



# Integrated Seed Sector Development Plus Uganda

End of Project Report

Patrick Oyee, Christine Kawuma, Marja Thijssen and Cecile Kusters

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Wageningen Centre for Development Innovation  
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The current report is the End of project report for the Integrated Seed Sector Development Plus project in Uganda, as managed by Wageningen Centre for Development Innovation. The project is funded by the Embassy of the Kingdom of the Netherlands in Kampala, Uganda. The report covers the complete implementation period 1 October 2016 till 30 June 2021.

Keywords: ISSD, Project, Seed, Development

This report is only accessible as internal report and is not available for distribution outside the project.



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Photo cover: Farmers at a seed fair in Layibi market, Layibi Division, Gulu District. ISSD Plus, 2018.

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# List of abbreviations and acronyms

AO	Agricultural Officer
AUC	African Union Commission
COMESA	Common Market for East and Southern Africa
DAO	District Agricultural Officer
DCIC	Department of Crop Inspection and Certification
DLG	District Local Government
DPMO	District Production and Marketing Officer
EAC	East Africa Community
EGS	Early Generation Seed
EKN	Embassy of the Kingdom of Netherlands in Kampala
FSE	Foundation Seed Enterprise
GALS	Gender Action Learning System
HI-HO	High Input – High Output
HOSPA	Horticulture Sector Professional Alliance
IFDC	International Fertilizer Development Centre
ISFM	Integrated Soil Fertility Management
ISSD	Integrated Seed Sector Development
KPI	Key Performance Indicator
LI-LO	Low Input – Low Output
LSB	Local Seed Business
LSB-T	Local Seed Business Trainer
MAAIF	Ministry Agriculture, Animal Industry and Fisheries
MSP	Multi-Stakeholder Partnership
MT	Metric tonnes
MTR	Midterm review
NARI	National Agricultural Research Institute
NARO	National Agricultural Research Organisation
NaSARRI	National Semi Arid Resources Research Institute
NIGI	Nutrition and Income Generation Intervention
NDP	National Development Plan
NGO	Non-Governmental Organisation
NHL	NARO Holdings LTD
NSCS	National Seed Certification Services
NSP	National Seed Policy
NSS	National Seed Strategy
OPV	Open Pollinated Variety
OSP	Out Scaling Partner
PPH	Plant Protection and Health
PVP	Plant Variety Protection
QDS	Quality Declared Seed
S4S	Seed for Seeds Uganda Ltd
SEVIA	Seeds of Expertise for the Vegetable Sector in Africa
SOP	Standard Operating Procedure
SRS	Seed Receipt System
STTS	Seed Tracking and Tracing System
ToT	Training of Trainers
UGX	Uganda Shillings
USTA	Uganda Seed Traders Association
VEA	Village Enterprise Agent
WUU	Wageningen University & Research Uganda

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WCDI, WUR

Wageningen Centre for Development Innovation, Wageningen University & Research

WPR, WUR

Wageningen Plant Research, Wageningen University & Research

ZARDI

Zonal Agricultural Research and Development Institute



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# Executive summary

The primary focus of the Integrated Seed Sector Development (ISSD) Plus project was making quality seed available and accessible for use by farmers. For all the interventions conducted, there was also the focus on institutionalization of all the four project components, which is crucial for sustainability.

The project achieved good results against its goal level indicators related to: (i) estimated area planted with quality seed, which was 205,416 acres (68% achievement); (ii) cumulative additional food produced as a result of farmers using quality seed, which was 143,663 MT (>100% achievement); (iii) cumulative additional income as a result of the additional food produced, which was UGX 178 billion (>100% achievement); (iv) amount of food produced that treats iron deficiencies, which was 11,014 MT (>100% achievement) and vitamin A deficiency, which was 5,498 MT (>100% achievement); and (v) cumulative number of households improving their productivity and income by using quality seed, which was 326,719 (>100% achievement). These goal level indicators were computed from the sales of Quality Declared Seed (QDS) made by 2,548 seed farmers from 250 Local Seed Businesses (LSBs) in active seed production for the period 2016 – 2020.

Under the '**Uptake of Quality Seed component**' (Uptake component) the project successfully conducted all major planned activities to increase awareness and access to quality seed for smallholder farmers. These included 149 roadshows, 3,960 media campaigns on 11 local radios, 115 compound dialogues, 145 seed fairs, and 616 weekly village markets. This came to a total of 4,224 awareness raising activities held out of the targeted 6000; and 761 sales outlets set up out of the targeted 1000. The road shows and seed fairs attracted approximately 64,000 people while the compound dialogues were attended by 2,320 people. Based on a reach analysis conducted, the mass media campaign on radio reached approximately 11,170,254 people in the six zones of the project's operation. Other interventions conducted included field days on demonstration plots, organoleptic taste events, exhibitions and door-to-door quality seed promotion through sub-county Agricultural Officers (AOs) and community quality seed use champions.

An assessment conducted in 2020 indicated that 35% of the farmers in the project areas of operation adopted QDS. This is a commendable project achievement within the project areas of operation since the National Seed Strategy (NSS) targeted to have 33-35% of farmers in the country using quality seed by 2023. The project also noted that for all crops apart from soybean and groundnut, farmers in locations with project activities had a relatively higher average willingness to pay for QDS as compared to those in locations without project activities. The project noted a drop in the proportion of farmers that accessed seed from informal seed sources, NGOs and government projects. These changes are attributed to the awareness creation conducted by the project. It is important to note that mindset change is a long-term process that requires intense and continuous efforts from all stakeholders that interface with farmers on issues of agriculture.

The '**Quality Declared Seed component**' (QDS component) saw the implementation of initiatives geared towards increasing QDS production by scaling the number of LSBs, upgrading already existing LSBs and institutionalizing QDS quality assurance. Through collaboration with Out Scaling Partners (OSPs), an additional 219 LSBs were established and combined with the existing groups. Out of the total number of groups established since the first ISSD project, 250 of them were in active seed production by 2020 which is 83% of the targeted 300 LSBs. Upgrading support to existing LSBs was tailor-made for the different LSB categories with the major focus areas being resource mobilisation, productivity enhancement, improved business management and market diversification depending on identified gaps.

There was a gradual increase in QDS produced across the project period because of the upgrading support and increase in number of active LSBs. QDS volumes produced were, however, lower than expected by the project because of the unfavourable weather conditions. Such conditions created an

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uncertainty that discouraged some farmers from investing their resources in the seed business. Challenges in resource mobilization were also a major setback for seed producers but the project implemented strategies to enable the LSBs to improve in this aspect. An assessment was carried out using the LSB A, B, C+, C- categorization and it revealed that 48 LSBs fell in category A, which represents the well performing and sustainable groups. The project targeted to have 75 LSBs under the A-category. Over the project period, LSBs produced 9,899 MT of QDS for Open Pollinated Varieties (OPVs) which earned the seed producers UGX 19.9 billion. All the QDS was of officially released varieties, which these LSBs disseminated in the local communities, hence exposing it to more farmers.

The project put efforts into operationalizing the quality assurance system for QDS to ensure the production and sale of a quality product. By 2020, 70% (175) of the active LSBs were receiving at least one mandatory field inspection per crop per season. Following harvest and cleaning of the seed, 44% (109) LSBs were having their seed sampled for lab testing and 98% of the seed samples passed the tests. Basing on the regulations, all LSBs were expected to sell the QDS when it is packed with a green tamperproof label and 15% of the groups in production were able to fulfil this requirement. Fewer LSBs were able to utilize the green tamperproof label because of delays at the sampling and seed testing stage.

For sustainability, the project worked with LSBs to establish in-house strategies including Local Seed Business Trainers (LSB-Ts), the group committees, gender champions and the LSB associations and clusters. Strategies that encouraged institutionalization of the QDS system included engagement of: (i) NARO for basic seed sourcing; (ii) MAAIF for laboratory seed testing and tamperproof labels; (iii) the District Agricultural Officers (DAOs) for field inspection; (iv) and sub-county AOs for regular coaching and monitoring.

For the '**Early Generation Seed component**' (EGS component) whose success impacts the two earlier components, the project achieved what it planned to in terms of increasing availability of basic seed and its access to seed producers through a central and zonal basic seed production model. It supported the National Agricultural Research Organisation (NARO) to formalize the foundation seed enterprise (FSE), which was registered as a subsidiary company limited by guarantee under NARO Holdings Ltd (NHL). This company, now called Seed for Seed Uganda Ltd (S4S) is a central basic seed enterprise established to boost basic seed production in the country. This foundation seed enterprise currently operates alongside the Zonal Agricultural Research and Development Institute (ZARDI)-led basic seed production strategy and the LSB-led basic seed production strategy. The latter strategies were specifically established to improve access to basic seed especially for the LSB farmers. By 2020, the three strategies had delivered a total of 269 MT of basic seed for legumes, cereals and oil crops and 358 MT of potato planting materials. Annual basic seed volumes produced were more than 300 MT which is way higher than the project target of 80 MT.

With project support, the Ministry Agriculture, Animal Industry and Fisheries (MAAIF) quality assured all the basic seed produced under the three strategies. To monitor the quality of seed on the market, the project in partnership with MAAIF developed a digital Seed Tracking and Tracing System (STTS) to streamline the multiple quality seed supply chains. The process of developing the STTS experienced delays in the earlier years of the project so the system was not yet in operation by the time the project was concluded.

To ensure smooth operations along the seed value chains, the project also put significant efforts into improving the seed policy environment. By the end of the project, the National Seed Policy (NSP) and NSS were passed. This was accompanied by the Seed and Plant Quality Declared Seed Regulations and the Plant Protection and Health (PPH) Regulations which were gazetted. The Plant Variety Protection (PVP) Regulations still awaited gazettement by conclusion of the project. The PVP and PPH regulations were developed to enhance access to improved high-yielding crop varieties and promote seed import and export. The Seed and Plant Quality Declared Seed Regulations particularly provide a framework for legal existence of the QDS system. The project also piloted two projects aimed at solving systemic bottlenecks in vegetable production. These included a semi-automated hydroponics system for production of lettuce and a research project into production and licensing of biopesticides.

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The '**Vegetable component**' of the project focused on adoption of advanced vegetable varieties bred by Dutch seed companies including East West Seed, Rijk Zwaan (Holland Greentech), Syngenta, Bejo (Dutch Seed Centre), Bakker Brothers (Home Harvest), and Enza Zaden (House of Seed). To promote these varieties, the project: (i) facilitated seed companies to conduct farmer field days on 442 demonstration sites (of the targeted 320); (ii) held four training events for vegetable farmers nationwide; and (iii) conducted mass media awareness on six local radios. To ensure that the varieties performed to their potential for farmers interested in adopting them, the project took 11,680 farmers (out of the targeted 20,000) through practical in-depth vegetable production trainings on 730 training sites (out of the targeted 800). To attain a multiplier effect in promotion of the vegetable technologies, the project trained 147 vegetable sector professionals (of the targeted 100) that interface with farmers regularly. These individuals further established a platform for supporting vegetable farmers beyond the project period. The project sometimes faced challenges with the partnerships with the business entities, which had different interests in some aspects.

By the end of the project, 53% of vegetable farmers were aware of at least one of the quality vegetable varieties promoted. The uptake levels of the quality vegetable varieties stood at 16.2% for the most adopted crops which included tomato, cabbage, onion and green pepper as evidenced in a 'Vegetable adoption study' conducted.

Although the project did significant work in the seed sector overall, there are still a number of areas that remain weak. Firstly, the basic seed production system needs further strengthening to ensure that activities under the basic seed production models are sufficiently coordinated to satisfy basic seed demand by seed producers. Secondly, the QDS quality assurance system though operationalized needs further institutionalization to guarantee active involvement of all relevant regulatory officers. Lastly, urgent regulatory changes are still needed to ensure smooth implementation of the NSP and NSS.



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# 1 Introduction

This is the end of project report for the Integrated Seed Sector Development (ISSD) Plus project for the period of 1 October 2016 to 30 June 2021. It highlights major interventions implemented, achievements and a reflection over the project period. Project outputs are reported following the logframe format which considers impact in two perspectives i.e. 'The people' and 'Sector change'. This report is structured as follows:

Chapter 1:	Introduction
Chapter 2:	Project performance impacting lives
Chapter 3:	Project performance impacting sector change
Chapter 4:	Lessons learned
Chapter 5:	Where the seed sector stands to date
Chapter 6:	Considerations for the future
Chapter 7:	Conclusions

A summarized version of this report with key highlights has been shared with stakeholders in the close-out event as organized on 29 April.<sup>1</sup>

## 1.1 About the ISSD Plus project

The ISSD Plus project aimed to support the development of a vibrant pluralistic and market-oriented seed sector in Uganda, providing more than 300,000 smallholder farmers access to affordable quality seed of preferred varieties. The project was implemented from 1 October 2016 – 30 June 2021. It is funded by the Embassy of the Kingdom of the Netherlands in Kampala (EKN) and implemented by Wageningen University & Research, Wageningen Centre for Development Innovation (WUR, WC DI), in partnership with the National Agricultural Research Organization (NARO) and Wageningen Plant Research (WPR). The other critical implementing partner was the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) through the National Seed Certification Services (NSCS). The project worked across the entire seed value chain and promoted all classes of quality seed in Uganda with the aim of increasing access to and uptake of quality seed for smallholder farmers in Uganda.

### **Why the project?**

The inherent problem of the seed sector in Uganda has always been the limited level of access to and use of quality seed of improved crop varieties by small holder farmers, which was estimated to be less than 15%; and this percentage largely consists of seed for maize and sunflower hybrids and imported vegetable seed.

There was evidently a large gap in availability of quality seed for important Open Pollinated Varieties (OPVs) of crops of legumes, oil seed, small cereals and roots and tubers commonly known as orphaned crops. The seed sector in general is characterised by numerous bottlenecks that hindered the prevalence of a pluralistic and market-oriented seed sector that favours production and marketing of quality seed of all crops including non-hybrid crops.

There was thus the need for sector transformation to foster pluralism through policy reforms to support alternative seed delivery systems to complement the existing formal seed system. At the same time, all related challenges across the seed value chain needed to be addressed in a holistic manner. The challenges included: (i) access to sufficient quantities of quality basic seed (early generation seed - EGS) as an input for quality seed production; (ii) access to seed business

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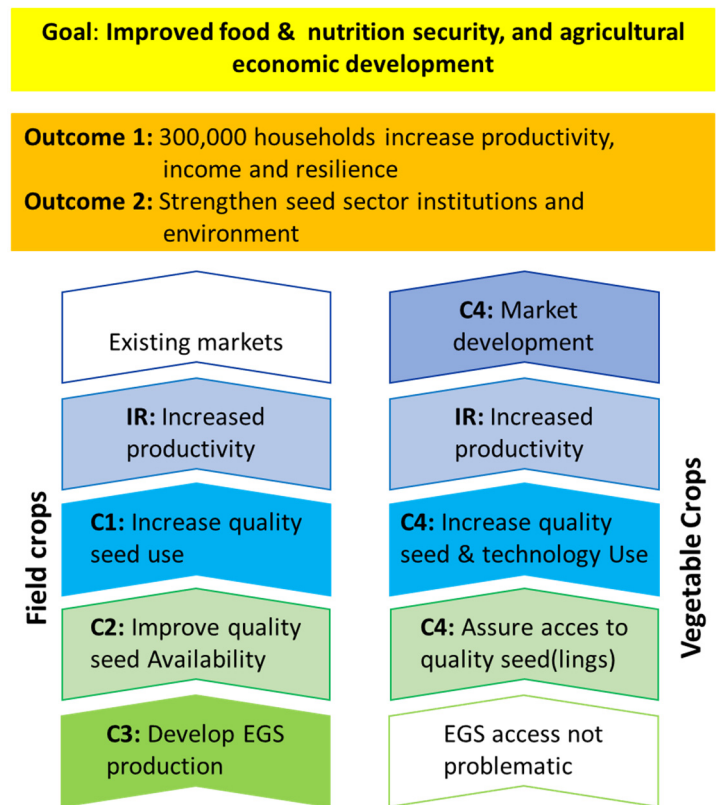
<sup>1</sup> ISSD Plus Project Close Out Report, April 2021:  
<http://admin.issduganda.org/assets/images/resources/reports/closeoutreport.pdf>

technology and affordable quality assurance services for quality seed growers; and (iii) at farmer uptake level, access to sufficient volumes of quality seed and sufficient awareness about quality seed.

**The approach used: an integrated approach to seed sector development**

The objective of the ISSD Plus project was to contribute to increased incomes of smallholder farmer households -especially women and youth, improved household food security and nutrition. The project goal was to be realized through increased productivity of field crops and vegetables through the increased use of quality seed of adapted and farmer preferred varieties.

In terms of field crops, the project worked across the seed value chain to ensure increased availability, access and use of quality seed by smallholder farmers. This was to lead to increased productivity and increased incomes as well as improved food security at household level. The productivity increase was to result from an increase in crop yields as a direct result of the use of quality seed by small and medium-scale farmers as opposed to use of farmer saved seed.



**Figure 1** Intervention logic of ISSD Plus

To increase uptake of quality seed, both certified and Quality Declared Seed (QDS), was to be promoted through publicity campaigns, demonstrations and proximity marketing efforts ('Uptake component'; C1 in Figure 1). Proximity marketing focuses on increasing farmers' access to seed by availing the seed in areas they easily reach.

To increase availability of quality seed, Local Seed Businesses (LSBs) were to be supported to produce and market QDS ('QDS component'; C2 in Figure 1). The project was thus scaling the LSB approach based on the experiences of the previous ISSD Uganda project to three additional zones, i.e. East, South Western Highlands (Kigezi) and Western Highlands (Rwenzori). The zones that already had ISSD Uganda operations included South West (Ankole), North and West Nile. The initiatives in West Nile zone were implemented by a sister project call 'Nutrition and Income Generating Initiative' (NIGI).

To ensure that seed producers (seed companies and LSBs) were able to produce quality seed, they needed to have access to the required quantities and qualities of basic seed whose availability was to also be addressed through the project's interventions in EGS supply ('EGS component'; C3 in Figure 1).

The ISSD Plus project also had a specific objective on vegetable seed sector development ('Vegetable component'; C4 in Figure 1). The project was to intervene through effectively promoting the use of superior vegetable varieties through partnerships with vegetable seed companies. The project was to train farmers and sector professionals on appropriate agronomic techniques that promote realization of the full potential of these varieties. This was to be coupled with improved access by vegetable producers to high quality seed and seedlings.

At the same time the project worked on the creation of a more enabling environment for the seed sector by supporting the public sector functions particularly the development of the new seed policy and its related seed regulations (policy support function). Having clear and transparent rules and guidelines in place for governing seed production, seed marketing, service provision and sector coordination was to benefit all seed sector stakeholders, including the farmers as seed users.

## 1.2 Overview of project achievements

### Major outcome level achievements

Table 1 provides an overview of major outcome level achievements of the project. The outcome level indicators were all mathematically estimated from QDS sales made between 2017 and 2020. Based on the lower than expected volumes of QDS produced over the project period, it was expected that all the above indicators would also be under achieved but this is not the in case as seen in Table 1. Instead, all of them apart from 'Area planted with quality seed' appear to be over achieved. This resulted from an under estimation of the indicator targets at the start of the project.

Taking the example of the 'Number of households improving their productivity and income by using quality seed', indicator, the correct target was supposed to be 828,000 which is based on the assumption that an average of 690 households can be reached with quality seed by one LSB in one year. The target for this indicator was under estimated because the project assumed that only 1,000 households could be reached by one LSB over the entire project period.

