB seed fields of Turibamwe Mixed Farmers' Rural Producers Organisation in Kamwenge (L) and, together with the District Agricultural Officer of Isingiro district (right) inspects seed fields of Omutima Gwa Ruhiira Cooperative Society (R)

Seed is a living biological product, which requires special attention and care to ensure its physiological quality. There are more specific measures required to produce quality seed compared to grain for consumption. Over time, LSBs have developed specialised skills to produce and market seed. Given its strict production guidelines, seed production seemed complicated to farmers in the beginning but they were able to understand the technicalities involved and have since consistently delivered quality seed to markets.

Learning by seeing and doing

"We used to sit under a tree and receive advisory services from extension workers. Extension workers responded to all the questions that we raised during training sessions. They also left us with a lot of reference materials. Most of us did not benefit a lot from these training as we do not know how to read and write. When we started working with ISSD, the story was different. Emphasis was on learning by practice and it has worked for us. Even those that cannot read and write are catered for. We simply observe, learn and do. Indeed experience is the best teacher!" said **Kyamulama Mixed Farmers' Group members in Lyantonde district.**





Farmers receiving instructions from ISSD's seed expert after marking plots (L); Farmers make planting holes (C); The Mbarara ZARDI crop agronomist (white cap) demonstrates fertiliser application to the planting holes (R)

Farmers expressed interest in learning about planting techniques for different crops, seed crop management practices, comparing different technologies (varieties, fertiliser use) and practices (improved vs. farmers' practices). To fulfil their learning interests, farmers proposed to establish demonstration gardens and organise learning visits to institutions such as research institutes. Seed production demonstrations were thus jointly established with farmers, which aimed to enhance farmers' knowledge and skills in observing and following best practices for quality seed production. Apart from technical skills development, demonstrations were also used to compare the yield advantage of using improved crop varieties and quality seed vs. currently used locally saved seed. Demonstrations also showcase LSB seed products to potential customers. The farmer-managed demonstrations were established via a cost-sharing arrangement to ensure ownership, proper management and utilisation of land for learning purposes. LSBs rented or provided land for demonstrations, seed, and all necessary labour from field preparation to harvesting. ISSD provided farmers with inputs such as fertilisers and pesticides. Farmers elected a committee to maintain records of all demonstration activities and outcomes. Technical staff from ISSD Uganda, the Zonal Agricultural Research and Development In-

stitutes (ZARDIs) and the sub-county extension department provided technical support to farmers during demonstration establishment. They also facilitated practical learning activities for farmers throughout the season.

For each crop variety demonstrated, plots with and without fertiliser were planted side by side for easy comparison. Farmers were able to observe the difference in crop performance as a result of fertiliser use during and at the end of the season. Having observed and appreciated this difference, one farmer noted: "Now I have seen the magic to improved crop productivity." In the picture on the next page, the effect of fertiliser at the different growth stages of finger millet is clear. Differences in crop performance between fertilised and unfertilised plots are visible. Farmers adopted the demonstrated technologies and practices accordingly.

Participatory variety selection

Besides traditional and indigenous seed varieties, LSBs also deal with improved and released varieties from research institutes. Researchers and breeders have released many crop varieties with superior traits such as tolerance to stresses, early maturity, and high yielding. However, LSB farmers were ignorant about the performance and traits of most of these varieties. This is because most of the information developed about various varieties was not dis-



Picture showing a fertilised and unfertilised portion of a farmer-managed finger millet demonstration at vegetative (L) and grain filling (R) stages



Picture showing an improved, early maturing finger millet variety-Seremi 2 (L) and a local variety (R) planted on the same date in a farmer-managed demonstration in Sheema district

seminated to farmers who are the final users of such research products. LSBs were therefore interested in learning about different varieties to improve their seed crop enterprises.

LSBs identified participatory variety selection (PVS) to learn about a selection of varieties adapted to their agroecologies. Some of these varieties provide a viable solution for responding to climate change. Learning is achieved by involving farmers in the selection process of the most adapted varieties exhibited in the PVS demonstrations.

Ten varieties of beans and groundnuts were planted in on-farm demonstrations with selected LSBs for participatory evaluation and selection by farmers. The variety demonstrations aimed to exhibit different traits of the most preferred and resilient varieties for evaluating and selection in the respective LSB localities and sharing information on new crop varieties and other technologies with farmers. For beans, nine released varieties (K132, NABE 14, 15, 16, 17, 19, 20 & 23) and one indigenous variety were evaluated. In the case of groundnuts, six released varieties (Serenut 5R, 6T, 7T, 8R, 11T & 14R), three elite lines and one indig-

enous variety were evaluated. Varieties were assessed using direct observation of key agronomic traits in the field such as maturity period, tolerance to stresses, yield and potential marketability (based on the price farmers were willing to pay for a particular variety). For beans, farmers selected NABE 19, 23 and 15 and for groundnuts Serenut 6T, 7T, Local red and 5R in that order as their most preferred and resilient varieties based on agronomic traits. The selected bean varieties have high yield (based on podding) and are early maturing (especially NABE 15) compared to traditional varieties. The groundnut varieties were selected for their disease and drought tolerance (except the indigenous red variety) and marketability in the case of the indigenous variety.