**Table 1** Summary of outcome level achievements

Key performance indicator	Derivation	Project 4-year target	Consolidated project achievement	Extent of target realisation
1 Area planted with quality seed (Acres)	Mathematically estimated from volumes of QDS sold and average seed rate per crop	300,000	205,416	68%
2 Additional agricultural production of grain equivalent as a result of using quality seed (MT)	Mathematically estimated from estimated area under food production, yield difference between QDS and farmer saved seed and cereal equivalents per crop group	87,500	143,663	>100%
3 Amount of food produced that prevents and treats Iron deficiencies (MT)	Mathematically estimated from volumes of iron rich QDS bean varieties sold by LSBs, bean seed rate and average yield of beans per unit area	1,360	11,014	>100%
4 Amount of food produced that prevents and treats Vitamin A deficiencies (MT)	Mathematically estimated from volumes of Vitamin A rich QDS sweet potato varieties sold by LSBs, sweet potato seed rate and average yield of sweet potato per unit area	840	5,498	>100%
5 No. of households improving their productivity and income by using quality seed	Mathematically estimated as the product of seed sold and the average seed use per farmer per season for each crop (Note that average seed use for each crop was constant over the project period and was set based on a study conducted during the first ISSD project)	300,000	326,719	>100%
6 Income (net benefits): difference between cost of production and price (Billion UGX)	Mathematically estimated from estimated additional food produced, farmgate price of food for which QDS was sold and Average cost price for food production	147	178	>100%

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## **Other accomplishments**

Other major accomplishments made by the project worth highlighting include:

- By 2020, 35% of the farmers in the zones of project operation had adopted QDS
- A total of 250 LSB farmer groups were in active QDS production across 63 districts
- 4,220 farmers were trained in the seed business concept (53% female and 24% youth)
- Supported NARO to establish a basic seed enterprise formally registered as Seed for Seed (S4S) (U) Ltd (a subsidiary of NARO Holdings Ltd)
- Supported decentralization of basic seed production by facilitating 6 ZARDIs and 6 LSBs to set up basic seed production businesses
- A total of 269 MT of quality basic seed of beans, groundnut, soybean, rice and 358 MT of potato was produced under the 3 basic seed production models
- Built capacity of a team of 147 vegetable sector professionals that continue to operate through a joint platform 'Horticulture Sector Professional's alliance' (HOSPA)
- Promoted quality vegetable varieties from Dutch seed companies to over 17,300 vegetable farmers through field days on demonstration sites and training events implemented in partnership with 6 Dutch seed companies
- Over 11,680 farmers were trained on advanced practices of vegetable production
- 23% of vegetable farmers in the areas of project operation had adopted the quality vegetable varieties by 2020
- Influenced development of 4 seed sector related instruments; 3 of these were passed/gazetted (National Seed Policy, Seed and Plant (QDS) regulations, Plant Protection and Health (PPH) Regulation). The draft Plant Variety Protection (PVP) regulation is now awaiting final approval and gazetting



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## 2 Project performance impacting lives

This chapter presents achievements made under the four project components, which also represent the various nodes along the seed value chain. We have organized the sections according to the project component areas of intervention i.e. Uptake, QDS, EGS and Vegetable components and we conclude the section by looking at climate change and gender, which cut across all the four project components. We start off with the quality seed uptake component which represents the demand side that basically drives the earlier supply nodes of the seed value chain.

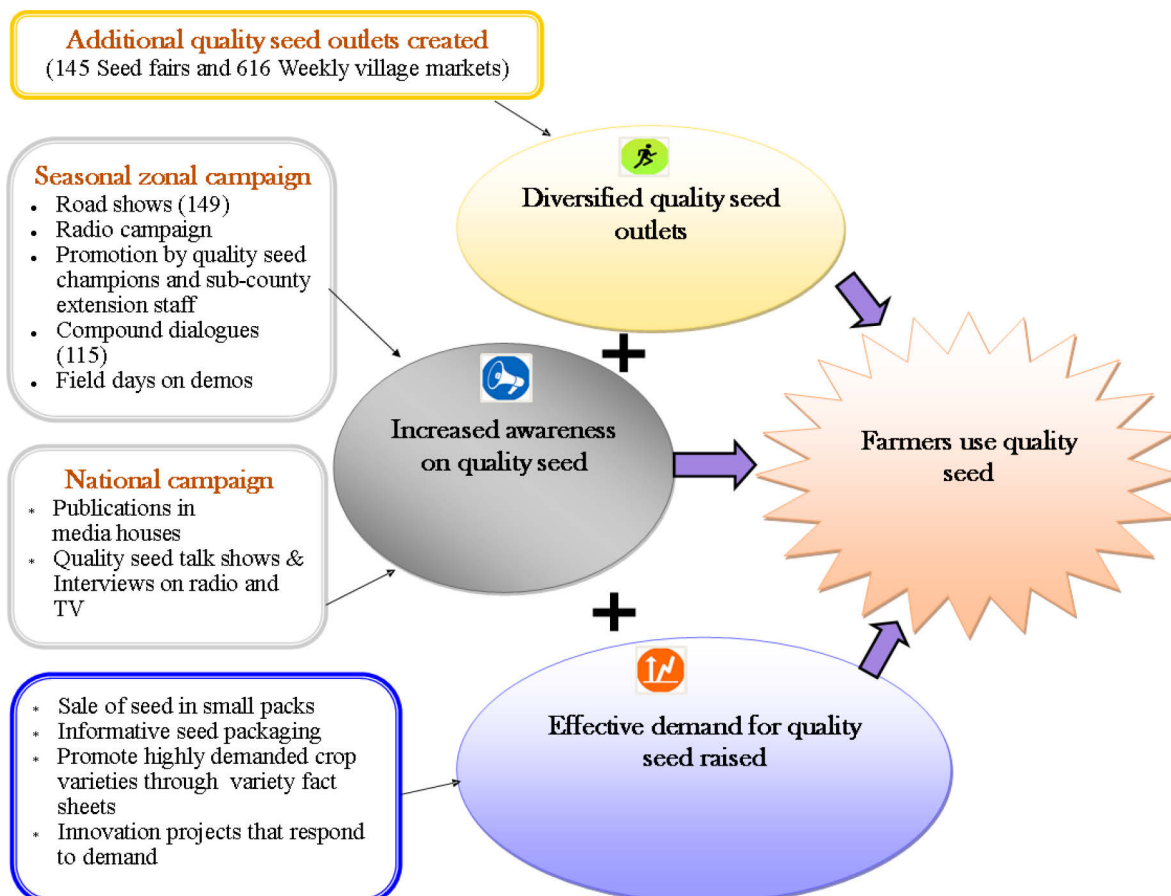
### 2.1 Increasing quality seed use – Uptake component

The ISSD Plus project baseline conducted in 2014 indicated that 11% of farmers obtained seed from the formal seed systems with most of this being seed of maize, sunflower and exotic vegetables. Limited quality seed use by farmers is not only a result of inadequate quality seed availability but also limited adoption by smallholder farmers. The project identified four major underlying causes of marginal quality seed use including: (i) lack of awareness on availability of quality seed; (ii) real or perceived lack of quality seed available at convenient locations; (iii) lack of knowledge on the economic benefits of investing in quality seed; and (iv) lack of cash to purchase quality seed. Alongside the efforts to increase availability of quality seed in farming communities through QDS production, the ISSD Plus project also set out to stimulate increased uptake of both certified seed and QDS within rural farming communities.

The quality seed use challenge was addressed by ensuring that: (i) the small holder farmers accessed quality seed at convenient locations; (ii) farmers were made aware of the economic benefits of using quality seed; and (iii) effective demand for quality seed was raised. These formed the major output areas for the quality seed uptake component of the project. Figure 2 provides an overview of the interventions in this component.<sup>2</sup>

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<sup>2</sup> Find the project's approach and results of the Uptake component also described in this project brief: Adong & Kawuma, 2021. Promoting quality seed uptake in Uganda. ISSD Plus Brief 18: <http://admin.issduganda.org/assets/images/resources/briefs/promotingqualityseeduptakeinuganda.pdf>



**Figure 2** Overview of interventions implemented to increase quality seed use

### 2.1.1 Major results from interventions of the Uptake component

#### Utilization of quality seed by farming communities increased

An assessment was conducted in September 2020 to evaluate the extent of adoption of QDS by farmers within the project zones of operation (Access to seed survey report, 2020<sup>3</sup>). Overall, it showed that a significant 35% of the farmers in the project areas of operation had adopted QDS by 2020. This is a significant achievement for the areas of project operation since the NSS targeted that adoption of quality seed be 33-35% by 2023.

#### Market share for QDS among households increased

With the increasing number of quality seed volumes availed to communities through the various outlets, supply of QDS generally increased between 2017 and 2020. To determine the extent to which QDS contributed to quality seed use, the project analysed its market share within the project zones. Results in Table 2 show the quantity of seed planted by the sampled farmers in 2019 and the market share of the QDS for the respective crops. Overall, the market share of QDS by 2019 was 10% with home saved seed and grain from the market taking the bigger share of the total seed planted.

<sup>3</sup> Find the Access to Seeds study of Mugisha et al., 2020 at: <http://admin.issduganda.org/assets/images/resources/reports/theaccessstoseedsurveyreport,2020.pdf>

**Table 2** QDS market share in farmer households by 2019

Crop	Season A 2019			Season B 2019		
	Quantity of seed planted (kg)	Quantity of QDS that makes up this seed (kg)	QDS Market share (%)	Quantity planted (kg)	Quantity of QDS that makes up this seed (kg)	Market share (%)
All crops*	156,377	15,744	10	115,434	7,424	9
Beans	19,718	1,279	6.4	13,975	597	6.8
Potato	120,066	12,660	10.5	91,981	5,890	6.4
Rice	5,974	560	9.3	5,197	495	9.5
Soybean	5,210	587	11.2	888	86	9.7
Sesame	683	57	8.4	1,968	157	7.9
Groundnuts	4,726	601	12.7	1,425	199	13.9
Cassava (bags)	2,569	408	15.8	385	19	4.9

\*Note; 'All crops' excludes cassava which is not measured in kg; Most LSBs are able to sell off all their QDS during planting.

Source: Access to seed survey report, 2020.

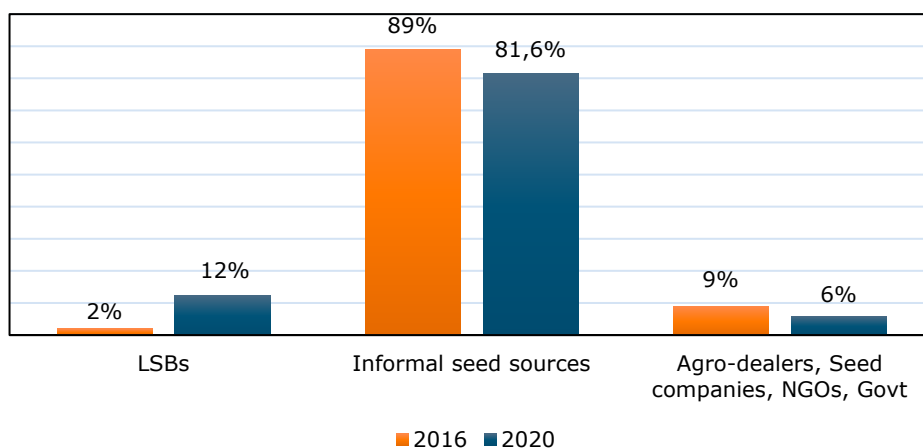
However, it is important to note that there is a potentially large multiplier effect that is not taken into account. This is due to the fact that most farmers replant the harvest of quality seed at least twice before buying fresh seed. Breeders indicate that this is allowable for self-pollinated crops since seed remains genetically viable for three planting seasons before fresh quality seed will be needed, especially under cases of minimal disease prevalence and good weather conditions. Farmers that have any form of relation with those using QDS unknowingly use QDS when adopters share with them the harvest from QDS after it is replanted twice. Considering that there is a potential multiplier effect in farmers using QDS, it is allowable to assert that the QDS market share is actually larger than the 10% reported by farmers during the study.

**QDS provided more variety options for OPVs hence contributing to variety dissemination**

Results from the adoption study showed that, majority of farmers (64.5%) attested to LSBs offering them more variety options to choose from for OPV crops indicating greater dissemination of NARO varieties bred for various productivity and nutritional attributes.

**Fewer farmers utilised the informal seed sources as they started using QDS**

A comparison of the seed source status for OPV crops in 2016 and 2020 (Figure 3) indicated that there was a 10% increase in farmers that access seed from LSBs and a drop in those that access seed from informal seed sources (food markets, home saved seed, friends, relatives), but also from NGOs and government. These changes can be attributed to the presence of LSBs within the communities and the diversification of markets for quality seed through the already mentioned field days, exhibitions, seed fairs and weekly village markets.



**Figure 3** Changes in OPV seed sources

Source: Access to seed survey report, 2020

For the various QDS crops grown, 34.9% of the farmers reported having ready access to QDS but as expected, QDS was found to be more readily accessible to farmers in locations with project interventions (42.9% of them) than locations without interventions (24.9%). This difference in accessibility is attributed to LSB operations as affirmed by the QDS accessibility index which is significantly higher for farmers in locations with LSBs than those in locations without LSBs by 14.5-14.8%. The 250 LSB groups in active seed production are operating in 63 districts of Uganda which implies an average of four groups per district. Considering that more than 80% of Uganda's population depends on farming, the current number of seed producing farmer groups is still low.

### Willingness to pay for quality seed increased in the areas of project operation

**Table 3** Average prices seed producers and farmers are willing to transact for QDS

Crop	Minimum supply price (UGX)	Average price farmers are willing to pay/kg/bag (cassava) (UGX)			Affordability gap (for pooled sample) (UGX)	t- value
		Pooled sample	Beneficiaries	Control		
Beans	4,000	2,410 (736)	2,584 (797)	2,244 (632)	1,600	-46.3***
Potato	2,500	1,512 (434)	1,524 (507)	1,504 (385)	1,000	10.39***
Rice	2,500	1,659 (475)	1,916 (353)	1,328 (408)	900	9.99***
Soybean	3,500	2,367 (894)	2,288 (550)	2,456 (1,176)	1,200	8.89***
Sesame	4,500	3,952 (3,350)	4,362 (3,760)	3,658 (3,025)	1,000	1.60**
Ground nuts	4,000	3,121 (747)	2,961 (733)	3,245 (743)	1,000	10.37***
Cassava	24,000	14,522 (5,372)	16,892 (4,614)	12,776 (5,244)	10,000	20.26***

Note: the willingness to pay for the pooled sample was rounded off to calculate the affordability gap (the difference between minimum supply price and willingness to pay for pooled sample). (\*\*- statistical significance is at the 95% confidence level; \*\*\*-statistical significance is at the 90% confidence level)

The project made an assessment of what farmers were willing to pay for QDS and the minimum prices seed producers were willing to supply the QDS for specific crops. For all crops apart from soybean and groundnut, the project noted that farmers in locations with project activities had a relatively higher average willingness to pay for QDS as compared to those outside the project areas. (Table 3). This difference was attributed to efforts put into awareness creation in the beneficiary locations.

#### 2.1.2 Interventions implemented under the Uptake component

##### I. Increasing access to certified seed and QDS at convenient locations

To complement the existing traditional quality seed sources including seed company outlets, agro-dealer shops and LSB stores, the seed suppliers were supported to employ innovative approaches to having quality seed brought nearer to farmers. The project facilitated LSB groups and seed companies to exhibit and market quality seed during 145 seasonal seed fairs held on market days within farmer communities. These events were estimated to have reached out to approximately 64,000 people who received the quality seed use messages and/or bought quality seed.

The project supported LSB groups to also create more than 616 weekly village market seed outlets for selling quality seed and train farmers on its economic benefits. Compared to seed fairs, weekly village markets are considerably less costly and easier to organize because transport and location set up costs are negligible.



**Photo 1, 2** Left: Farmers at a seed fair in Layibi market, Layibi Division, Gulu District. Right: A weekly village market organised by Latyeng Farmers Group in Gulu district (March 2021)

## II. Creating awareness on the economic benefits of using quality seed

Awareness on the benefits of quality seed use was achieved through national and regional campaigns on quality seed use while utilizing a number of strategies aimed at mindset change.

### a. Road shows

Alongside each seed fair implemented, the project conducted a road show to attract more farmers to the seed markets. Road shows are an innovative educational–entertaining approach used to impact on large gatherings. The project implemented a total of 149 road show events in the project areas of operation.



**Photo 3** A road show in Rwenzori zone

### b. Field days on demonstrations and exhibitions

As part of their QDS product promotion strategy, LSBs seasonally set up demonstration sites on which they held field days at appropriate growth stages of the crops. Through these activities, LSBs exposed communities to varieties released by NARO; some of which had positive climate SMART and nutritional attributes. Each field gathered more than 100 farmers to compare and contrast between QDS and farmer saved seed.

LSBs also showcased QDS during nationally celebrated events, exhibitions and expos regularly organized by other development organisations e.g. The 'World Food day' organized zonally by NARO, the 'Nile National Agricultural Show' organized by National Farmers' Federation and the 'Harvest Money Expo organized by New Vision'. These events gave LSBs an opportunity to expose farmers, public and private sector players to the QDS product.

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### *c. Organoleptic taste events*

During the seed fair events, some LSB farmers also promoted improved varieties through organoleptic events. Organoleptic events are meant to exhibit the taste, colour, odour, and cooking properties of the varieties. Because most smallholder farmers produce for not only sale but household consumption as well, their choice of the variety to plant will also thus be determined by the organoleptic properties. This therefore requires this specific strategy of awareness creation to increase adoption of a variety. Women particularly take interest in such attributes as compared to men whose main interest is production for the market.



**Photo 4, 5** Organoleptic taste activity to select preferred bean varieties in West Nile

In this regard, the project conducted 'organoleptic events' which involved cooking of different varieties of a specific crop being promoted and allowing participants to taste so that they could give feedback on specific attributes of personal interest to them.

### *d. Door-to-door quality seed use promotion*

This involved building capacity of selected sub-county Agricultural Officers (AOs) and community champions in conducting door-to-door awareness creation. AOs and community champions were targeted because their work schedules involve close daily interaction with many households which presents an opportunity for them to also chip in information on quality seed use. The community champions approach was a modification of the initially planned 'Village Enterprise Agents (VEA) Model'<sup>4</sup> which didn't turn out to be a feasible approach for the QDS product. A total of 149 AOs and 50 community champions were trained to promote quality seed use within their communities of operation.

### *e. Compound dialogues*

With the onset of the COVID-19 pandemic in 2020, the project modified its awareness creation strategies by introducing 'Compound dialogues' to share information on quality seed use. These dialogues involved fewer farmers (20) in compliance to COVID-19 Standard Operating Procedures (SOPs), making them more impactful for mindset change than mass events like road shows. A total of 115 dialogues were conducted with 2,320 farmers; 43% of these being women.

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<sup>4</sup> The VEA model is a youth seed project of Lutheran World Relief under which selected individuals referred to as VEAs were engaged as distributors of agricultural production inputs including quality seed and chemicals directly to households.



**Photo 6** A compound dialogue conducted in Kashasha, Rubanda district (2020)

*f. Mass media awareness campaign through print media, radio and television*

Mass media campaigns were widely used to expose large populations to quality seed messages through routine use of existing media channels including television, radio, and newspapers. Through mass quality seed use promotion on 11 local radio stations in the six zones, the project reached out to a unique audience (percentage of individuals exposed to an advert expressed as an absolute number) of 11,170,254 people (outreach review by Reelforge Uganda Ltd). This was conducted through a total of 3,960 talk shows, radio spots and presenter mentions played over a 60-day period during the planting seasons of 2018, 2019 and 2020. Talk shows were also held on selected local and national televisions in Uganda to promote quality seed use to additional segments of viewers that play critical decision-making roles in the agricultural sector. Various LSB and quality seed use success stories were also disseminated through local and National newspapers to promote enlighten people on quality seed use.



**Photo 7** A strip promoting quality seed use in the Newvision newspaper (2019)

Through all of these promotional initiatives, the project empowered farming communities with knowledge to make informed decisions on the kind of seed to plant.

**III. Raising effective demand for quality seed**

In addition to raising interest of farmers, attention was also given to increasing their willingness to spend money on buying quality seed. This was done through the strategies as described below.

*a. Sale of seed in small packs*

During seed fairs, the project LSBs were facilitated with packaging material to enable them sell QDS in a wide range of package sizes with most of the sizes being the 1-2kg packs. The small packs were largely utilised to stimulate non-adopters and cash constrained individuals into buying and trying out QDS which raises effective demand for quality seed. One of the farmers at a seed fair in Northern Uganda said: *'We appreciate that these local producers are selling seed in small packs. This gives us the chance to buy the quantity of seed desired based on one's purchasing power'*.