Farmers were able to observe some undesirable varieties for their environments such as Serenut 7T for its delayed flowering and NABE 15 for its susceptibility to excessive rain. Farmers were willing to pay on average UGX 3,000-5,000 and UGX 4,000-6,000 per kg of bean and groundnut seed, respectively, for the most preferred varieties. As long as the variety attributes are well understood by farmers, they are willing to pay a reasonable price for seed.



Farmers scoring preferred groundnut varieties in the field

Learning for all

Demonstrations were strategically located to encourage easy access and active participation of all group members, which particularly favoured women given limited mobility due to gender norms. Some LSBs have members from different parishes, making it difficult for all members to closely follow demonstration activities. In such cases, demonstrations took place in more than one location to encourage active participation and joint learning amongst all group members. This way, the entire community observes and learns about good crop management practices. It is important for the group to seek technical support from extension services, research or other development partners in establishing and managing demonstrations. It is the responsibility of all LSB members to manage demonstration gardens.

Learning visits

Learning visits are opportunities for LSBs to improve knowledge and practices and to integrate experiences gained from visits into their activities. LSBs consulted the ISSD programme to select the best institutions to visit in relation to identified capacity gaps. Learning visits were organised to research institutions, seed companies, the national seed laboratory, fellow LSBs and other community-based seed producing farmer groups.

At the national seed laboratory, farmers were guided through the procedures for seed sampling and testing. LSBs learned that quality control starts with the seed grower, so farmers do not have to wait for

A seed germination test is shown to LSB participants during a learning visit to the national seed laboratory

"We are always anxious to see what other people are doing. We want to see how we are progressing in relation to others doing similar activities. We have heard of seed companies and research institutions. How do they function? We heard that they could help our business!" said **Turibamwe Mixed Farmers' Rural Producer Organisation members in Kamwenge district.**



external quality assurance in order to implement procedures for quality seed production. LSBs also learned that it is a pre-requisite for every seed business to have an internal quality management system, and that external quality assurance complements seed growers' efforts in observing good quality assurance practices.



A seed analyst explains how to obtain a working sample for seed testing

When LSBs visited Equator Seeds Ltd during a learning visit they saw complicated automatic machines for drying, cleaning, treating and packaging seed. But LSB members were determined to use locally available materials to process seed and achieve the same high quality standards. Members learned that achieving the right seed quality is not about complicated

When visited a seed company, **Nyio Ajia LSB members in Arua district** said, *"We cannot be stopped from properly processing our seed by lack of machines. We shall winnow our seed using locally-made baskets so that we can separate rubbish from clean seed and we shall use the sun to dry our seed."*

machinery but about following correct seed handling and processing procedures.

Nalweyo Seed Company (NASECO) advised LSBs to set clear visions and long-term objectives. NASECO cautioned LSB members to be patient as developing a seed business occurs in phases, starting with investment in organising seed production and handling processes, and market development. LSBs learned to first concentrate on investing and developing internal management systems for their seed businesses. This is because a seed business requires considerable initial investment and returns usually come later. LSBs also considered different cost-effective seed packaging materials.

"I have just realised that we are producing a limited number of varieties and old ones." This is a statement from a **Kishasha Twekambe Bean Seed Producers member in Mbarara District** after observing a display of 29 released bean varieties during a learning visit to the National Crop Resources Research Institute (NaCRRI) in Namulonge.

Generally, learning visits have resulted in formal collaborations between LSBs and strategic actors in the seed sector, and improved service delivery to LSBs. For example, some LSBs now work closely with researchers and breeders and are involved in PVS and basic seed production. LSBs with well-developed seed markets sell seed on behalf of those that do not. LSBs have learned effective strategies for seed business development and sustainability. Therefore, learning visits improve knowledge and practices when experiences gained are integrated into daily business activities.



NASECO's processing manager explains seed packaging and branding to LSBs

How to achieve potential yields

"We used to grow beans but would get very poor yields. We used to hear that when you use beans from research, you get better yields. As a group, we bought some improved bean varieties from research for our own trials. We were informed that the minimum we would harvest per acre of the bean varieties was 800 kg. But we were really disappointed as we did not even achieve half the stated yield. We asked ourselves: Is it because researchers use irrigation and fertiliser or do they have better soil conditions than ours?"

Agetereine Rural Farmers' Organisation members in Isingiro district.

ISSD field staff have to find ways to answer farmers' dilemmas, which is why yield evaluation was integrated into farmers' learning

activities including factors affecting productivity. Demonstration gardens' design enabled application of all yield parameters including balanced plant nutrition through use of fertilisers, and plant population through appropriate spacing. Yield was assessed at two levels, at the demonstration gardens and at selected farmers' fields.

Yield data collected from demonstration gardens compared: fertilised and unfertilised plots; and, improved varieties and quality seed with local varieties and farmer saved seed. All costs incurred in the demonstration were recorded to calculate production costs per unit (per kg of seed). A cost analysis provided justification for extra investment involved in seed compared to grain production. Analysis also helped motivate farmers to adopt better crop management practices and technologies, such as line planting, use of quality seed, fertiliser and other inputs usually perceived as costly.

Table 1: Yield evaluation from farmer managed demonstrations of beans

Treatments	Av. yield (kg/acre)		Yield difference (kg/acre)	% difference
	Unfertilised plots	Fertilised plots		
LSB Quality Seed	402	736	334	83%
Farmer saved seed	187	456	269	114%
Yield difference	215	280		
% difference	115%	61%		

Source: ISSD Uganda internal reports

In addition, yields from a randomly selected acre of an individual farmers' seed production fields was determined. Yield evaluation identified why the yield potential of improved varieties from research (on-station) are not usually attained under farmer's conditions (on-farm). It also helped to determine the yield increase as a result of using quality seed of improved varieties and other technologies compared to farmer saved seed. Yield data was compared for fields planted with LSB quality seed against farmer saved seed; and fields with fertiliser against fields without fertiliser. Table 1 presents the yield assessment. Quality seed without fertiliser resulted in 115% more yield than unfertilised farmer saved seed. A combination of quality seed and fertiliser resulted in 61% more yield than farmer saved seed with fertiliser.

Within treatments, yield variations were observed between fertilised and unfertilised plots (Table 1). Quality seed produced 83% (736 kg/acre) more in fertilised rather than unfertilised plots (402 kg/acre). A similar situation was observed with farmer saved seed where fertilised plots resulted in 114% (456 kg/acre) more yield than the unfertilised plots (187 kg/acre). The farmer managed demonstrations of beans gave a higher average yield of 700 kg/acre compared to farmer fields. This was close to the average research/on-station yield of 800 kg/acre.

On the other hand, selected individual farmers' bean seed fields yielded on average 300 kg/acre; about 60% less than the yield from demonstrations. Average bean seed production costs per acre were higher in farmer managed demonstrations (UGX 919,000) compared to selected individual farmers' fields (UGX 552,000). The disparity was because farmers did not implement all recommended practices that maximise production potential of planted bean varieties, especially fertiliser and pesticide application. This also accounts for the yield differences between farmer-managed demonstrations and individual farmers' fields. Thus, due to lower yields, the unit cost of production for farmer fields was 40% higher (UGX 1,840/kg) compared to demo fields (UGX 1,313/kg). Therefore, although the average cost per acre was higher in the demonstration, the net profit was still much higher than farmers' fields due to higher productivity per unit area. High yields from farmer managed demonstrations were attributed to timely implementation of recommended production practices used on-station.

Farmers learned that achieving a variety's yield potential involves more than just quality seed alone. There are other factors that influence yield including timely planting, soil fertility management, and pest and disease management. Farmers

Table 2: Summary of average production costs for an acre of bean seed

	Demonstration	Farmers' fields
Average yield/acre	700	300
Average selling price	2,750	2,750
Total revenue	1,925,000	825,000
Average costs/acre	919,000	552,000
Unit cost of production/kg	1,313	1,840
Net profit (UGX)	1,006,000	273,000

are now willingly investing in extra inputs (seed, fertiliser and pesticides) and practices such as line planting that are usually perceived to be expensive and labour intensive. Consequently, on-farm bean yields have progressively improved from an average of 300 kg/acre in 2013 to 550 kg/acre in 2015 (83%) after three years of demonstration and training.

Improved farming practices

"Agronomic practices have greatly improved and this is good for quality seed production," reported **Mr. David Wanyama, senior agricultural inspector, Department of Crop Inspection and Certification, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)** after inspection of LSB seed fields in 2014.