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*b. Support to market demand driven research to increase availability of preferred varieties*

Through an innovation grant, the project engaged NARO under its groundnut breeding program to identify, clean and maintain the 'red beauty groundnut variety'. This is one of the old groundnut varieties that NARO no longer maintained because of its susceptibility to the groundnut rosette disease. Red beauty had since been replaced by the more disease resistant 'Serenut' series. In spite of its production related challenges, local consumers showed high preference for this variety because of its taste and low aflatoxin susceptibility attributes. Companies involved in groundnut value addition like RECO Industries Ltd that manufactures therapeutic foods specifically preferred this variety because of its low aflatoxin infestation levels compared to other varieties. The response to this market demand was to support the positive selection of EGS for true red beauty. Through this innovation, the project realized 0.4 MT of basic seed for red beauty which was being further multiplied by National Semi Arid Resources Research Institute (NaSARRI). Plans for ex situ storage were also underway to guarantee access to this variety over time.

### 2.1.3 Sustainability of achievements made under the Uptake component

The project considers LSBs as one of the most important sustainability strategies for quality seed promotion. This is because their activities are in line with the QDS marketing strategies aimed at increasing seasonal seed sales volumes. The project therefore endeavoured to empower LSBs to enhance their ability to continue implementing affordable strategies like weekly village markets, field days, organoleptic taste events, compound dialogues and door-to-door quality seed promotion. For events that would attract the attention of masses like radio campaigns and seed fairs, LSBs were encouraged to partner with district local governments and local development organisations in order to successfully implement them.

### 2.1.4 Challenges faced in implementation of Uptake component activities

#### **Certified seed companies were less enthusiastic to participate in quality seed promotion**

With the project's vision to create a vibrant pluralistic seed sector, active involvement of seed companies in the various quality seed promotion events was key. In spite of the project's efforts to motivate them into participating, this was not satisfactorily achieved. Rather, it was the agro-dealer networks which the project later on engaged in the various seed promotion events. This is probably because the seed companies prefer to target institutional markets as opposed to community level marketing which is perceived as costly and tedious.

#### **Delays in QDS certification processes affected implementation of the seed events**

While it was a requirement for all seed used in the seed promotion events to be fully certified (bearing a green tamperproof label), this was not always the case because of delays in seed sampling and testing which also delayed issuance of seed lab testing reports and acquisition of tamperproof labels. As a temporary measure, the project advised LSBs to always present the lab test certificates which showed that the seed being sold had passed the necessary tests. This challenge was most evident for the first season produced seed since there is a short window between harvest of the seed and the next planting cycle (second season). This challenge is further discussed under the QDS component of the report.

## 2.2 Improving quality seed availability – QDS component

After the proof of concept of the feasibility of QDS by LSBs in Uganda, the ISSD Plus project set out to scale the LSB approach and QDS quality assurance system to other zones. The new target zones included East, South Western Highlands (Kigezi) and Western Highlands (Rwenzori). The ISSD Plus project also planned to upgrade existing LSBs established through the first project (North, West Nile and South Western (Ankole) zones of Uganda) in further professionalization of their seed businesses.



Project implementation under this component, focused on three major output areas: (i) scaling of local seed business development; (ii) diversification and upgrading of established LSBs; and (iii) national roll out of the QDS quality assurance system.<sup>5</sup>

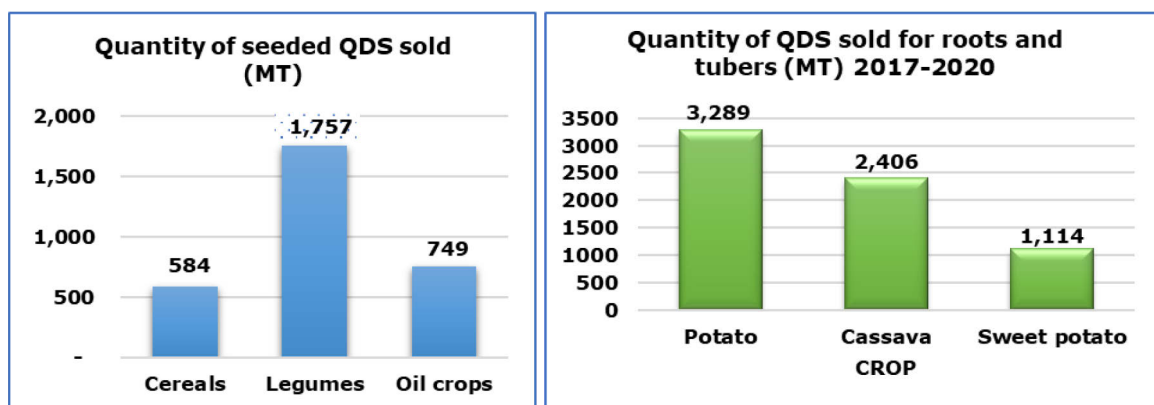
### 2.2.1 Major results from interventions of the QDS component

#### Seed technology was successfully disseminated within farming communities

Through the LSB methodology, most of the varieties that were officially released by NARO were disseminated in the local communities as QDS which exposed more farmers to them. As part of product promotion, these seed growers endeavour to establish demonstration plots that compare farmer varieties and the varieties released by NARO. This is critical to farmers because most of the varieties were bred to be tolerant to yield loss resulting from extreme weather conditions. For instance, through demonstration plot activities in Rwenzori, farmers selected NAROBAN 1, NAROBAN 2 and NABE 16 as the most drought tolerant bean varieties.

#### Improved availability and access to quality seed through the LSB model

Since 2017, LSBs brought quality seed for OPV crops closer to more farmers in the zones of operation. Overall, LSBs sold 9,899 MT of QDS between the period of 2017 and 2020 within local farming communities (see Figure 4). Crops including beans, rice and soybean, were the most preferred enterprises for most farmer groups. Other seeded crops and the roots and tubers remain important enterprises for specific value chains or regions.



**Figure 4** Quantity of QDS marketed over the project period

#### Improved livelihoods and business acumen for the seed producing farmers within LSBs

The QDS volumes sold between 2017 and 2020 earned the LSB groups a total of UGX 19.9 billion. From cost benefit analysis data provided by LSBs, the average net benefits per hectare per year for each farmer was UGX 3.8 million. However, for high value crops like potato, the average net benefits per hectare per year for each potato farmer were over UGX 17 million. LSB activities offered self-motivated farmers with an opportunity to diversify their income options by complementing the usual food production activities with a product that only a few farmers can produce (QDS). Compared to food, seed introduced a longer marketing cycle which allows for continued earning beyond the peak food selling periods. Seed producing groups like Latyeng LSB in Gulu district have farmers that not only produce rice QDS but rice grain which is milled as well. The volumes of production from this group attracted the attention of the NAADS programme which granted this LSB with a rice milling machine for value addition.<sup>6</sup>

<sup>5</sup> Find the project's approach and results of the QDS component also described in this project brief: Ssemwogerere & Adong, 2021. Quality Declared Seed (QDS) Class: Bridging the gap in quality seed availability and access for non-hybrid crops in Uganda. ISSD Plus Brief 19: <http://admin.issduganda.org/assets/images/resources/briefs/brief19.pdf>

<sup>6</sup> Find the stories of farmers in relation to seed business in the following publication: ISSD Plus, 2020: Making a life out of seed business; Stories from seed producers in Uganda: <http://admin.issduganda.org/assets/images/resources/briefs/makinglifeoutofseedbusiness.pdf>



**Photo 8, 9** On the left the rice mill house (Co funded by ACDP and latyeng LSB) that will house and operate the complete rice mill for Lalyeng LSB on the right

### More LSBs were in the A and B category of performance

In order to monitor LSB progress over time, the project developed simplified criteria and scoring for assessing them annually based on the parameters and scoring provided in Annex 2. This categorisation indicates the level of understanding of the LSB methodology. Based on this, it graded LSBs into four performance classes i.e. A, B, C+ and C- with the 'A's being the best and the 'C-' being the weakest.

Table 4 shows the LSB categorization for 2018 at the initial status and 2020 which is the status by project conclusion. There was an overall increase in the number of LSBs in the A and B category across the two years which is an indicator of LSB progress since the upgrading support. The table shows that 48 LSBs were in the 'A' category by the end of the project which is an achievement of 64% of the project target; the project targeted to have at least 75 LSBs in the A-class category. The 'B' category LSBs are also considered sustainable seed businesses although they have a few gaps in their operations. Overall, the project considers 119 LSBs to be successful and sustainable seed businesses.

**Table 4** LSB categorisation by zone for 2018 and 2020

Zone	A class		B class		C+ class		C- class	
	2018	2020	2018	2020	2018	2020	2018	2020
South West (Ankole)	6	10	10	9	20	13	1	1
South Western Highlands (Kigezi)	5	7	7	7	16	11	3	5
East	1	7	3	9	27	16	9	13
Western Highlands (Rwenzori)	1	3	1	11	2	19	31	2
West Nile	4	6	18	20	9	8	8	2
North	12	15	14	15	8	16	12	3
<b>Total LSBs per category</b>	<b>29</b>	<b>48</b>	<b>53</b>	<b>71</b>	<b>82</b>	<b>83</b>	<b>64</b>	<b>26</b>
<b>Proportion in each class</b>	<b>13%</b>	<b>21%</b>	<b>23%</b>	<b>31%</b>	<b>36%</b>	<b>36%</b>	<b>28%</b>	<b>11%</b>

Note that the number of C- LSBs significantly decreased between 2018 and 2020 because the project scaled down on the number of groups supported so that it prioritises growth to those that had a higher potential to stand alone as businesses in future. This was a key recommendation from the project Mid-Term Review (MTR) conducted in 2018 and it was implemented in 2019. Since self-funded OSPs still established new LSBs even up to 2020, the number of active LSBs appears stable for both years. However, new LSBs established in 2020 were not part of the categorization since most of them had just started seed production and this explains why the number of categorized LSBs is less than 250.

## 2.2.2 Interventions implemented under the QDS component

### I. Local seed business development scaled out

The ISSD Plus project partnered with 29 out-scaling partners (OSPs), including NGOs, NARO institutes and private agro-enterprises, to scale out the number of LSBs by an additional 219 groups which

brought the cumulative total to 328 in all six zones of operation. Of the OSPs engaged to establish LSBs, 19 of them received grant funds with 50% co-funding while ten of them utilised own funds to establish new groups. The partnership arrangement with OSPs was such that they received grant funds for the first year of LSB establishment and they continued providing coaching to the new groups using own funds over the remaining three years of the project. In addition to the grant funds, the project provided capacity building for OSP staff in the LSB methodology and training materials on the LSB model.<sup>7</sup>

Along the way, the project conducted an assessment of all groups established since the first project and it dropped 78 of them because they failed to implement the LSB concept. This was a major recommendation from the project MTR conducted in 2018. To date there are a total of 250 LSBs in active seed production across the six zones of project operation; see Table 5.

**Table 5** LSBs in active seed production per zone<sup>8</sup>

Zone	Supporting ZARDI	Number of districts	Number of LSBs	Principal crop	Other crops
Southwest - Ankole	Mbarara	9	33	Beans	Millet, potato
South Western Highlands -Kigezi*	Kachwekano	4	28	Potato	Climbing beans
Western Highlands -Rwenzori*	Rwebitaba	8	42	Beans	Potato
Eastern Zone*	Buginyanya	16	31	Beans	Groundnut, rice
			19	Soybean	Sweet potato
Northern Zone	Ngetta	17	39	Soybean	Sesame
			6	Groundnut	Pigeon pea
			16	Rice	Beans
West Nile	Abi	9	36	Sesame	Beans, rice, Potato
Total		63	250		

\*New zones under the ISSD Plus project

## II. Diversification and upgrading of established LSBs

The project planned to continue offering support to LSBs that were established under the pilot ISSD Uganda project that operated in the North, South West and West Nile zone. This support focused on further upgrading of the capacities of the already existing LSBs to produce seed of higher quality; operate more efficiently; and as a consequence, increase both their turnover as well as their impact in the zones. This support was offered to all existing groups and the project targeted to groom at least 75 LSBs into the A category (sustainable seed businesses).

The support provided was demand based, addressing seed business aspects identified by the LSBs in conjunction with the ISSD Plus project. The major areas of focus included; (i) productivity enhancement; (ii) increasing area put to production of QDS; (iii) encouraging seed bulking and value addition; (iv) improving resource mobilization and group re-investment; (v) improving QDS marketing; and vi) improving group governance and business management. The project utilised various strategies to tackle the above gaps. These are shared in the sub-headings that follow.

### a. Productivity enhancement

The project took on a practical approach referred to as "one-acre strategy" to improve knowledge and evidence on benefits of rightful use of fertilizers. This strategy involved use of a recommended fertilizer blend provided by the project with all other inputs taken care of by the LSB farmers. Trials were conducted with 291 seed farmers from 62 LSBs and they targeted beans, groundnut, potato, soybean and rice which are major QDS crops.

<sup>7</sup> A key resource supporting capacity development of LSBs in QDS production is: ISSD Plus, 2018. Quality Declared Seed Production Handbook for Local Seed Businesses in Uganda: <http://admin.issduganda.org/assets/images/resources/briefs/qds.pdf>

<sup>8</sup> Find the locations of all the active LSBs through this link: [https://www.appsheet.com/start/03680b0b-a5fe-447a-9f8c-b4b7326bd8df#\\_currentLat=0.37961783146612765&\\_currentLng=31.36613554687501&\\_mapType=hybrid&\\_zoom=7&appName=LocalSeedBusinesses-2128608&page=google-map&table=LSBs&view=Local+Seed+Business](https://www.appsheet.com/start/03680b0b-a5fe-447a-9f8c-b4b7326bd8df#_currentLat=0.37961783146612765&_currentLng=31.36613554687501&_mapType=hybrid&_zoom=7&appName=LocalSeedBusinesses-2128608&page=google-map&table=LSBs&view=Local+Seed+Business)

Overall, these fertilizer blends had a positive impact on seed harvest. Bean farmers that used the blends registered an average yield increase from 400kg to 500kg per acre which is a 25% increase in yields. The trial results, however, indicated a potential increase in bean yields of up to 42% with the use of the fertilizer blends. The groundnut trials did not show a significant response to fertilizer and this can be explained by the fact that groundnut responds to residual fertilizer not direct fertilization. In Kigezi zone, the production of potatoes increased to an average of 75 bags from the initial 40 bags harvest per acre. The effect of the blends on soybean, groundnut and rice needed to be further studied for more conclusive results but this was not possible because of disruptions brought about by the COVID-19 pandemic.



**Photo 10, 11** Left: A close view to show podding for one of the plants from Sebastian Twesigye's one acre trial. Right: Fourth from left is Sebastian admiring his harvest (1,005kg)

Although the number of farmers that adopted use of the yield enhancing inputs had not significantly increased by the end of the project, it is anticipated that more farmers will gradually take on these inputs if LSB leaders continue setting up demonstration sites. Some LSBs at cooperative level took on the initiative to stock these fertilizer blends in collaboration with the manufacturers (Grain Pulse Ltd) making them more available to seed producers in their vicinity.

*b. Implementation of the QDS by-laws to enhance area put to seed production, bulking and resource mobilization*

Under the upgrade strategy, there was need to increase both the number of active farmers and acreage to seed production by the group. The project responded to this by supporting the LSBs to develop and implement 'QDS by-laws' which are internal group targets to reinforce QDS production, marketing and resource mobilisation. Find the overview of those by-laws in Box 1. Failure to fulfil the targets resulted into penalties that ranged from fines to expulsion from the LSB group.

**Box 1. Overview of the QDS by-laws**

- All LSB members should participate in QDS production
- Minimum acreage of seed field per farmer is 0.5 acres
- The LSB shall plant a total of not less than 20 acres per season
- All seed produced should be bulked at the LSB storage point
- There shall be a sales commission of X% on sales made by each member
- All members shall make weekly collections in the savings box
- Members that produced QDS volumes larger than Y kg will be recognized in a special way

By the end of the project period, a total of 2,548 farmers were in active seed production out of the 4,220 farmers that were trained in the seed business. The average number of active seed producers per group increased from 8 in 2018 to 10 by 2020.

Alongside the by-laws, the project continued scaling the 'seed receipt system' (SRS) of financing to more LSBs. For weaker LSBs, the project continuously coached farmers into utilizing strategies including the 'seed box' and commissions on sales. The project linked selected high potential LSBs to financial institutions for input loans and by 2019, five from the North and South West had utilised these agricultural loans. Efforts by other LSBs to access financial resources through the SRS and financial institutions after 2020 were, however, hindered by restrictions that resulted from the COVID-19 pandemic.

*c. Improving LSB business management and group governance*

To improve the seed business environment, the project supported 28 LSBs in the construction of seed stores that are of a capacity of 60 MT. This was on a co-funding arrangement with the different LSBs contributing 25% and the project contributing 75% of the cost. Through lobbying, more groups (22 LSBs) received stores from other partners including Agribusiness Cluster Development Project (ACDP), Northern Uganda Resilience Initiative (NURI) and International Fertilizer Development Centre (IFDC) while others established central bulking points for QDS by themselves (3 LSBs). Support in store construction improved seed bulking by LSBs and eased the seed sampling processes which require seed of various growers in an LSB to be aggregated in one location. At the moment, at least 80% of the QDS produced is bulked centrally at the different stores.



**Photo 12** Kamwenge Tukorehamwe LSB store (Rwenzori)

In response to the drudgery involved in conducting activities like planting, seed drying, seed cleaning and packaging, the project supported selected LSBs with equipment like hand push seed planters, seed cleaners, moisture meters, heat sealing machines and stitching machines. The seed cleaners for example tremendously reduced the time taken by LSBs to clean and bulk their seed in preparation for seed sampling and testing. Although the seed cleaned by the seed cleaners required resorting, the time taken and money involved while using laborers was reduced by over 70%. Since mechanization support was only offered to a few groups as pilot, other LSBs were encouraged to purchase these equipment using retained LSB incomes.

LSBs also received support in financial literacy, record keeping and revision of group constitutions to improve business management. Since demand is a great pull for production, the project emphasized areas of entrepreneurship and marketing to raise demand for QDS.

The project trained members in areas of governance to make them more professionally organized. This was relevant because some LSBs collapsed prematurely as a result of conflicts that arose from poor leadership. The groups received guidance in setting up of seed business committees i.e. executive committee, production committee, marketing committee and quality assurance committee. Selected committee leaders received coaching on how to support fellow group members in their areas of focus.

### III. QDS quality assurance system rolled out nationally

Quality assurance of seed is a critical requirement for the production and sale of quality seed. For both QDS and certified seed, this includes field inspection, laboratory seed testing and tamperproof label acquisition and utilisation. At each quality assurance stage, the project played a significant role in ensuring that QDS was certified as required by the Seed and Plant (QDS) Regulations. Details on the stages are provided in Annex 3. Find below the accomplishments made.

#### a. Seed field inspection

The uniqueness of field inspection for QDS is in the decentralization of the service whereby MAAIF delegates it to DAOs as mandated in the Seed and Plant (QDS) regulations, 2020. To achieve this decentralisation, the project facilitated MAAIF to train a total of 64 DAOs and 159 AOs in QDS field inspection procedures. The project also facilitated these inspectors with crop specific inspection guides and created linkages between LSBs and their DAOs and AOs. By 2020, 70% (175) of the LSBs in active seed production were receiving at least one field inspection seasonally. Since the start of the project, only 1% of the QDS fields across all the regions were rejected for not meeting the required minimum standards.

#### b. Seed sampling and laboratory testing

Compared to the field inspection stage of quality assurance, there are fewer active LSBs that had their QDS sampled and laboratory tested for purity, germination percentage and moisture content i.e. an average of 109 LSBs per year out of the 250 in active seed production (44%). However, more LSBs fulfilled this quality assurance requirement over each project year which was an indication of progression over time (see Table 6). Of the 907 QDS samples picked for testing over the project period, 98% of them passed the lab tests which is continued evidence that LSBs have the capacity to produce good quality seed.

**Table 6** Status of seed sampling and laboratory testing stage of quality assurance

Year	Number of LSBs that received sampling services	Total number of samples picked	Number of samples that passed	% of samples that passed lab test
2017	69	164	159	97%
2018	86	166	166	100%
2019	146	300	295	98%
2020	137	277	269	97%
<b>Total/AVG</b>	<b>109*</b>	<b>907</b>	<b>889</b>	<b>98%</b>

\*This is the average number of LSBs that had their seed tested annually

The project played a key coordination role and facilitated MAAIF-NSCS seed analysts to conduct seed sampling at the various LSBs. To increase seed producers' access to seed testing services, the project facilitated MAAIF to train two staff who were selected to operate the Ngetta seed testing laboratory in Northern Uganda. This lab was established with the support of the first ISSD Uganda project although it was not yet operational by 2016. To date, this lab offers private seed testing services to interested seed producers and seed buyers hence it is not yet playing its main role of testing seed samples on behalf of MAAIF-NSCS. This was not achieved because the project was yet to get the full commitment of MAAIF and NARO regarding the inclusion of zonal seed testing facilities within the current institutional framework for seed quality assurance. For this reason, the project couldn't proceed with the establishment of similar facilities planned for other zones.

### c. Green tamperproof label acquisition

The green tamperproof label is a seed customer's proof that the QDS they are purchasing underwent all the quality checks by MAAIF and it passed. Table 7 shows that apart from the year 2020, the number of LSBs that utilised green tamperproof labels increased annually especially for the old zones. Out of the total number of LSBs in active seed production, however, this is only an average of 15% of groups that marketed their QDS with the green quality assurance mark. Over the four-year period, these groups purchased a total of 18,715 green tamperproof labels from MAAIF.

**Table 7** Green tamperproof label acquisition by LSBs

Year	Number of LSBs that procured Green labels	Total number of labels acquired in that year
2017	32	5681
2018	39	4061
2019	62	7784
2020	18	1189
<b>Total</b>		<b>18,715</b>

At this quality assurance stage, the project supported MAAIF by coordinating label printing through the Uganda Seed Trade Association (USTA) and providing consumables including the printer, cartridge/ribbons and blank label rolls. Few LSBs utilised the green tamperproof labels because ordering for them depends on official release of the laboratory seed test results from NSCS-MAAIF.

### 2.2.3 Sustainability of achievements made under the QDS component

To ensure effective and efficient support during seed production and marketing, the project worked with LSBs to establish support systems that are fully operational. The most important support system being the MAAIF, which takes on the regulatory roles. This was possible because the QDS system is embedded in a recognised institutional framework which includes the National Seed Policy (MAAIF, 2019) and the 2020 seed and plant (QDS) regulations. With such an enabling environment in place, LSB operations to produce QDS are expected to continue even without project presence. See other support systems below:

#### **National Seed Certification Services**

Under MAAIF, NSCS will continue to provide timely seed sampling and testing services to LSBs across all zones. Although most of the services were dependent on facilitation from the ISSD Plus project, LSBs were equipped to be in the position to meet the costs required of them to ensure quality seed supply to the local communities in compliance with the QDS regulations. However, looking at where the project left off by closure, there is a great concern that NSCS still lacks resources and impetus to sustain the quality assurance processes on its own.

#### **Local seed business associations and/or LSB clusters**

Present across all project areas, these offer support by coaching and mentoring the LSBs and by coordinating access to EGS, QDS marketing and quality assurance services, among other things. A total of three LSB associations were established in Ankole, West Nile and Northern zone to coordinate seed-related activities and services on behalf of the LSBs. ISSD Plus supported these associations with seed value addition equipment for hiring out to LSBs at a fee. This was done to enable them obtain an income for running their activities considering that the grant they received at the start of the project had come to an end. The three associations had a strong dependence on ISSD Plus because their establishment was more project driven than LSB farmer driven. In addition to the associations, a total of six LSB clusters self-evolved in the Eastern zone where LSBs clustered themselves based on crop value chains and proximity to one another. The six clusters proved to be more independent entities as compared to the associations and they were able to coordinate all aspects of seed production and marketing.

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### **Local seed business trainer and gender champion approach**

Each LSB was equipped with a full-time trainer, who was selected among the LSB members and given additional training in various aspects of seed production and marketing by the ISSD Plus project. Their goal was to support fellow seed growers by coaching and mentoring them with the help of area agriculture officers. A total of 250 LSB-Ts were fully equipped by the ISSD Plus project and 226 of them were satisfactorily supporting fellow LSB members by the end of the project. These also work closely with a total of 186 gender champions to mainstream gender within LSBs and at the household level.

### **LSB Committees for production, marketing and internal quality control**

In addition to the LSB trainer and gender champions, all LSBs instituted leaders for three committees most critical to QDS production i.e. production, internal quality control and marketing. These committees performed their roles excellently which contributed to the success of the LSB model.

### **District local government production departments**

Being a community-based model, the project prioritized lobbying and advocacy for the support to the LSB approach to be embedded into the DLG. This was done through strategic linkage with actors like the District Production and Marketing Officers (DPMOs), DAOs, and Sub-county AOs. By 2020, 17 district local governments had intergraded QDS support activities valued at over UGX 290 million within their activity budgets which is to benefit LSBs within those districts. Through the DLGs, some LSBs already benefited from government-sponsored programmes such as the Agribusiness Cluster Development project under MAAIF, in which several LSBs were supported with tractors, store grants and agricultural inputs to improve their seed business.

### **NARO**

The ISSD Plus project worked through the various ZARDIs under NARO. These (Rwebitaba, Ngetta, Mbarara, Kachwekano, Buginyanya and Abi ZARDIs) were instrumental in hosting the project and building the capacity of QDS producers in the respective zones. They were also sources of EGS for LSBs. In addition, the project worked closely with the private arm of NARO (NARO Holdings Limited) to ensure the sufficient and timely supply of EGS to LSBs. The project also supported the establishment of the Foundation Seed Enterprise, a subsidiary of NARO Holdings Limited that will streamline and sustain the supply of basic seed to the LSBs.

### **Out-scaling partners and other development partners**

The project continued to work through out-scaling partners (OSPs) such as ZOA, VEDCO, KYEDFA, COVOID, etc. and development partners such as GIZ/World Vision, USAID/AIM project and PRELNOR, among others, to ensure continued support for LSBs. Since these are based in the areas of operation for the LSBs, remote support to the LSBs will continue as well, particularly in the areas of QDS production and market linkages.

### **Uganda Seed Traders Association**

USTA supported the project in coordinating the printing of the green tamperproof QDS labels for LSBs and created links to ensure continued support.

With the above support systems, the LSB model will likely remain more sustainable for QDS production and marketing for a long period of time.

## **2.2.4 Challenges faced in implementation of QDS component activities**

### **Lack of support from OSPs in scaling LSB development**

Some of the OSPs engaged to establish LSBs lacked an inherent interest in the LSB approach and they instead needed funds to conduct their regular business. Some OSPs put minimal efforts in building capacity of the new groups while others stopped providing support to the LSBs beyond the first year of engagement. As a result, some new groups received insufficient support from these partners which limited their growth as seed businesses.

### **Free hand-outs by OSPs reduces interest of LSBs to invest themselves**

Some OSPs engaged in LSB establishment weakened the LSB approach by giving their LSBs free



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foundation seed at the start in order to attract farmers participation. This affected seed producers' enthusiasm to self-invest in the business later on and some groups continued requesting for free foundation seed even after receiving various trainings in farming as a business.

**In some zones farmers do not consider farming as a business**

The project noted that the LSB approach was weakly embraced by farmer groups in zones like Rwenzori, West Nile and East (specifically Busoga sub-region) because of their poor mindset to farming as a business. As a result, most groups established in these areas are low performing and others were dropped by the project so that efforts could be focused on groups with potential. This poor business mindset was likely brought about by the high dependence on handouts from other projects operating in these areas.

**Poor weather conditions reduced interest of LSBs to invest**

In spite of the trainings and exposure that some newly established LSBs received, their seed businesses failed to flourish overtime because of low seed harvests which resulted from poor climatic conditions (droughts, excessive rain). Under such conditions, some seed producers limited re-investment into the seed business while others chose to remain inactive in the seed business. This kept some seed businesses below the break-even levels of production and therefore unattractive to members. Also experienced LSBs opted out of seed business after making losses in weather affected seasons.

**Farmers lack resources to invest in seed business**

The financial status of the seed farmers remains a major hindrance to the success of LSBs in spite of the various strategies that were put in place to solve this. Because these farmers are unable to invest to a reasonable scale of QDS production, their unit costs of operation remain high which impacts expected profits and ultimately discourages many of them from actively participating in the business. Some of the upgrading strategies put in place by the project like the mechanization of seed production and use of fertilizer blends couldn't be adopted in the short run because of the same challenge.

**Field inspection hindered by several challenges at LSB and inspector levels**

A major challenge faced at the field inspection stage is failure of some groups to have their seed fields inspected as required. This results from delayed submission of planting returns by LSBs which distorts planning by inspectors; failure of some LSBs to pay for the inspection service on time; and some DAOs having busy schedules that limit their availability to the LSBs in need of field inspection services.

**Delay in receiving the green labels results in LSB seed sold without certificates**

As noted earlier, few LSBs had their seed laboratory tested and they consequently lacked the green mark of quality on the seed marketed because of failures in synchronisation of seed testing and with seed marketing. LSBs faced delays in receipt of the seed laboratory test results from MAAIF-NSCS which translated into failure of most groups to utilise the green mark of quality. Due to the high demand for QDS within the communities and the urgent need for cash by LSB farmers, some LSBs tended to sell off the QDS before it was laboratory tested or before results were received. This challenge was most evident for the first season produced seed since there is a short winter between harvest of the seed and the next planting cycle (second season).

**COVID-19 hindered access to basic seed and other inputs**

The prevalence of the COVID 19 pandemic was a major setback for the project since some activities were not completed. For the seed farmers, challenges in movements made it hard for them to obtain basic seed and other critical inputs.

## 2.3 Increasing availability and access to quality assured early generation seed – EGS component

Sustainable access to quality EGS, particularly basic seed, was a significant challenge in producing the much-needed quality seed (certified and QDS) for food security crops in Uganda. Unlike for hybrid maize, commercialisation of EGS for self-pollinated crop has been a challenge due to their unattractive

business cases resulting from, *inter alia*, low profitability, unpredictable seasonal demand etc, with no exception to their EGS. The QDS system, however, created a profitable business case for these OPVs when produced under the LSB arrangement. This has overtime increased the demand for EGS for the self-pollinated crops required to sustain the supply of QDS on the market.

NARO through its National Agricultural Research Institutes (NARIs) initially took sole responsibility for production and supply of EGS in the country. However, due to challenges in human and financial resources, these institutions were not able to meet the increasing demand from quality seed multipliers. This triggered project interventions at this stage of the seed value chain. These included: (i) piloting initiatives for basic seed production; (ii) operationalizing quality assurance for basic seed; and (ii) forecasting, planning and coordinating basic seed production and marketing.<sup>9</sup>

### 2.3.1 Major results from interventions of the EGS component

#### **Improvement in the proportion of basic seed demand that is met for seed producers**

The project monitored the extent to which basic seed demand for various crops was met over the four-year period through LSBs. Table 8 shows the basic seed quantities ordered by LSBs and the quantities purchased for the range of QDS crops grown.

By 2020, the project noted that basic seed demand for most crops was met to a proportion of more than 70%. This is a significant improvement from the situation in 2018 where only 44% of the basic seed demand was met. This improvement is attributed to the newly formed basic seed production models especially the zonal models (LSB and ZARDI) which made basic seed more accessible to seed farmers. For crops including pigeon pea, greengram, sesame, groundnut and cassava, the challenges around their availability were crop specific.

It is important to note that the low proportion of basic seed purchased compared to that demanded is not only a factor of availability but also limited financial resources i.e. some of the basic seed booked is not bought off by farmers even when available because they lack money. Since resource mobilization capacities of LSBs had not significantly changed by 2020, it is plausible to note that the improvement in average basic seed demand met was attributed to the introduction of the basic seed production models.

**Table 8** Basic seed demand versus supply

Crop	Total demand (kg/bags)*	Total purchased (kg/bags)*	% Demand that was met
Beans	155,148	112,240	72%
Soybean	57,886	55,813	96%
Rice	20,426	40,316	197%
Pigeon pea	2,442	257	11%
Green gram	5,747	870	15%
Sesame	26,983	6,922	26%
Groundnut*	2,339	1,033	44%
Potato*	10,636	12,497	117%
Cassava*	23,336	12,607	54%
Sweet Potato*	2,985	2,629	88%
Millet	2,576	2,027	79%
Pasture	1,730	1,485	86%
Average demand that was met			74%

\*Bags unit only relevant for groundnut, cassava, sweet potato and Irish potato

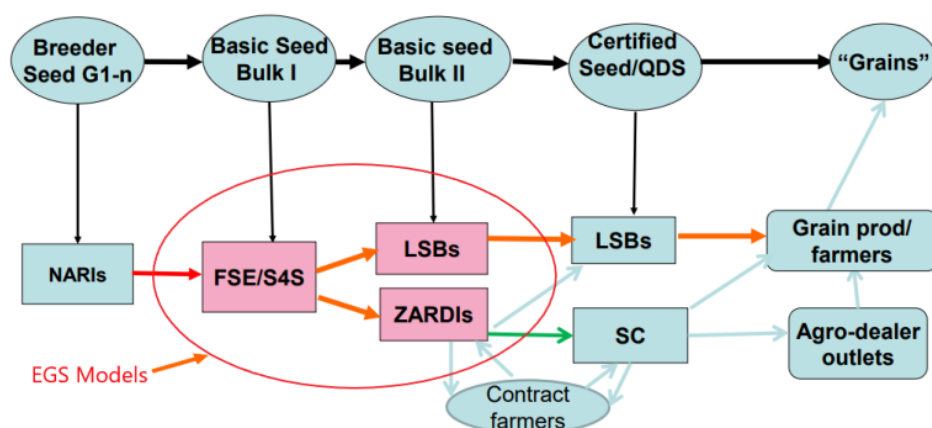
<sup>9</sup> Find the project's approach and results of the EGS component also described in this project brief: Otim, 2021. Early generation seed business models for sustainable access to quality basic seed The case of non-hybrid crops in Uganda. ISSD Plus Brief 20: <http://admin.issduganda.org/assets/images/resources/briefs/thecaseofnon-hybridcropsinuganda.pdf>

## 2.3.2 Interventions implemented under the EGS component

### I. Initiatives for basic seed production

In partnership with NARO, the project successfully piloted three EGS models including: (i) an independent not-for-profit company formally registered as Seed for Seeds Uganda LTD (S4S (U) LTD); (ii) basic seed production by ZARDIs; and (iii) basic seed production by qualified LSBs. The last two models were to decentralize basic seed production to enhance availability and access by seed growers at the zonal level. Figure 5 shows how the three models were integrated in the quality seed institutional framework to ensure diversified sources of basic seed for seed producers.

#### Institutional framework to enhance quality seed production and marketing



**Figure 5** Institutional framework in which the EGS business models are embedded

By 2020, all three EGS models were performing effectively under their unique operational environments. The ZARDI-led model showed good performance for potato and rice crops, while the LSBs model is effective for groundnut and beans. The S4S (U) Ltd model is well placed to coordinate operations of the other two basic seed models while complementing their efforts by producing large volumes of high quality bean, groundnut and soybean basic seed for seed growers. The LSB model generated significant revenue for the basic seed growers involved while the other two models were operating on cost recovery basis. This indicated that these models could sustainably produce and market basic seed which will ultimately scale up production of quality seed (certified seed and QDS).

Under the three models, a total of 268.7 MT of quality basic seed of beans, groundnut, sesame, soybean, rice and 358.3 MT of potato was produced and marketed since 2018 (see Table 9). For beans, this met over 80% of the basic seed demand by LSBs. The soybean basic seed was produced under the Makerere University soybean programme which the project supported to quality assurance services.

**Table 9** Basic production under the three models

EGS Model	Crop	Basic seed Production (MT)*					Total
		2018A	2018B	2019A	2019B	2020A	
ZARDI & LSB led model	Beans	7	5.4	21.3	30.4	29.9	94
	Potato			37.2	83.6	237.5	358.3
	Sesame			0.1	0.2		0.3
	Groundnut	10.6	5.4	17.5	1.5	2.1	37.1
	Soybean				0.2	1.3	1.5
	Rice				1.8	2	3.8
FSE (S4S (U) LTD) model	Beans	27.5	12.5	16.8	20.3	37.1	114.2
	Groundnut			8.4	3	2.1	13.5
	Soybean					4.3	4.3
<b>Total by season</b>		<b>45.1</b>	<b>23.3</b>	<b>101.3</b>	<b>141</b>	<b>316.3</b>	
Total for legumes, cereals and oil crops basic seed across all seasons							<b>268.7</b>
Total for potato planting material across seasons							<b>358.3</b>

*a. A central basic seed enterprise*

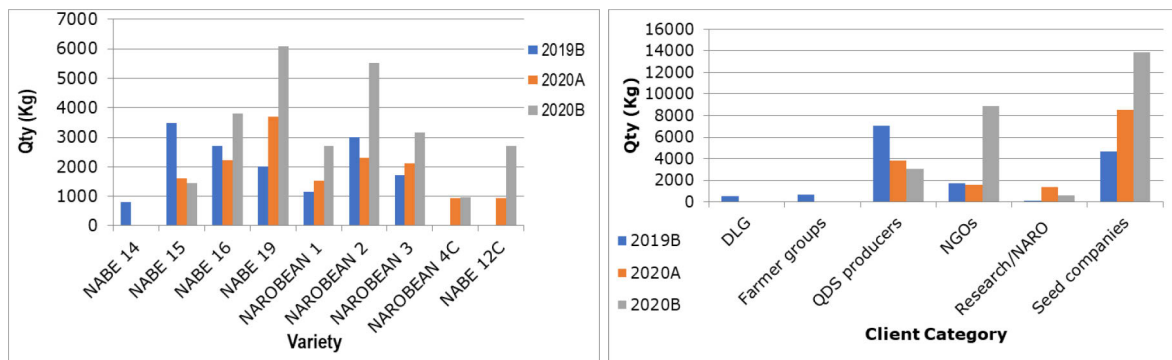
Together with NARO, the project supported the establishment of the Seed for Seed (S4S) (U) Ltd as a subsidiary of NARO Holdings Ltd. The company operates independently of NARO Holdings and has its own Board of Directors involving representations from NARO, MAAIF, USTA and experienced seed system experts. The model was designed to produce and market the first generation of basic seed for self-pollinated crops to the decentralised producers of basic seed but also directly to certified and QDS producers in some cases. This model was tactfully designed to address the difficulties in sustaining low profit EGS production of the self-pollinated crops which are characterised with low multiplication and seed replacement rates that greatly deters their commercialisation.

This model required significant start-up funds to stimulate production and, in this regard, the ISSD Plus project in partnership with NARO jointly invested in the initial start-up to give it momentum for the business. Start up support included operational and capital expenditures to establish an asset base and run smoothly; see also Box 2.

**Box 2. Capital items procured as per S4S (U) LTD business plan**

- 200 Acres of production land
- 30 Acres in under permanent drip irrigation
- 60 MT cold room for storage
- 01 4x4 Pickup truck
- 02 Field motorcycles

Figure 6 and Figure 7 illustrate the various bean basic varieties grown by this model and its major clients by volume of basic seed they purchase.