Farmers are now willing to invest in inputs (quality seed, fertiliser, pesticides) and follow the best agronomic practices for better crop yields. A spill-over effect from seed producers (LSBs) to grain producers in practice has occurred in communities around the LSBs.

One farmer noted: *"I am a commercial farmer and trader, dealing in beans. I always scratched my head to find a solution to my poor bean crop yields. I eventually found a solution from the LSB in my community. I used to observe what farmers in this LSB did in their demonstration gardens and their own fields. One time I attended the LSB's field day and learned about the benefits of using good quality seed and following the right field management practices. I bought quality bean seed (variety NABE 15) from the LSB for commercial production. I followed all the instructions given to me at the*



The situation before, after training and now (left to right)

time of seed purchase. I am now excited to have harvested 220 kg of beans from the 10 kg of this variety I planted. The multiplication ratio of this variety (1:22) is absolutely incredible compared to 1:10 in previous seasons when I used farmer saved seed obtained from the local market. I have realised that complementing good quality seed with

the right practices has the potential to triple crop yields. I'm now motivated to do large-scale production for this variety."

LSBs are consistently producing seed that meets the required minimum quality standards set by National Seed Certification Services (NSCS) of MAAIF - see Tables 3 and 4.

Table 3: Minimum quality standards

Crop	Purity (%)	Germination (%)
Beans	99	80
Groundnuts	98	80
Rice	99	75

Source: Seed certification procedures, NSCS

Table 4: LSB seed quality test results

LSB Name	Crop	Variety	Results 2014B		Results 2015A		Results 2015B	
			Purity (%)	Germination (%)	Purity (%)	Germination (%)	Purity (%)	Germination (%)
Agetereine Rural Famers' Organisation	Beans	NABE 15	100	93	100	94	99.8	97
		NABE 16					99.2	91
Kigaaga Farmers' Cooperative Society	Beans	NABE 15	99.9	90	100	91	99.4	95
		NABE 16	100	98	100	89		
		NABE 17	99.9	94	100	95	99.3	93
		NABE 19					99.2	92
Kyamulama Mixed Farmers' Group	Beans	NABE 4	100	93	100	95	99.3	82
Kyazanga Farmers' Cooperative Society	Beans	NABE 4			99.9	92	99.8	92
		NABE 5			99.9	89	99.7	94
		NABE 15	99.8	94	99.9	90	99.7	97
		NABE 16	99.9	93	99.9	86	99.9	95
		NABE 17	99.9	93	99.8	85	100	92
		NABE 19			99.7	91	99.5	92
Omutima Gwa Ruhira Coperative Society	Beans	NABE 15	100	99	100	94	99.8	94
		NABE 16			100	88	99.6	94
		NABE 19					99.4	91
PELIDO LSB	Beans	NABE 16	99.9	90	100	90	99.9	95

Source: ISSD seed quality test reports

Yield assessments led to increased demand for quality seed within LSB localities because of the associated yield advantage. Acceptability of LSB quality seed within LSB communities in south-western Uganda has significantly improved as has the percentage of seed sales to local farmers. This is largely attributed to the good seed quality sold by LSBs and confidence created through demonstrations and participatory yield assessment.

LSBs are now 'centres of knowledge and technologies' and are used by extension workers as farmer field schools to teach other farmers in their respective districts and communities. Facilitating peer-to-peer interaction is a powerful tool in successful adoption of technologies and practices by farmers, and should be integrated in routine agricultural extension activities.



Etom Pius, practicing use of heat sealing machine

References

- 1 ISSD Uganda, Supporting Local Seed Businesses, A training Manual for ISSD Uganda, January 2015. Centre for Development Innovation, Wageningen UR.
- 2 ISSD-Uganda Internal Reports



Colophon

Published by:

The Integrated Seed Sector Development
Uganda Programme (ISSD Uganda)
Studio House, Plot 5 Bandali Rise, Bugolobi.
P.O. Box 20106, Kampala.
Tel: +256 775 968005
Email: info@ISSDuganda.org

Editorial Committee:

Astrid Mastenbroek | *ISSD Uganda,*
Chief of Party
Patrick Oyee | *ISSD Uganda,*
Deputy Chief of Party

Gerard Baltissen | *Royal Tropical Institute*
(KIT), Senior Advisor

Disclaimer:

This brief is produced with the assistance of the Embassy of the Kingdom of the Netherlands in Uganda funding the implementation of the ISSD Uganda programme by Wageningen UR, Centre for Development Innovation (CDI) in collaboration with NARO. The contents are the sole responsibility of ISSD Uganda. To reproduce content of the brief, please quote the brief number: ISSD Brief No 5, 2015, Seeing Is Believing. Improving farmers' technical skills for quality seed production.