**Figure 6, 7** Left: Bean basic seed sales by variety by S4S (U) Ltd. Right: Market diversity for Basic seed sales by S4S (U) Ltd (2019-2020)

*b. Basic seed production and delivery by ZARDIs*

The project supported establishment of the ZARDI basic seed business model which is a public sector-based model that leverages on opportunities at disposal of the ZARDI to produce and market quality basic seed as a business. Such opportunities included the availability of large production land, technical skills from the ZARDI scientists and farm managers, their mandate for zonal agricultural technology dissemination which is very pertinent to crop varieties and proximity to quality seed producers especially LSBs. The ZARDI model obtains its starter material (cycle one) from the S4S (U) LTD, bulks it at least one season and markets it to seed producers at affordable price. Being zonally placed, this model decentralised basic seed production hence addressing the key challenges of distance and timeliness in accessing quality basic seed for seed producers.

### Box 3. ZARDIs involved in basic seed production

- AbiZARDI (West Nile) – Beans, soybean, sesame, potato
- Kachwekano ZARDI (Kigezi) – Potato, climbing beans
- Ngetta ZARDI (North) – Upland rice, soybean, groundnut
- Buginyanya ZARDI (East) – Potato, beans
- Mbarara ZARDI (Ankole) – Beans, soybean
- Rwebitaba ZARDI (Rwenzori) – Beans

ISSD Plus supported the start-up of the six ZARDI led basic seed business models by supporting their production needs and providing some seed conditioning equipment to support operation of the business; see Box 3. In addition, ZARDI directors and farm managers from the ZARDIs involved were taken through a training in the principles of seed business management; an essential skill needed for effective implementation of the ZARDI-led EGS production and delivery model.



**Photo 13, 14** Buginyanya ZARDI team and ISSD representative monitoring basic seed production field for potato in Eastern Uganda, Aug 2020

#### c. Basic seed production and delivery by trained LSB farmer groups

The third basic seed business model put in place is the LSB based approach. Under this model, capable and competent LSBs were identified and trained by the respective crop breeders on the technical requirements to produce quality basic seed; find the LSBs involved in Box 4. The farmer groups were also trained in business management by the ISSD Plus agribusiness experts. In this model, LSBs obtain the last cycle of basic seed from the ZARDI, bulk it under MAAIF inspection for purposes of quality assurance and market it to QDS producers in their locality. This model targeted bulky planting materials which are difficult to safely move across regions such as potato and groundnut seed. However, tremendous progress was also recorded for beans, especially in regions of high bean production like south western Uganda.

### Box 4. LSBs involved in basic seed production

- Kyazanga LSB (Ankole) – Beans
- Omutiima Gwa Ruhira LSB (Ankole) – Beans
- Tic Ryemo can LSB (North) – Groundnut
- Aye Medo Ngeca LSB (North) – Groundnut
- Mengya Integrated Farmer association (Sebei area, East) – Potato
- Agiermach odyebo women’s group for development (West Nile) – Potato

The LSB model leverages on proximity of the basic seed producers to QDS producers and their available production assets such as land and labour. The proximity is important to reduce the

transportation challenge especially for crops which are bulky in nature such as potato and groundnut. The respective crop breeders from NARO regularly monitor the basic seed production fields during growing period and they provide guidance on maintenance of genetic purity. Six LSBs were engaged in implementing the LSB led basic seed model; see Box 4. To date, all these LSBs more than doubled their basic seed production volumes since the start.

The project noted that it was easier for LSBs to get into full production of foundation seed compared to ZARDIs because of the adequate knowledge and exposure to the seed business through the QDS system. Secondly, LSBs incur lower costs of doing business especially when it comes to labour which is cheaper compared to the public ZARDI settings.



**Photo 15** Omutima Gwa Ruhira LSB in Ankole zone conducting postharvest handling activities for basic bean seed

## **II. Institutionalisation of quality assurance for basic seed**

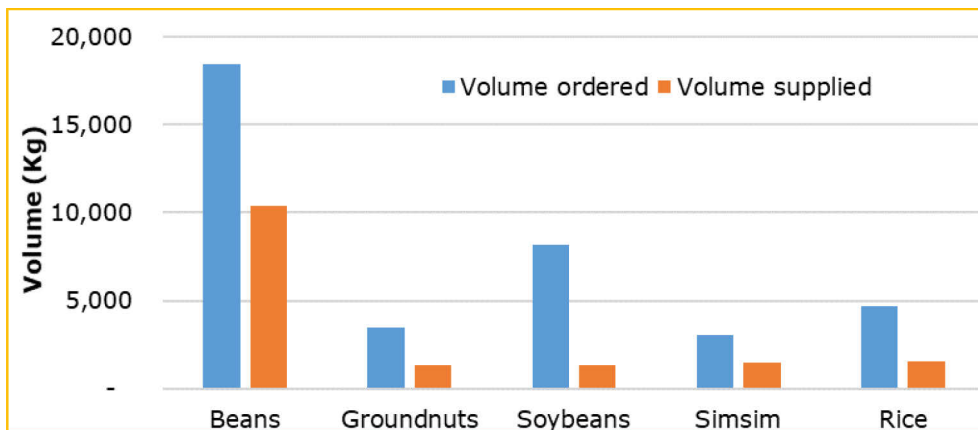
It was important that an independent quality assurance system operated to provide proof of recommended quality standards for basic seed. Unlike previously when MAAIF left the quality assurance roles to the respective crop breeders, ISSD Plus piloted the inspection of basic seed fields by facilitating inspectors from NSCS which remains the current arrangement. Through this pilot, it was proven that providing external quality assurance for basic seed is very important in ensuring that the seed classes produced from it thereafter are of the required genetic purity.

MAAIF now inspects basic seed fields from all the three basic seed business models and the process is coordinated by S4S (U) Ltd. Similarly, as a regulatory requirement, the company compiles the planting return from all the basic seed producers and submits them to the NSCS to prepare for field inspection. The basic seed producers also pay for the inspection through S4S (U) Ltd. After harvest, the available seed is sampled for purposes of laboratory testing. Only seed lots which pass the laboratory tests are issued with white manila-based labels which will be upgraded to tamperproof labels over time. By 2020, all basic seed produced under the three models was undergoing field inspection and laboratory testing with 100% of it passing the purity and germination tests.

## **III. Forecasting, planning & coordinating EGS demand, production and marketing**

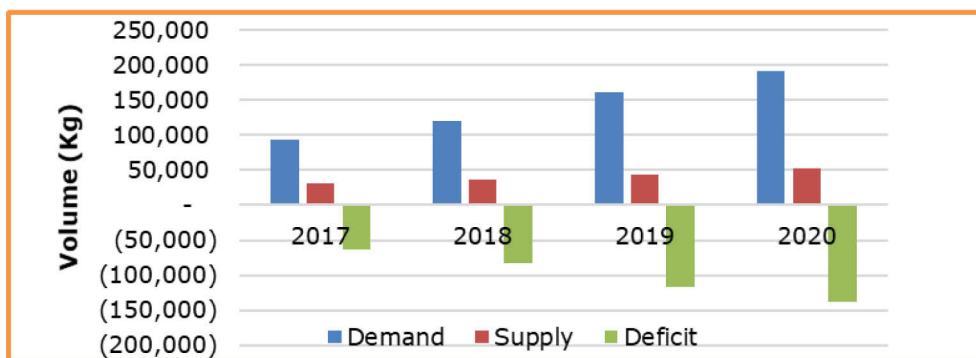
The disconnect in the seed value chain right from the market makes it difficult for seed producers to target farmer's desired varieties in the rightful quantities. In this regard, the project supported training of NARO's bean and groundnut breeders, technicians, ZARDI directors, ZARDI farm managers and their respective agronomist in basic seed demand estimation and forecasting for effective planning and production.

Additionally, ISSD Plus in collaboration with NARO estimated basic seed demand for selected crops (beans, groundnut, soybean, sesame and rice) over a four-year period to guide the three EGS models established. Figure 8 presents LSB basic seed demand and what was supplied in 2017B clearly showing large deficits.

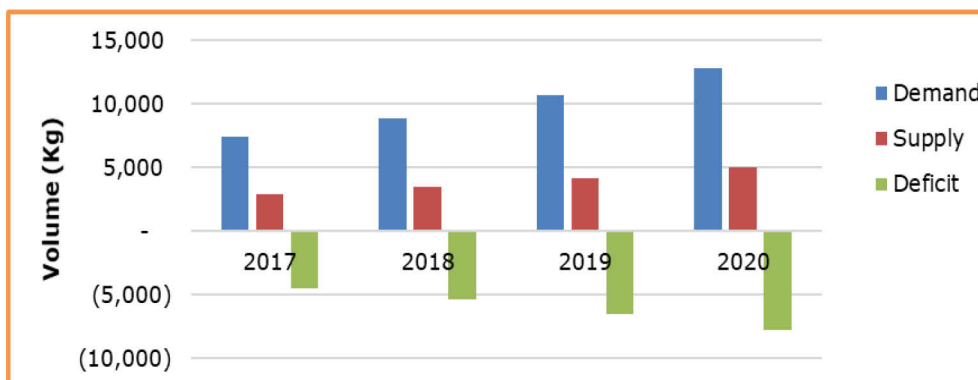


**Figure 8** LSB Basic seed demand and supply for selected grains crops in 2017B

Figure 9 and Figure 10 show the consolidated bean and groundnut basic seed demand projections for seed companies and LSBs for the period 2017-2020. The supply was based on breeder seed stocks in 2017B and the supply gap/deficit. For the seed companies, the actual bean basic seed demand projections for the respective years (source: AgResults Legume Seeds Pilot Project) were considered. For groundnut, information on breeder seed stocks and basic seed demand by seed companies was provided by the breeder. The calculations were based on the total hectares covered by the crops and seed rate per hectare.



**Figure 9** Bean basic seed demand projections made for seed companies and LSBs 2017-2020



**Figure 10** Groundnut basic seed demand projections for seed companies & LSBs 2017-2020

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### 2.3.3 Sustainability of achievements made under the EGS component

#### **Models based on cost recovery**

The EGS production models established during the project period were all created to operate on a self-sustaining basis. That is to say, at least they should be able to cover all costs of producing EGS.

#### **Leadership of public institutes**

All accomplishments made by the component were spearheaded by public institutes i.e. MAAIF and NARO which raises the chances of their being easily institutionalised

### 2.3.4 Challenges faced implementation of EGS component activities

#### **No standardization against basic seed quality standards**

Although the inspections were going well, there are still gaps in standardizing the laboratory testing process as most of the EGS samples tested were not against the basic seed minimum quality standard but against minimum quality standard for certified seed.

#### **Not yet dedicated government budget for basic seed quality assurance**

Despite the progress towards institutionalization of the basic seed quality assurance, MAAIF is yet to include the cost of these certification processes in their annual budgets for sustainability.

#### **Seed Tracking and Tracing System developed but not yet operationalized**

Although the digital STTS software development was completed in the last quarter of 2020, its rollout to improve the EGS quality assurance systems was not possible because of political pressure on MAAIF which kept its priorities to other government programmes.

#### **Lack of demand projections for EGS**

It is still challenging for NARO to effectively plan for production of basic seed because of the lack of demand projections. This is made worse by the fact that seed producers have not yet adopted the pre-booking system. For these reasons, NARO is unable to produce basic seed two seasons earlier than required which is the best-case scenario for a more effective seed system.

#### **ZARDI-led basic seed production still lacks efficiency**

The ZARDI-led model experienced bureaucratic challenges, high production costs and failure to reinvest generated revenues back into foundation seed production. As a result, operations under this model were inefficient for most of the ZARDIs.

## 2.4 Promoting use of quality vegetable varieties – Vegetable component

The vegetable component of the project aimed to contribute to increased earnings and competitiveness of vegetable sector actors which would subsequently contribute to improved national food and nutrition security. The ISSD Plus project addressed constraints to productivity by partnering with six international seed companies which introduced quality vegetable varieties in the North, East, South Western, Western and Central region of the country. The vegetable varieties promoted were bred for various variety attributes that surpass those of OPVs. These attributes include high yielding potential, disease tolerance, early maturity and long shelf life depending on the variety. The seed companies that introduced these varieties included: East West Seed, Rijk Zwaan (Holland Greentech) Syngenta, Bejo (Dutch Seed Centre), Bakker Brothers (Home Harvest), and Enza Zaden (House of Seed).

All efforts under this component of the project ultimately intended to facilitate uptake of a diverse range of quality vegetable varieties. This component targeted to only influence the uptake node of the vegetable seed value chain because earlier stages of the chain were taken care of by the seed companies involved. It is imperative to note that this component of the project also aimed at increasing trade



between the Netherlands and Uganda. The major interventions implemented included promotion of the advanced vegetable varieties and skilling of farmers in improved production practices.<sup>10</sup>

#### 2.4.1 Major results from interventions of the Vegetable component

##### **Higher incomes were earned by farmers that adopted the quality vegetable varieties**

The project interacted with some of the farmers that adopted the vegetable varieties to get an overview of their experiences in the aspect of income generation. To illustrate superiority of these varieties, Table 10 compares the average costs and gains per acre for a tomato farmer and an onion farmer; keeping all other factors constant.

Use of the quality vegetable varieties gave the farmers an extra harvest of 10,000 kg and 8,000 kg for an acre of tomato and onions respectively. This translated into an additional profit of UGX 18.2 million and UGX 15.4 million for tomatoes and onions respectively. The extra production per acre also translated into an additional 85kg/acre and 96kg/acre of nutrients (potassium and protein) tomato and onions respectively. Note that these were yields from farmers who used all the advanced recommended practices of vegetable production.<sup>11</sup>

**Table 10** Illustration of superiority of the vegetable varieties promoted by ISSD Plus

Parameter	OPV of tomato	Quality variety of tomato	OPV of onion	Quality variety of onion
<b>Production costs per acre (UGX)</b>				
Average cost of seed	40,000	900,000	170,000	800,000
Average staking cost	1,500,000	2,500,000	0	0
Fertilizer cost	300,000	300,000	300,000	500,000
Chemical cost	600,000	500,000	500,000	300,000
Total production cost per acre	2,440,000	4,200,000	970,000	1,600,000
<b>Yield and price</b>				
Average yield per acre (kg)	5,000	15,000	4,000	12,000
<b>Difference in yield between the quality vegetable variety and OPV per acre (kg)</b>		<b>10,000</b>		<b>8,000</b>
Average price/ kg	2,000	2,000	2,000	2,000
<b>Earnings</b>				
Average income earned per acre	10,000,000	30,000,000	8,000,000	24,000,000
Profit per acre	7,560,000	25,800,000	7,030,000	22,400,000
<b>Difference in profit per acre with use of the quality vegetable variety</b>		<b>18,240,000</b>		<b>15,370,000</b>
<b>Nutritional value</b>				
Protein content in g/kg	8.5		12	
Potassium content in g/kg	2		1	
<b>Additional protein content as a result of using hybrid per acre/kg (nutrient content in g/kg*difference in yield)/1000</b>		<b>85</b>		<b>96</b>

<sup>10</sup> The following study assessed the impact of the interventions in the project's Vegetable component: Sebatta, 2021. Adoption vegetable technologies. ISSD Plus: [https://issdafrica.files.wordpress.com/2021/11/sebatta-2021\\_issd-vegetable-adoption\\_final-report-issd-plus.pdf](https://issdafrica.files.wordpress.com/2021/11/sebatta-2021_issd-vegetable-adoption_final-report-issd-plus.pdf)

<sup>11</sup> Find the stories of farmers in relation to how they benefit from vegetable growing in the following publication: ISSD Plus, 2020. Swift prosperity through growing superior vegetable varieties; stories from vegetable farmers in Uganda: <http://admin.issduganda.org/assets/images/resources/briefs/swiftprosperitythroughgrowingssuperiorvegetablevarieties.pdf>

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### **Customer base was established for the international seed companies**

The promotion, technical backing and capacity building support that the project offered to the seed companies increased their confidence and it gave them a direction for marketing their seeds to vegetable farmers in Uganda. To date, the seed companies have opened up outlets in different parts of the country and others are in collaboration with agro-input dealers to stock their seeds for easy access by farmers. The seed companies also continued to establish their own self-funded demonstration sites for continued visibility and competitiveness in the seed market. They also continued with promotional activities to expand their market after establishing that there is a business case for the quality varieties in Uganda. Even if the actual sales figures are confidential, seed companies mentioned that their collaboration with the project steadily increased their vegetable seed sales since starting business in Uganda.

### **Demystified belief of vegetable seed being too expensive for farmers**

The project ably showcased the potential and benefits of over 100 Dutch superior varieties for various vegetable crops which demystified the common belief that vegetable seed is expensive. This was most evident among onion growers in the South Western highlands who forsook use of seed costing UGX 250,000 for an acre and adopted one of the promoted onion varieties costing UGX 1,000,000 for an acre. After promotion of this variety and others at demonstration sites, farmers in the highlands of Uganda adopted it extensively for commercial production. Similar processes happened with other superior varieties especially those of tomatoes, cabbage, and water melon.

## 2.4.2 Interventions implemented under the Vegetable component

### **I. Promoting the use of advanced vegetable varieties**

#### *A. Wide-scale variety demonstrations*

To expose the newly introduced varieties to vegetable farmers, the project facilitated seed companies with a grant to set up 442 variety demonstration sites in the zones where they wanted to make presence, i.e. North, South Western Highlands, Central, East and Western Highlands. Field day events were the climax of the seasonal demonstration sites activity and it is on these one-day events that concerned seed companies showcased their range of crop varieties to over 16,000 vegetable farmers. Farmers evaluated the performance of varieties at the sites and they received information on how to access seed as needed. Seed companies indicated that this was the most impactful activity under the partnership with ISSD because it led to immediate benefits to the sales business.



**Photo 16** Farmers on a field day in Central zone

### *b. Training events*

The project also conducted 'Vegetable training events' at national level to showcase the quality vegetable varieties and skill farmers in improved vegetable production practices. Trainers demonstrated the different varieties and critical production practices using specially grown on-site gardens. Four of such events were implemented in the central and western zone of the country and they attracted more than 1,316 participants who received knowledge on the varieties and practical production practices. Institutions such as Mukono Zonal Agricultural Research District Institute (MUZARDI), Mountains of the Moon University, Farmers Leadership Centre and Bukalasa Agricultural College hosted these training events.



**Photo 17, 18** Participants at a vegetable training event

### *c. Mass media awareness on quality seed for vegetables*

To further promote uptake of the advanced vegetable varieties, the project conducted radio campaigns through spot advertisements, DJ mentions and live talk shows on 6 local radio stations spread across the seed companies' regions of operation. The radio promotion initiative was estimated to have reached a unique audience of 7,898,543 people over the period it was conducted (Advertising review by Reelforge Uganda LTD). This campaign triggered the interest of many vegetable farmers as observed from the follow up calls made to the seed companies.

By the end of the project, 53% of farmers were aware of at least one of the quality vegetable varieties promoted. The uptake levels of the quality vegetable varieties stood at 16.2% of farmers for the most adopted crops which included tomato, cabbage, onion and green pepper as evidenced in a 'vegetable adoption study' conducted. Exploring the relationship between adoption and awareness, the project noted that chances of adopting the quality vegetable varieties were higher for farmers who had knowledge of the available varieties; this justifies the need for awareness creation in order to achieve desired uptake level.

## **II. Skilling of farmers in improved vegetable production technologies**

High quality seed can only perform to its potential when the crop is treated with the right production practices. Since utilization of these quality vegetable varieties by any farmer is a considerable investment into the vegetable production business, it was essential to supplement promotion of these varieties with capacity building in major vegetable agronomic practices. Below are the major initiatives implemented to achieve this.

### *a. In-depth farmer trainings on training sites*

The project implemented this activity in partnership with three seed companies, i.e. East West Seed International-Knowledge transfer team (EWS-KT), Cycas and House of seeds although EWS-KT implemented more than three quarters of the sites. The seed companies set up a total of 730 training sites on which they rolled out trainings to 11,680 vegetable farmers. The selected farmers underwent 5-week long in-depth demonstrational trainings in technologies critical to vegetable agronomy while following the crop growing cycle. These technologies included appropriate; fertilization application;

crop protection; spraying techniques and climate smart technologies and others like trellising.<sup>12</sup>

Few seed companies participated in the training sites activity because they considered it to be very demanding in terms of knowledge, skill and time yet the outcomes did not result into immediate benefit to the company involved. They further noted that the benefits would be considered a common good since skilled farmers would use the attained skill to grow any variety of their choice not necessarily varieties of the training company.



**Photo 19** A farmer in Northern Uganda producing seedlings using the tray technology

*b. Training of Trainers for vegetable sector professionals*

To achieve a multiplier effect in promotion of varieties and advanced vegetable production practices, the project in collaboration with Wageningen Plant Research (WPR) designed a practical training of trainers' course in vegetable production. The target group included; agro-input dealers, researchers, academia, government extension officers and commercial vegetable growers. The project conducted six such training courses for 147 sector professionals who also received manuals, crop guides and practical hand books on practices like crop protection and fertilization. To consolidate skills and lessons learned from the ToT programme, the project additionally organized two benchmarking trips to SEVIA Tanzania for a selected 34 sector professionals and 8 commercial farmers.



**Photo 20, 21** Left: A sector professional training participants during a training event. Right: A participant admiring staked tomato variety

The ToT programme also provided sector professionals with improved farmer facilitation skills that would enhance adult learning. The sector professionals adopted the farmer extension methods trained

<sup>12</sup> We supported the development of the following case study, based upon the work of EWS-KT: Guijt & Reuver, 2019. Adoption processes of good horticulture practices in northern Uganda: Sowing the seed. Wageningen Centre for Development Innovation: [https://issdafrica.files.wordpress.com/2020/10/sowing\\_the\\_seed\\_adoption\\_processes\\_of\\_good\\_hortic.pdf](https://issdafrica.files.wordpress.com/2020/10/sowing_the_seed_adoption_processes_of_good_hortic.pdf)

to varying degrees and use of demonstration sites as a practical extension method was the most adopted by 42% of them. Other adopted farmer extension methods although to a lower extent included regular farm visits and group meetings. By the end of the project, the sector professionals had shared out their knowledge with approximately 55,566 vegetable farmers since going through the ToT programme.

The adoption rates of improved agronomic practices in vegetable production ranged between 17-29% of the vegetable farmers that the project interacted with in the vegetable adoption study. Table 11 also shows that the practice of seedling production (raising seedlings using different media on trays) was the most adopted overall.

**Table 11** Extent of adoption of the vegetable agronomic practices by farmers

Agronomic practice	% of vegetable farmers using practice				
	Central	North	East	West	Overall
Fertilisation - fertilizer application following a specific regime	12.04	30.77	48.48	28.57	22.96
Seedling production - raising seedlings using different media on trays	26.85	46.15	30.3	28.57	29.08
Crop protection - use of traps and proper use of chemicals	17.59	7.69	30.3	9.52	17.35
Soil and water conservation techniques - ridges, blanket mulch	17.59	7.69	27.27	33.33	21.94
Trellising - raising tomato plants off the ground using sticks or any other propping methods	33.33	15.38	9.09	7.14	22.45

### 2.4.3 Sustainability of achievements made under the Vegetable component

#### **A platform for the trained sector professionals**

By the end of the project, the trained sector professionals had set up a legally operating platform called 'Horticulture Sector Professional's alliance (HOSPA)' to ease access by vegetable farmers as required. The objectives of the vegetable brigadiers' platform are: (i) to promote best practices in vegetable production; (ii) to provide a one-stop centre for all needs with regard to vegetable production (inputs, technical assistance, new research findings, market information); and (iii) To foster peer learning/coaching among the sector professionals. This platform is a step towards sustaining knowledge transfer on the vegetable technologies promoted by the project.

#### **Seed companies' motivation to continue implementing some activities**

Being businesses entities, seed companies are interested in a strategy that brings about immediate increases in sales volumes. The professionally set up demonstrations was noted to be such a strategy and they have since embraced it as one of their promotion activities although at a lower scale than the project implemented.

### 2.4.4 Challenges faced in implementation of Vegetable component activities

#### **Insufficient support to demos from seed companies**

It was challenging for seed companies to set up professional demonstrations as required by the ISSD Plus project because these needed fulltime commitment from responsible staff. The seed companies could only facilitate an agronomist who doubled as a salesman. As a result, some demonstrations were not to standard and the project invalidated them leading to wastage of project funds.

#### **Difficult to measure impact since companies do not reveal seed sales figures**

The vegetable seed companies declined to share their sales records and as a result, the ISSD Plus project was unable to report on some of the component's key performance indicators set out in the log frame. These included: (i) number of farmers using the advanced vegetable varieties; and (ii) income earned per household. Although it significantly affected reporting, the project came to an understanding that little could be done about these indicators. This was not unique to this project; generally, companies are not willing to exchange records that show how they do in business. A key

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lesson learned for the project is that in the development of Key Performance Indicators (KPIs) for activities led by partners, the project should always be assured of the possibilities of obtaining data to measure them. Otherwise, some KPIs may never be reported on over the whole project period.

## 2.5 Cross cutting issues

### 2.5.1 Climate change

LSB farmers indicated that the frequent variations in temperature and rainfall was one of the main challenges in the seed business. This entailed extreme temperatures, low rainfall, floods and unfavourable changes in the crop seasonal calendar. Such incidences affected seed entrepreneurship since seed production by LSBs is also rain fed. In planning the ISSD Plus project therefore, supporting stakeholders to manage climate change was an integral aspect right from the start. Strategies to create resilience to effects of climate change were already part of the main activities implemented. Find below the strategies for field crops and vegetable crops.<sup>13,14</sup>

#### **I. Strategies for field crops**

##### **Diversifying locations for basic seed production**

Diversifying of basic seed production (from the NARIs) which was to reduce the risks by spreading the geographies of basic seed production from the current NARIs. This led to creation of the ZARDI-led and LSB-led models as explained earlier on.

##### **EGS pre-booking system**

Supporting the development of an efficient EGS pre-booking system which was to ensure better production planning that would facilitate timely availability of EGS to seed growers. This was not yet achieved by the end of the project.

##### **Promoting integrated soil fertility management by LSBs**

Integrated soil fertility management was promoted since unfavourable climate lead to amplification of the soil nutrient deficiencies. The one-acre strategy to increase productivity contributed to this although most LSB farmers were yet to adopt the fertiliser blends.

##### **Promoting uptake of quality seed by farmers especially after a bad season**

This was through the creation of awareness on the benefits of using quality seed with emphasis on climate resilient varieties available with the LSBs within farmer communities. The uptake component activities were an avenue for this awareness creation.

##### **Train sub-county AOs on climate mitigation strategies**

The project team utilised avenues like the trainings of sub-county AOs on quality seed use to emphasise the concept of climate change, its effects and coping strategies to mitigate potential resulting losses. AOs were expected to deliver this information to farmers during the regular extension service delivery.

##### **Select varieties well adapted to changed climatic conditions**

The LSB associations and project staff supported LSBs to annually set up variety promotion demonstrations for soybean, beans and sesame in the North and West Nile zone. These demos were aimed at selecting and promoting crop varieties that are well adapted to the local climatic conditions. The LSBs organised farmer led field days on each site and local communities were able to evaluate

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<sup>13</sup> See also the following brief on climate change, risk reduction and mitigation measures: Mastenbroek & Nakanwagi, 2021. Smallholder livelihood risks and barriers to adoption of drought tolerant maize varieties in Uganda. ISSD Plus Brief 17: <http://admin.issduganda.org/assets/images/resources/briefs/brief17.pdf>

<sup>14</sup> The programme looked into willingness to pay for drought tolerant varieties and organized a webinar on this topic; see the following report: Nakanwagi, 2021: Affordability and willingness to pay for hybrid drought tolerant maize seed: anchoring and learning. Webinar meeting report. 4 June 2021: <http://admin.issduganda.org/assets/images/resources/reports/affordabilityandwillingnesstopayforhybriddroughttolerantmaizeseed:anchoringandlearning.pdf>

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and voted for the best performing variety for adoption.

### **Test simple and affordable irrigation technologies for LSBs**

The project also worked with six LSBs in the North, West Nile and South-western and an irrigation consultant to test simple and affordable life-saving irrigation technologies for QDS.<sup>15</sup> The focus was gravity irrigation for potato, rice and beans. The latter crops were to only be irrigated at critical stages of plant growth in case of insufficient rain moisture. In the Eastern zone (Bugisu and Sebei sub-regions), the gravity irrigation technology was already being used by LSBs for off-season production of high value field crops like potato. Where off-season production did not apply especially for lower value field crops, the irrigation technology was recommended for off-season vegetable production from which profits could be ploughed back into the QDS business. LSBs involved were to invest in set up of the irrigation system while the project's role was technical capacity building and ensuring sustainability of these systems with good returns on investment for QDS producers. Installation of an irrigation system was demonstrated for two of the LSBs in West Nile and South Western. An assessment done at the two demonstration sites indicated that there is quite some potential for irrigated production, not only to secure seed production in the light of increasingly variable rainfall patterns, but also to add another production cycle during the dry period.

## **II. Strategies for vegetable crops**

### **Variety selection**

Farmers were trained to be keen enough to understand all about a variety that one intended to grow so that they chose the most suitable one for the area and season of production.

### **Use of raised beds**

Raised beds were recommended to guard against destruction by floods and stagnant water where rains were intense in a short duration of time. The technique of raised beds was to improve drainage and aeration within the crops' root zone.

### **Mulching for soil and moisture conservation**

Mulching guards against soil erosion and excessive evaporation from the soil hence maintaining some moisture in the soil even when there is minimal rain.

### **Proper crop nutrition**

Farmers received in-depth training on fertilization to ensure that their crops were strong enough to resist or tolerate pests to a large extent.

## **2.5.2 Gender**

The project paid special attention to women as primary beneficiaries in the QDS business hence gender mainstreaming was a major intervention area.<sup>16</sup> Focus was placed on increasing women's voice in decision making, increasing their participation in LSB top leadership roles, increasing their involvement in group trainings and coaching sessions and economic empowerment. The project utilised the household approach to encourage husband and wife to plan and work together in the seed production activities. The gender action learning systems (GALs) methodology was also utilised to increase women empowerment, household visioning, gender balance. Capacity building also included the utilization of in-house LSB group trainers referred to as 'Gender champions'. These members continue to offer coaching to fellow group members considering that gender mainstreaming involves mindset change which can only be effectively achieved after a long time period.

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<sup>15</sup> See also: De Klein, 2021. Evaluation report on irrigation design and installation at LSBs Kitembe and Wadelai: <http://admin.issduganda.org/assets/images/resources/reports/evaluationreportonirrigationdesignandinstallationatlsbskitebeandwadelai.pdf>

<sup>16</sup> ISSD Plus studied the effectiveness of gender mainstreaming in the project; find the report here: Birungi Kyazze & Birungi, 2021. Assessment of gender mainstreaming for the ISSD Plus project, Uganda. <http://admin.issduganda.org/assets/images/resources/reports/assessmentofgendermainstreamingfortheissdplusproject,uganda.pdf>

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LSB farmers noted that the main impact of the gender mainstreaming activities by the project was: (i) increased joint planning and decision making amongst couples; (ii) higher production and incomes since men and women work together; and (iii) reduced cases of gender-based violence which strongly comes out in the North and west Nile zone. To date, 53% of the top leadership positions in LSBs are occupied by women which represents a 23% increase from the situation before the ISSD Plus intervention. The increase in women's voice went beyond LSB groups as seen with various women that took on local council leadership positions in their communities. Regarding women economic empowerment, LSB members indicated that one major change is that more men now allow their wives to market farm produce which allows them to also earn an income.

The project also conducted a gender study within the horticulture sector to understand how its interventions were impacting women. From recommendations made by the study, seed companies made the below adjustments in implementation of activities:

- Encouraged household responsibilities of hosting a demonstration/ training sites
- Purposively chose female farmers to host some demonstration/ training sites
- Started planning project activities outside the busiest hours for women
- Brought services such as trainings closer to the communities such that interested women did not have to travel long distances to access the services
- When sending out invitations to project events specify that ladies are invited or invite households
- Implementing partners made effort to implement the recommendations



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## 3 Project performance impacting sector change

This chapter presents achievements made to create an enabling environment for the smooth running of the whole seed value chain. This section highlights interventions made to impact seed sector change. It is divided into three major sub-sections including: (i) lobby and advocacy for an enabling environment; (ii) innovations as novel solutions to sector bottlenecks; and (iii) stakeholder engagement for the seed sector. Find the highlights of achievements in Box 5.<sup>17</sup>

### Box 5. Highlights of achievements

- Influenced development and approval of three seed sector related instruments, i.e. the National Seed Policy, National Seed Strategy and Seed and Plant (QDS) regulations
- Disseminated the National Seed Policy and National Seed Strategy to 729 participants in 139 districts of Uganda
- Facilitated MAAIF to draft the Plant Protection and Health regulation (PPH) and the Plant Variety protection regulation (PVP); the later was gazetted in 2020
- Developed a low-cost hydroponics systems for lettuce production
- Identified 12 biological control and assessed one (*Trichoderma Koningiopsis*) through field trials

### 3.1 Lobby and advocacy for an enabling environment

An enabling environment plays a key role in creating and sustaining growth of any value chain. The ISSD Plus project particularly targeted to influence seed related policies, strategies and regulations to support establishment of a well-regulated seed sector that ensures availability and access to safe and high quality seed.

At the beginning of the ISSD Uganda program in 2012, Uganda did not have an approved National Seed Policy (NSP) and National Seed Strategy (NSS); regulations to operationalise the Seed and Plant Act enacted in 2006 to regulate plant breeding; seed production and marketing guidelines, seed quality control guidelines and sector coordination guidelines. These instruments are essentials of an enabling environment for a vibrant, pluralistic and market-oriented seed sector that provides smallholder farmers access to affordable quality seed of superior varieties. Below are the interventions that were implemented.

#### **I. Revision of the National Seed Policy and regulatory framework**

ISSD Plus and USAID Feed the Future Enabling Environment for Agriculture (USAID-EEA) supported MAAIF in lobbying for cabinet approval of the NSP<sup>18</sup> and NSS<sup>19</sup>; these two frameworks are critical for seed sector governance. Considering that the NSP was a highly technical document, the project additionally provided MAAIF with financial support to produce a more user-friendly version known as the “NSP Popular Version” with graphical illustration for easy understanding by the key implementers. This marked a significant stage of creating an enabling environment for a vibrant, competitive and pluralistic seed sector in Uganda. Find the vision and mission of the NSP in Box 6.

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<sup>17</sup> Find the project’s approach and results towards seed sector transformation described in this project brief: Ntare, 2021. Transforming the seed sector in Uganda; The journey by ISSD Uganda. ISSD Plus Brief 21: <http://admin.issduganda.org/assets/images/resources/briefs/transformingtheugandaseedsector.pdf>

<sup>18</sup> MAAIF, 2018. National Seed Policy: <https://agriculture.go.ug/wp-content/uploads/2019/05/Ministry-of-Agriculture-Animal-Industry-and-Fisheries-National-Seed-Policy.pdf>

<sup>19</sup> MAAIF, 2015. Uganda National Seed Strategy 2014/15 – 2019/20: <http://extwprlegs1.fao.org/docs/pdf/uga175068.pdf>

## Box 6. The National Seed Policy

### **The vision of the NSP 2018**

A competitive, profitable and sustainable seed sub-sector where farmers and other seed users have access to affordable quality seed.

### **The mission of the NSP 2018**

To create a well-regulated seed sector that ensures availability of and access to safe and high-quality seed under a pluralistic seed system.

In addition, while the Seed and Plant Regulations of 2017 were available to regulate regional and international seed trade, it was deemed essential to develop separate Seed and Plant (Quality Declared Seed) regulations specifically for the domestic seed market to avoid confusion in the market place. Thus, ISSD Plus supported MAAIF in all processes of developing and final legal drafting of the Seed and Plant (Quality Declared Seed) regulations that was gazetted in January 2020. By supporting the development of the Plant and Seed QDS regulations, the project contributed to creation of a framework within which the QDS system will legally exist with support from critical partners like MAAIF and the DLGs.<sup>20</sup>

## **II. Dissemination of the National Seed Policy and National Seed Strategy to users**

The project in partnership with MAAIF and USTA, conducted a country wide dissemination of the NSP and the NSS. The dissemination targeted DAOs, farmer representatives and other key stakeholders in all regions of the country. The dissemination process involved 139 districts divided into subregional clusters of 5-7 districts to ensure a maximum of 40 participants per cluster. This maximum was necessary because of government restrictions on large gatherings. Overall, 729 participants majorly DAOs and other technical persons attended the dissemination meetings. The project provided each of the DAOs with 30-50 copies of the NSP popular version<sup>21</sup>, the NSP original version and the NSS. These were to be distributed to lower levels (sub counties and villages). The dissemination workshops enabled DLGs to understand their roles and responsibilities in the implementation of the NSP in their respective districts.

## **III. Development of seed regulations to accompany the National Seed Policy**

In addition to the Seed and Plant Act of 2006 that regulates plant breeding, seed production, quality assurance and supply as prescribed in the NSP, other laws were also developed to enhance access to improved high-yielding crop varieties and promote seed import and export. These included the Plant Variety Protection (PVP) Act of 2014 and the Plant Protection and Health (PPH) Act of 2015. However, these two laws could not be implemented without regulations. These regulations were later drafted by MAAIF with financial and technical support from the ISSD Plus project. The PPH was gazetted in 2020 while the PVP regulations passed the legal drafting stage and awaits formal gazetting.

These additional regulations reinforce effective implementation of the policy and regulatory frameworks thus strengthening growth of the seed sector in Uganda. This will further enhance its competitiveness in the regional seed markets of the East Africa Community (EAC) and the Common Market for East and Southern Africa (COMESA). Overall, the project was a driver in seed sector development, bringing stakeholders together to collaborate and align interventions solving key challenges in the enabling environment for improving seed sector performance.

<sup>20</sup> See the publication on this topic of Mastenbroek, et al., 2021. Institutionalizing quality declared seed in Uganda. *Agronomy*, 11(8), [1475]. <https://doi.org/10.3390/agronomy11081475>

<sup>21</sup> MAAIF, 2020. National Seed Policy; Popular version: <http://admin.issduganda.org/assets/images/resources/reports/thenationalseedpolicy.pdf>

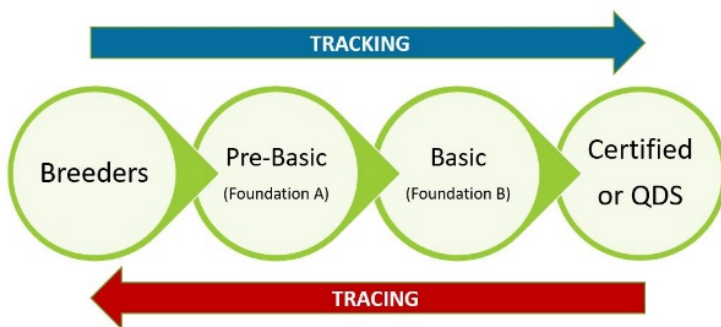


**Photo 22** Hon. Vincent Ssempijja (front row 5th Left) posing for a group photo with participants of the NSP dissemination meeting in front of Kalungu district administrative block (October, 2020)

### 3.2 Seed tracking and tracing system

To ensure that farmers get seed that is of good, it was essential to streamline the multiple quality seed supply chains. The project therefore provided financial and technical facilitation to the development of the digital STTS by MAAIF. The STTS Application developed in 2020 is an integral component of quality assurance along the entire seed value chain. This tool has numerous benefits for the seed sector stakeholders. For example: (i) farmers will have real time information on seed availability; (ii) seed growers will benefit from all online processes (including ordering for basic seed, submission of planting returns and payment of prescribed services, seed sales to potential buyers thus saving on advertising costs); and (iii) the NSCS will be able to maintain a centralized database on seed supply and demand since it will be providing most services online. This will all enhance effectiveness and efficiency in operations of the NSCS. The STTS is an important module of the envisaged digital Integrated Seed Sector Information Management System (ISSIMI) necessary for efficient coordination in the seed sector.

The STTS software development was completed with the Apps available on google play store for access by stakeholders. The database system, mobile app and user manual were fully developed and currently hosted in the clouds ready for rollout/utilization by the seed sector. For effective operationalisation of the STTS App, the principal users (i.e. NSCS, USTA, seed growers and merchants) will have to be trained on its use and rolled out. Figure 11 illustrates the different seed production stages that the STTS App will be monitoring and how.<sup>22</sup>



**Figure 11** Tracking and Tracing of seed in the seed value chain

Considering that the STTS App development was completed towards the end of the project and user training was not yet done, the effectiveness of the system could not be ascertained by the project.

<sup>22</sup> Find a brief explaining the purpose and functionalities of the STTT here: SSD Uganda, 2021. Seed Tracking and Tracing System. ISSD Plus Brief 23: <http://admin.issduganda.org/assets/images/resources/briefs/briefonstts.pdf>

However, MAAIF remained to take full responsibility of implementation and management of the system.

### 3.3 Innovations to sector bottlenecks

The project planned to pilot a total of 39 innovation ideas aimed at solving systemic bottlenecks in the seed sector but this was not fully achieved. After various attempts to source innovation ideas in quality seed production and marketing from partners, the project came to a conclusion that the innovation grant activity under the QDS and Uptake component didn't have the potential to yield expected results. A major adjustment made therefore for the two components was re-allocation of the grant funds to other activities and this decision was endorsed by the midterm review.

For the vegetable component on the other hand, implementation of the planned innovation ideas was dependent on a vegetable sector study which was to inform ISSD Plus of the major sector systemic bottlenecks. The project was to then address these bottlenecks through innovations activities. Since EKN commissioned the vegetable sector study rather late (2019), the project lacked a basis on which to implement all targeted number of innovations.

While awaiting launch of the vegetable sector study, ISSD Plus management decided to award two projects addressing food safety. They included a semi-automated hydroponics system for production of lettuce and a research project into production and licensing of biopesticides. These were easy to decide upon because issues of food safety are alarming as evidenced by the numerous interceptions suffered by horticultural exporters due to exceeded maximum residue levels.

#### **I. Trial of low-cost hydroponics system for lettuce production to eliminate use of nematicides**

The project conducted this innovation in partnership with Finca Verde Ltd in Mukono district. The hydroponic systems involved growing lettuce in a nutrient solution without soil but using low-cost materials compared to those used under the fully automated system. It was aimed at eliminating soil born pests on lettuce specifically nematodes thus consequently doing away with the use of toxic nematicides. The developed system does not only eliminate nematodes but also soil-borne pests and diseases. It also eliminates the need for crop rotation so growers can specialize in lettuce production and be consistent on the market since they are able to produce lettuce on the same piece of land. With the system, ground water is also safe from contamination with any agrochemicals.



**Photo 23** Lettuce crop on hydroponics at Finca-verde LTD (2019)

The innovation project successfully portrayed the possibility of utilising a hydroponics system to produce lettuce vegetables without using nematicides. Nematicides are chemicals for killing nematodes. These are common pests on vegetables like lettuce. This presents an opportunity for

lettuce growers who will be spending less on chemicals while producing safer vegetables for consumers; this is particularly attractive for farmers interested in a niche market. The niche market in this case are consumers that have a preference for lettuce with lower proportions of chemicals. After its commissioning the project, 53 lettuce growers received training on the system and two of these replicated the it on their farms. This innovation proved to be a good business case and Finca has since more than doubled the area under production of lettuce on hydroponics. Find in Box 7 the story of an early adopter of the system.

#### Box 7. Experience of an adopter of the lettuce hydroponics system



**Photo 24, 25** Commercial adopter of the hydroponics

Mr. John Musajjakawa, as shown in the photo above, is a lettuce producer who started by growing cherry tomatoes but later on picked up lettuce production on soil outdoors in 2017. His target market segment is the high-end restaurants/ hotels, expatriates in the country and the people working at the United Nation bases in Uganda.

John indicates that most of the time, his product did not meet the customers' quality needs because it was always spoiled. After a visit on the Finca Verde farm in 2019, he realized that the hydroponics production system could improve the quality of his lettuce to meet his clientele needs. John immediately adopted the system and has since realized the following benefits:

- Short maturity period of the lettuce.
- Reduced incidences of infestation by nematodes and Cercospora leaf spot pests.
- Reduced manpower/labour needs.
- Ice bug variety of lettuce is performing better since he can use the system to control PH and prevent burning of leaves as a result of acidity.
- He managed to retain his share of the target market segment which is characterized by the elites who are cautious about food safety.

## **II. Research on biological control agents (biopesticides) undertaken to influence national protocols on food safety and competitiveness**

The project partnered with MAAIF and Xclusive Cuttings Ltd (now called Milk weed biologicals Ltd) to undertake a study that was to lead to the establishment of National Protocols for licensing massive production and trade in indigenous biological control agents (Biopesticides) within Uganda.

Biopesticides are of interest because they are the most environmentally friendly crop protection agents and also preserve food safety. Under this study, the project targeted to have at least 10 biological control agents isolated and clearly identified and at least one of them registered by MAAIF for commercial marketing.

ISSD Plus specifically supported Xclusive Cuttings to put up an eight chamber fully equipped facility for mass production of biopesticides and to participate in the research. From this research, 28 micro-

organisms were isolated (2 mites, 4 bacteria and 22 fungi), 12 of them identified and one (Trichoderma Koningiopsis) was subjected to the required field trials. Data was collected and analysed, and results were compiled and submitted to MAAIF for registration. This agent was undergoing registration at MAAIF by end of the project.

This partnership was interesting as it's outcomes would be double faceted benefits i.e. commercial benefits for Xclusive Cuttings as well as a common good for the public in form of the national protocols for licencing biopesticides. Though the protocols were not yet drawn and approved, the project laid a foundation upon which they could later be developed.



**Photo 26** One of the products produced by Milk Weed Biologicals LTD

Since the biological agents were developed within the country, there will be no associated risks of the biological agents changing status once in a new environment as is the case for imported agents. Evident from this research is the fact that there are many of biological control agents existing within Uganda which is a great opportunity to improve environmental health, farmers’ safety and image of Ugandan food products on the market thus improving competitiveness.

### 3.4 Stakeholder engagement for seed sector development

All activities aimed at institutionalizing processes and creating an enabling environment require the intense engagement of multiple stakeholders in order to achieve the desired output. In this regard, the project utilised various strategies to get stakeholders into discussions and agreements on the project agendas for sector change. The strategies that were employed are discussed below.

*a. National level Multi Stakeholder Platform*

The project organized one national level Multi-Stakeholder Platform (MSP) for seed sector actors in 2018. Its major purpose was for stakeholders to provide an update on the status of the seed sector from their angles of implementation. The project did not hold another national level MSP thereafter, because stakeholders came to an understanding that smaller forms of engagement would be more effective at operationalizing actions that came out of the national level MSP.

*b. Bilateral meetings with influential persons*

As compared to platform engagements (MSPs), such smaller engagements lead to faster results since they target individuals who have the authority to move matters forward. For all interventions that required the approval of specific stakeholders, this mode of engagement was most effective and the

project held numerous such engagements while implementing activities under each of the project components. Additionally, policy related activities are slow and require a lot of patience, persistence and multidimensional approaches with key influential persons, informational networking for trust building to be able to address challenging situations and building consensus.

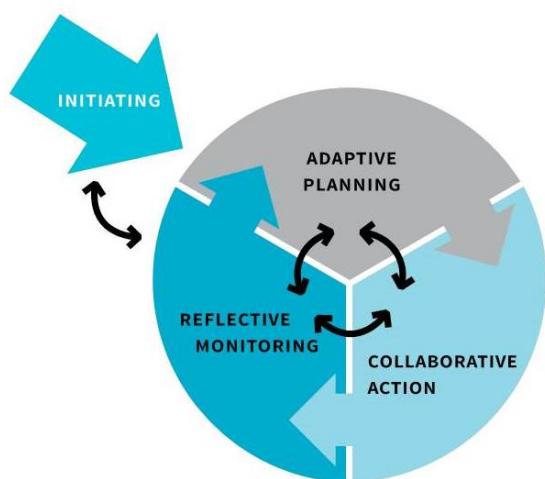
*c. Retreats*

This was a key mode of engagement for cases where the project required stakeholders to concentrate and finalise particular regulatory instruments. This strategy was used for drafting and review of the seed sector instruments (NSP, NSS and the regulations).

*d. Zonal level Multi Stakeholder Platforms*

Different from the national level MSPs, these activities were held at zonal level and their purpose was to create a platform for stakeholders to hold deliberations on seed sector challenges that needed attention. The project guided stakeholders into utilising the generic multi stakeholder partnerships process model while establishing these MSPs.

All six zones conducted stakeholder mapping and were able to analyze key bottlenecks affecting the effective functioning of the seed value chain. The MSPs also formed steering committees which composed of different technocrats that were to generate different ideas and follow up on actions.



**Figure 12** MSP cycle

By 2020, the Northern zone MSP was at Phase 3-Collaborative Action while the Eastern zone was at Phase 2-Adaptive Planning (see Figure 12). The Rwenzori and Ankole MSP kept oscillating between phase 1-initiating stage and phase 2. This is because MSP members were not constant in their participation, i.e. new members kept appearing for meetings as old members left which affected progress of these particular platforms. MSPs were not conducted in the Kigezi zone because there already existed an association which brought together seed potato producers (Uganda National Seed Potato Producers’ Association). The project advised LSB farmers in Kigezi to join this platform.

The MSP in the Eastern zone focused on challenges along the QDS system, i.e. quality assurance, marketing, agric-financing, seed extension and seed entrepreneurship. Being that the LSBs in the Northern zone was more mature, it focused on cost-effective crop productivity enhancing technologies, e.g. setting up a Rhizobia handling facility at Ngetta ZARDI and developing an appropriate crop rotation calendar. Overall, there was dialogue going on among stakeholders in the zones however the frequency and quality of the conversations was still largely influenced by ISSD Plus presence.

An assessment of the zonal MSPs by the end of the project indicated that these platforms contributed little to policy dialogue in higher level MSPs and were generally unsustainable. Their unsustainability resulted from the fact that institutional buy-in of MSPs was still very low and this was partly attributed

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to participants not reporting back after the MSP meetings. Additionally, participating institutions that were supposed to spearhead piloting of the various interventions suggested were cash strapped and hence unable to carry out these tasks. It was for the same reason that the project could not conduct 12 meetings annually as planned but rather an average of five meetings. In addition to the financial constraint, the project noted that for zones like Rwenzori, institutions had an individualistic approach to some of the challenges which went against the mode of operation of an effective MSP.

Because most zonal MSPs did not progress beyond the adaptive planning stage of the MSP cycle, little observable change could be reported on for the challenges identified. However, the project observed the following:

- Market for QDS increased as most of the MSP committee members got involved in market research for QDS in the zone. This benefited the seed farmers
- In Rwenzori zone, Mountains of the Moon University started supporting students to engage in research on matters related to seed
- As a result of the MSP interactions, many of the stakeholders especially the Government officials were pushed to make mention of seed production in their areas of operation. Some of the district officials actually started to establish district platforms.
- There was improved investments by MSP players e.g. private sector taking up strategies that feed in its supply chains e.g. a successful case of ACILA enterprises in soybean seed value chain.



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## 4 Lessons learned

In this chapter, we elaborate lessons learned from implementing the ISSD Plus project; they are organized by component area, concluding with lessons on facilitating sector change.

### **I. Increasing quality seed use – Uptake component**

#### *a. The learning process that triggers uptake of quality seed is still incomplete for most farmers*

Other than the lack of money to buy seed at planting time, which many farmers point out as the major cause for their inability to buy quality seed, the project also learned that the price of QDS relative to the grain price determines affordability (*Access to seed study, 2020*). Farmers argue that they cannot buy seed at a higher price, yet they are to sell the produce harvested (grain) at a lower price. This is an indication that many farmers have not properly understood that by using quality seed vis-à-vis home saved seed, they stand to benefit from higher yields per unit area although the unit product price is lower than that of seed. This clearly indicates that in spite of the various quality seed promotion interventions conducted by the project, the learning process on the benefits of using quality seed is usually incomplete as it is more protracted than assumed. This calls for continued rigorous and innovative quality seed promotion strategies that will focus on educating farmers about the ultimate benefits of using quality seed over a longer period.

#### *b. The absence of structured commodity markets influences farmers' decision to use quality seed*

During interactions with farmers in the various promotion events carried out over the four-year period, the project also learnt that some farmers choose not to use quality seed because the market doesn't distinguish prices for products from quality seed and products from home saved seed. Farmers indicated that these market conditions demolarise them hence they decide to go for a cheaper seed option as long as the harvest will be sufficiently sorted to look like that of quality seed. Looking at most OPV crops, it is true that most product markets in Uganda are not structured by variety in terms of value chain linkage to final off takers. The situation, however, improved over the past few years for enterprises like soybean whose value chains have grown because vegetable oil companies demand farmers to produce varieties that have specific oil content levels. This calls for a more market systems-oriented approach by both government and development partners to structure product markets as a way of stimulating quality seed use.

#### *c. It is more feasible to implement the quality seed promotion events during the first season planting period*

Considering that the challenges around timely seed quality assurance requires hefty investments in the seed quality assurance system, which may not be achieved in the short run, it is recommended that quality seed promotion events only target the period leading to the first season planting period. This is because the period between harvest of the seed to be used in the promotions (December) and sale of this seed (March) is long enough to achieve full seed certification. As a result, all LSBs are able to comfortably sell seed that has green tamperproof QDS labels. This recommendation is in consideration of the fact that LSBs are currently unable to produce QDS two seasons earlier than needed for sale which would be the best-case scenario; this is because most of them lack the appropriate storage facilities.

#### *d. The certified seed class can be better represented in the quality seed promotion activities if more efforts are placed on engagement of local agro-dealer networks*

Considering the various misconceptions that seed companies have about the QDS system, it is pertinent that any future efforts need to target more of the local agro-dealers networks to a wider extent than was considered under the ISSD Plus project.

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*e. For effective mindset change, awareness creation activities need to be conducted alongside those to improve access to quality seed*

The project noted that quality seed adoption will be better achieved if interventions to increase farmers' awareness of its value at a specific point in time are conducted alongside interventions to make it accessible to the farming communities. For example, road show events should be held alongside seed fairs for a particular location of interest.

*f. For a multiplier effect in quality seed promotion, build capacity of sub-county agricultural Officers*

As the project continuously aims at institutionalising the QDS system, it was noted that there is need to build capacity of as many sub-county AOs as possible in aspects of quality seed adoption. These officers are well placed to continue promoting quality seed adoption beyond a particular intervention activity.

## **II. Improving quality seed availability – QDS component**

*a. By embracing QDS, the District Local Government greatly fostered sustainability of the QDS quality assurance system*

Most DLGs in the various districts effectively took on their quality assurance role as planned by the project, which enhanced sustainability of the QDS system since the local seed producers needed quality assurance service providers that were more accessible, affordable and familiar with their local environments. As compared to engaging MAAIF inspectors therefore, involvement of DLG inspectors created sustainability.

*b. The LSB concept has attracted many organisations which calls for regulation of seed producers*

Having turned out to be a successful concept for production of quality seed within rural communities, there has been a growing number of organization that are establishing LSBs even beyond the project life cycle. It is therefore critical that MAAIF registers all trained QDS producers for better regulation of QDS production. This will not only facilitate tracking and tracing of the QDS product but it will also facilitate planning for basic seed and the various quality assurance services.

*c. Centralisation of seed testing is still a critical challenge*

The centralisation of seed testing at the Kawanda National Seed Testing Laboratory for all seed producers was the main reason for the tedious sampling and delays in release of lab test results. The establishment of zonal laboratory seed testing hubs by MAAIF would therefore decentralise this quality assurance service and consequently encourage more LSBs to utilize the green tamperproof labels. Certified seed companies would also gain from such a development since their out growers also operate within the rural areas. However, considering that decentralization of seed testing is a long-term solution, challenges around incomplete QDS certification could be solved in the medium term by facilitating LSBs to embrace QDS production two seasons in advance. Under this arrangement, the period of time between harvesting and sale of seed is long enough to allow for complete quality assurance. This, however, calls for all LSBs to own appropriate seed store facilities which is another limitation at the moment.

*d. Commodity based out scaling partners involved in value chain integration are more effective LSB establishment partners*

During implementation partnerships with the LSB OSPs, the project noted that groups that were established by OSPs who had a focus on specific crop value chains performed better than those established by OSPs involved in general agricultural interventions. This is because the QDS produced by the LSBs was a critical input to interventions aimed at improving grain production for the food crops that were of interest to an organization. Having well performing LSBs was therefore a major target for such OSPs.

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### **III. Increasing availability and access to quality assured early generation seed – EGS component**

#### *a. Working with out-growers is an effective modality for the production of basic seed*

Production of basic seed is more effective through working with out-growers, especially large commercial farmers. Opening large farms on station is not cost effective. This information was useful to refocus the business cases in the foundation seed enterprise business plan.

#### *b. Government organizations need to lead change trajectories to create ownership and institutionalization of innovations*

Engaging government representatives as an institution (NARO, MAAIF) and allowing them to take lead in most activities cemented development of the institutional acceptance of most initiatives. It is important for government to take credit on the success despite the major efforts coming from the project in the background. This provides ownership and buy in by the public sector to support the progress of the activities.

#### *c. Close stakeholder collaboration and trust is a key for institutional change*

The period spent implementing activities planned under the EGS component indicated that it takes longer to achieve progress for initiatives geared towards institutional change because building trust is key. A major lesson learned therefore is the need to intensify stakeholder engagement both at platform level and bilateral level in order to achieve progress. This is a critical lesson especially for the interventions is largely dependent on the approval by public institutions.

### **IV. Promoting use of quality vegetable varieties – Vegetable component**

#### *a. Non-commercial farmer capacity building is not interesting to most seed companies*

The vegetable component presented a partnership experience different from that shared with partners under the other three project components because for most of the vegetable partners, their main purpose was increasing seed sales. This implied that there were differences in priorities for some activities which strained the collaboration. The project particularly noted that seed companies did not have interest in farmer capacity building which is a critical area for the project. To limit such incidences, the project noted the need to increase the level of engagement of vegetable seed companies in planning and review of component activities through quarterly meetings. It also required the project to identify and make strategic decisions that are a win-win for the collaboration. For example, the training sites activity was left to the foundation East West Seed-Knowledge Transfer which has an interest in farmer capacity building alongside its business wing (East West Seed company).

#### *b. Seed company-led variety promotions are more effective*

Having the variety owners at the forefront of the superior vegetable varieties' campaigns boosted the success of the vegetable component activities. The seed companies guided on conditions for which their varieties were adapted to, thus on the appropriate geographical areas for the varieties' promotion. Presence of seed companies within the country also guarded against having variety counterfeits on promotion and this strengthened farmers' confidence in the seed.

#### *c. Visual aids are critical for farmer training*

The project noted the need to incorporate visual training materials (short videos) to sufficiently conduct selected farmer training topics. It was observed that some vegetable production techniques were not well understood by farmers through verbal explanation.

### **V. Facilitating seed sector change**

#### *a. Sector transformation trajectories need an independent facilitator*

The ISSD Plus project playing broker, bridge and catalyst roles was fundamental for effective stakeholder engagements to create coalitions on innovations tailored to enhancing the growth of the seed sector, building trust, confidence and transparency in general.

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*b. Policy development needs intensive bilateral engagement with government actors*

The project noted that increased engagement of relevant public sector actors at a bilateral level instead of large meetings or workshops yielded significant results for most of the policy related activities

*c. A multi-pronged approach and trust building are prerequisites for the facilitation of policy innovation*

Policy related activities are slow and it requires a lot of patience, persistence and multidimensional approaches such as frequent bilateral meetings, retreats for technical tasks, target meetings with key influential persons, workshops and informational networking. The multipronged approach is important for trust building, to be able to address challenging situations and building consensus.

*d. Supporting a partner in one area, may lead to support in another area also*

Stretching beyond project objectives to support the public sector with its most pressing needs created a win-win position with MAAIF. In this regard, ISSD Plus supported MAAIF with its Plant Protection and Health Regulations development for import and export of agricultural commodities (though remotely pertinent to the ISSD Vegetable component). This gesture from the project earned more confidence from MAAIF towards a working relationship with ISSD plus project and it became simpler to achieve a lot in the planned policy activities.

*e. Successful MSP processes need careful facilitation towards clearly defined outcomes; this needs time*

A successful MSP process requires patience because it takes long for all stakeholders to appreciate and invest resources in joint action. It is for this reason that an MSP may not yield tangible results in the short run. In addition, every MSP must develop a results framework that is clear to all participants to in order to limit tendencies of deviating from the goal.

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## 5 Where the sector stands to date

### 5.1 Assessment on the impact of COVID-19 on access to quality seed

Government restrictions on mobility and gatherings as a result of lockdown to prevent the spread of COVID-19, starting from March 2020, had a knock-on effect on key seed sector services and seed value chain activities. The project conducted online surveys involving key stakeholders as respondents to assess the impact of the pandemic on access to quality seed for the first crop season of 2020. The survey revealed major disruptions in variety evaluation and promotion, production and supply of basic seed, scarcity of agricultural inputs, increased prices, and general difficulty in distribution of seed to selling points. The survey results were discussed and confirmed in online stakeholder meetings, in which stakeholders also agreed on necessary actions to address the challenges, as well as on who should lead the actions. Note that some actions go beyond the mandate of the project; still ISSD Plus took responsibility of motivating respective stakeholders to take action. Find all details in the Uganda Seed Alert – May<sup>23</sup>; and Seed Alert June<sup>24</sup>. Since June 2020, the seed sector as well as the ISSD Plus project adapted activities to deal with the COVID-19 situation, and the assessment was not repeated in subsequent months.

The Uganda Seed Alerts provided inputs for a synthesis paper, which also incorporate the results from Seed Alerts in Ethiopia, Nigeria and Myanmar<sup>25</sup>; a peer reviewed article in the journal Agricultural Systems<sup>26</sup>; and a white paper published by the by the African Union Commission (AUC) advising Governments in Sub Saharan Africa on adequate actions to mitigate the impact of the pandemic on access to quality seed for resilient seed systems.<sup>27</sup>

### 5.2 Online seed sector scan

To assess the level of performance in terms of seed value chain functions, services and activities, and get an overview of its status, the project conducted an online sector scan in July-September 2020.<sup>28</sup> This scan was designed based on the model of the Seed Alerts and shared among different stakeholder groups. Overall, the performance of the seed sector functions and services were rated fair (3) on a scale of 1-5 (where 1 = does not meet sector requirement at all; and 5 = fully meets sector requirements). However, survey participants indicated that key areas of variety development and release, EGS production and supply, seed quality supply and quality assurance, seed marketing, financing, coordination, utilization and the prevalence of fake seed on the market require more attention.

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<sup>23</sup> "Seed Alert Uganda, number 1. Wageningen Centre for Development Innovation, Ministry of Agriculture, Animal Industry, and Fisheries, and Uganda Seed Trade Association, May 2020 (date 18 May 2020): [Seed sector assessment - Uganda - May 2020.pdf](#)

<sup>24</sup> Seed alert: Uganda, number 2. Wageningen Centre for Development Innovation, Ministry of Agriculture, Animal Industry and Fisheries, and Uganda Seed Trade Association, June 2020 (date 25 June 2020): [Rapid assessment Uganda seed sector - June.pdf](#)

<sup>25</sup> Seed alerts - synthesis, number 1. Wageningen Centre for Development Innovation, 17 June 2020: [Seed Sector Alert - June - Synthesis.pdf](#)

<sup>26</sup> De Boef et al., Agricultural Systems 188 (2021) 103037: [Rapid assessments of the impact of COVID-19 on the availability of quality seed to farmers: Advocating immediate practical, remedial and preventative action \(wur.nl\)](#)

<sup>27</sup> AUC, 2020: [White Paper on the COVID-19 Crisis and the Seed Sector in Africa: Impact, Options for Actions and Recommendations | African Union \(au.int\)](#)

<sup>28</sup> Find the seed sector scan in this report: Otim et al., 2020: Assessment of the performance of the seed subsector regulatory and institutional framework in Uganda: <http://admin.issduganda.org/assets/images/resources/reports/assessmentofthepformanceoftheseedsubsectorregulatoryandinstitutionalframeworkinuganda.pdf>

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The key observations and recommendations from this quick scan are:

- Build capacity in policy formulation at the DLG level
- Target clusters of districts to enact ordinances and bylaws that combat distribution of fake seed
- Review seed and Plant Act of 2006 to align it with the NSP
- Implement NSS activities, develop variety maps, document market potential of new improved varieties and build technical capacity of seed producers
- Streamline the multiple seed supply chains to ensure that farmers get the quality seed they desire
- Strengthen LSBs in production of quality seed
- Focus on secure regions of the country for seed production and determine seed demand
- Establish a seed sector integrated information management system
- Utilize tailored communication tools/strategies and translation of the NSP popular version
- DLGs to prioritize seed production and delivery activities and allocate resources
- Improve access to EGS
- Coordinate actions by all stakeholders in the seed sector to enhance stakeholder integrity and transparency
- Enhance seed sector stakeholder coordination by strengthening the National Seed Board and NSCS

### 5.3 Status of the Ugandan vegetables and fruits sector

The production of vegetables and fruits in Uganda is becoming more important, with farmers being able to earn a reasonable income from growing these commodities. This was the reason for ISSD Plus to specifically focus on providing farmers access to quality seed of high performing vegetable varieties, as well as building farmers' capacities on improved vegetable cropping practices to allow for optimal performance of the varieties. In 2019 EKN asked for a fruit and vegetable sector assessment to look at the sector's competitiveness and opportunities to further improve its performance. The purpose of the study was to guide a new investment of EKN, specifically targeted at strengthening vegetable markets and increasing vegetable trade, building upon the work done by ISSD Plus over the past years.

The study was implemented by Wageningen Economic Research.<sup>29</sup> It selected five indicator crops, i.e. onion, tomato, pepper, pineapple and avocado; and looked at challenges at farm level, value chain level, and the enabling environment. The study shows that Ugandan vegetables and fruits are very competitive at regional markets when looking at quality, price and yield; however, there are still ample opportunities to improve performance of the sector. At farm level, challenges were observed with e.g.: access to quality inputs (tomato); varieties not fit for the export market (avocado); and poor crop performance due to use of low quality farmer saved seed (hot pepper). At value chain level challenges included: high post-harvest losses (tomato); lack of adequate storage facilities (onion); and lack of awareness of export standards (pineapple). For the enabling environment the absence but importance of a well-functioning farmer extension system was emphasized; as well as, e.g.: the lack of government sector coordination; not well developed regulatory framework; and the need of attention for food safety issues.

In 2020 Technoserve<sup>30</sup> was selected by EKN to coordinate and implement the new HortiMAP project.

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<sup>29</sup> See the study report: Dijkxhoorn et al., 2019. The vegetables and fruit sector in Uganda; Competitiveness, investment and trade options: <https://edepot.wur.nl/505785>

<sup>30</sup> TechnoServe in Uganda: <https://www.technoserve.org/our-work/where-we-work/uganda/>

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## 6 Considerations for the future

### **The EGS system needs further strengthening**

For efficient and effective delivery, the EGS models established will require additional support to establish standard coordination systems for pre-booking and access to quality basic seed, and quality assurance services, including field inspections, laboratory seed testing and label acquisition for standard packaging. It is also important that they are linked to the newly established digital STTS for easy tracking of sources of EGS as a quality assurance strategy for the seed sector. Additionally, due to institutional bottlenecks, initial implementation of the S4S (U) Ltd business plan was delayed, which in turn caused a setback in consolidating its performance. The business model predicts that the S4S (U) Ltd can only start breaking even from the third year of its implementation for self-sustainability. This requires further support.

### **Further institutionalization of the QDS quality assurance system is important**

Because of delayed gazetting of the QDS regulations, ISSD Plus has continued to shoulder a lot of responsibilities that should otherwise fall under the domain of the regulator MAAIF; it is clearly cognizant that nurturing the new regulation to its full and sustainable implementation is a protracted and delicate process thus a medium to long term venture. The implementation of the QDS regulations has been hampered by issues of disharmony within the parent laws, as well as capacity limitations at the levels of MAAIF (responsible for audits), NSCS (responsible for seed sampling, testing and certification) and the decentralized government (DAOs, responsible for field inspection). Further capacity strengthening is needed to ensure that MAAIF is fully capacitated to implement the regulations and own the QDS system in its entirety. To further improve the performance of the QDS system it is required to look into options for further decentralizing seed sampling, testing and certification; and develop and implement clear frameworks for collaboration between DLG and MAAIF. Also at QDS producer level further sensitization and training is needed as well as continued promotion of farmers' uptake of quality seed to expand the QDS marketing.

### **Urgent regulatory changes are still needed to ensure smooth implementation of the national seed policy and seed strategy**

There are remaining urgent policy challenges that must be addressed to ensure the smooth implementation of the national seed policy and seed strategy. This includes disharmonies in the regulatory framework, which hinder the smooth operation of the DCIC. This is caused by a passing of the NSP almost 14 years after the enactment of the Seed and Plant Act 2006; the latter mandates the Department of Crop Protection of MAAIF with the current responsibilities of DCIC. Legal and administrative frameworks need to be aligned to the new policy. Also, for an efficient PVP system, the regulation needs to be finalized and implemented. This is important for local breeding activities, as well as attracting foreign companies to introduce their new varieties into Uganda. In the gazetting of the Seed and Plant Quality Declared Seed regulations, crops including rice, sorghum and potato were excluded as QDS crops. There will be need to re-include these crops to allow LSB groups to deal in them without hesitation.

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## 7 Conclusions

Overall, the project moved well with implementing activities under its major result areas. While an enabling environment for the seed sector was put in place, implementation of the seed strategy requires deliberate efforts by the DLGs to embed seed-related activities in their annual works plans. This is especially critical for activities related to field inspection, supporting LSBs in their seed businesses, and disseminating good agricultural practices to enhance crop yields with an aim of having a surplus for agro-industrial processing – a theme in the National Development Plan III (NDP III). Further, the Seed and Plant (Quality Declared Seed) Regulations need to be disseminated to guide the LSBs in their seed businesses.

The decentralised basic seed production by the ZARDIs and selected LSBs creates a coordination challenge of seed inspection as demand for quality basic seed increases. It is desirable to strengthen the zonal associations and MSPs to enhance their capacity to play their role.

Coordinated actions by all stakeholders in the seed sector are essential to foster integrity and transparency, both of which are critical in building trust in the sector among farmers. It is also imperative to strengthen the National Seed Board & NSCS, which are the main regulators.

The number of seed producer groups are still few and not well spread out in all districts. Currently, LSBs exist in only 63 of 146 districts. To scale these nationwide, like-minded organisations need to come together to support interested farmer groups using a similar methodology and train them in seed production and marketing.

To ensure that farmers get quality seed, it is essential to streamline the multiple seed supply chains. This can be achieved by operationalising the digital STTS recently developed by MAAIF with the financial and technical support of ISSD Uganda. This will further eliminate the sale of fake seed.

The decentralised quality assurance scheme is designed to relieve the pressure on the national certification by decentralising inspection services at the district level. ISSD Uganda has supported the NSCS to train DAOs to conduct field inspections and issue recommendations on quality. It is essential that the DAOs are formally accredited so that districts can embed this service into their annual work plans and budgets.

Decentralisation of seed testing and issuing of labels at the zonal level will improve accessibility and affordability. ISSD Uganda supported NARO in establishing a seed testing laboratory at Ngetta ZARDI in northern Uganda, but the NSCS was yet to accredit it. Such zonal labs would enhance service delivery to all quality seed (certified and QDS) producers.

Overall, it is essential that: commodity markets are structured; all sector actors clearly understand their roles and responsibilities for effective implementation of the NSS; breeders develop variety descriptors to guide farmers in variety choice; the market potential of new improved varieties stimulates demand for quality seed; and above all that the technical capacity of seed producers is enhanced. This will go a long way in addressing challenges in the utilisation of quality seed by smallholder farmers.



# Appendix 1 Results framework

The project results framework is based on the revised logframe as approved by EKN. Find the framework, including performance against targets below.

Project strategy	Key performance indicators	Target	Achievements	Extent of achievements	Comments
<b>Goal: Improved food and nutrition security and agricultural economic development</b>					
	Area planted with quality seed (Acres)	300,000	205,416	68%	
	Additional agricultural production of grain equivalent as a result of using quality seed (MT)*	87,500	143,663	>100%	
	Amount of food produced that prevents and treats Iron deficiencies (MT)	1,360	11,014	>100%	
	Amount of food produced that prevents and treats Vitamin A deficiencies (MT)	840	5,498	>100%	
	No. of households improving their productivity and income by using quality seed*	300,000	326,719	>100%	
<b>Outcome 1: 300,000 households increase productivity, income and resilience</b>					
<b>Output 1.1: Smallholder farmers increased productivity from use of quality seed for crop production</b>					
1.1.1: Sale of QDS and certified seed at convenient and diversified outlets (seed fairs, weekly village markets etc.)	Number of quality seed outlets created	1000	761	76%	
1.1.2: Create awareness on the benefits of farmers using quality seed (LSB demos, radio, TV and print, road shows etc)	Number of awareness raising activities conducted	6000	4,224	-	The target was met since this achievement excludes more than 500,000 print materials which were produced and distributed every season to participants of the quality seed uptake activities
1.1.3: Stimulate effective demand for quality seed among smallholder farmers (value chain integration, small packs, seed demand studies)	Types of demand pilots initiated	15	0	0%	The project planned to engage in value chain integration to promote quality seed uptake through 15 demand pilots over the project period but this was not accomplished by the component since it required substantial resources than was planned for by the project. At the zonal level however, the project focused on facilitating networking platforms to create market linkages among relevant running projects, produce off-

Project strategy	Key performance indicators	Target	Achievements	Extent of achievements	Comments
					takers, grain producers and LSBs. Some of the stakeholders that were successfully engaged at zonal level included; Harvest Plus, Chain Uganda, ARCOD Uganda, Operation Wealth Creation, District Local Governments, oil millers, educational institutes and grain millers. These stakeholders ultimately provided market both directly and indirectly for QDS.
<b>Output 1.2: LSB members increased QDS productivity and income</b>					
	Number of LSB farmers producing and selling QDS	7,500	2,548	34%	Average number of farmers in active seed production is only 14 per group which is way lower than the targeted 25 per group. As indicated earlier, the project put in place a number of strategies to improve this situation i.e. QDS by-laws and resource mobilisation strategies
	Difference in productivity of seed production as a result of support provided to LSBs (technical training, ISFM, irrigation, climate smart agricultural practices etc.) (yield benefit in Kg/hectare)	Legume: 863 Cereals: 1250 Oil seeds: 1000 Tubers: 8750	-	-	Information collected under the yield verification activity was inconclusive because of various challenges faced in implementing the trials with the LSB farmers. It was concluded that such an activity could be better implemented with the support of NARO which implies higher budgeting than was available before
	Income (net benefits) per ha per HH per year: difference between cost of production and price (UGX)	1,750,000/ =	3,800,000/=	>100%	However, the income per ha per farmer per year is greater for potato (17,600,000/=) which makes it a valuable crop in the Kigezi region
	No. of upgraded LSBs that are sustainable in terms of profitability of LSBs	75	48	64%	The 48 LSBs are those under the A-Class category. LSBs in the B-Class category can also be classified as profitable and these are a total of 71.
	Number of women in LSBs top leadership positions (LSB chairman, committee chairman)	225	746	>100%	Target was underestimated at the start of the project
1.2.1: Support and train additional LSBs to produce and market QDS	No. of LSBs supported by out scaling partners	200	211	>100	OSPs established more LSBs than was targeted but note that some of these (211) were dropped by the project because of poor performance
1.2.2: Support LSBs to increase productivity and improve business management practices	Number of participants in training and type of trainings provided	-	-	-	Number of distinct participants by name cannot be reported because of challenges in record keeping as this detail was not part of the M&E database from the start

Project strategy	Key performance indicators	Target	Achievements	Extent of achievements	Comments
	No. of LSB associations providing coordination and support to LSBs	6	9		This includes three LSB associations and six clusters in the East
<b>Output 1.3: Vegetable growers increased productivity and income using high input-high output production systems</b>					
	No. of vegetable producers using advanced vegetable varieties	32,000	-	-	Project couldn't access data from the seed companies
	Income benefits per HH per crop cycle for users of advanced vegetable varieties (million UGX)	1.25	-	-	As above
	Difference in productivity of HI-HO vegetable system and LI-LO vegetable system (yield benefit in MT/Ha)		-	-	Data unavailable
1.3.1: Skilling farmers on improved vegetable production practices (indepth training, training of professionals)	No. of vegetable producers receiving training at the training sites	20,000	11,680	58%	Fewer training sites were set up because in the project design, 200 of the targeted sites were supposed to be established by out scaling partners and these were allocated a smaller grant rate per site (Eur 500) unlike the seed Company led sites which were allocated Eur 750 per site. However, the project failed to get appropriate outscaling partners to take on the 200 and these were allocated to seed companies instead. To fit into the seed company rate per site, the total number of sites to be established had to be reduced.
	No. of sector professionals trained	100	147	>100%	This activity attracted interests from many people
	Number of training sites set up	800	730	91%	As earlier explained
1.3.2: Promote use of advanced vegetable varieties by private sector (variety demos, field days, radio shows)	No. of variety demonstrations set up	320	442	>100%	The established demo sites were more than those targeted because many partners expressed a lot of interest in this activity. Because fewer innovation projects were implemented than planned, funds were reallocated the demo activity
	No. of vegetable farmers attending field days	12,800	16,000	>100%	The achievement was way higher than the target because the number of demonstration sites set up was higher by 122 and field days were extensively advertised through local radio stations which prompted mass attendance

Project strategy	Key performance indicators	Target	Achievements	Extent of achievements	Comments
<b>Outcome 2: Strengthen seed sector institutions and environment</b>					
<b>Output 2.1: QDS institutionally embedded</b>					
	% of seed samples complying with set minimum QDS quality standards	80	98	>100%	
	No of DLGs integrating the QDS system (activities and budget) in their annual planning	28	17	61%	Looking at the logframe targets per project year, it was assumed that new DLGs would be brought on board every year so the target of 28 is a summation for all project years.
	NSCS coordinates seed inspection and issuing of labels (# LSBs that receive at least one inspection)	250	175	70%	Note that the target is 250 LSBs not 300 because not all LSBs that were established too on seed production. Some groups were dropped by the project.
2.1.1: Train, coach and coordinate DAOs in new zones on QDS regulation and quality assurance	No. of DAOs trained	100	64	64%	Project also trained an additional 159 sub-county agricultural officers to support the DAOs making the total number trained to be 223
2.1.2: Support development of decentralized seed testing capacities	Number of regional seed testing lab initiatives supported	4	1	25%	Ngetta seed testing lab was supported but it still couldn't operate as planned because MAAIF had not yet included zonal seed testing facilities in the institutional framework of seed quality assurance. For this reason, the project couldn't proceed with the establishment of similar facilities in other zones
<b>Output 2.2: Increased availability of quality assured EGS</b>					
2.2.1: Operationalise quality assurance for foundation seed including seed tracking & tracing system (STTS)	System rolled-out and operational	Yes	No	-	System was developed but it was not yet in operation by the end of the project because of political pressure on MAAIF which kept its priorities to other government programmes
2.2.2: Forecast, plan & coordinate EGS demand, production & marketing	Number of LSB associations that are effectively coordinating foundation seed demand with NARO	4	6	>100%	The 6 includes the Eastern LSB clusters which effectively played this role with minimal ISSD support. The LSB Associations on the other hand have sustainability issues
	Number of LSBs using the pre-booking system	75	0	0%	Advance cash payment was still challenging because of the resource mobilization challenge that LSBs face and the fact that NARO didn't have a system in place to receive the funds.
	Number of seed companies using the pre-booking system	8	0	0%	
2.2.3: Pilot initiatives for foundation seed production (FSE, Individual member, LSB and ZARDI)	Number of initiatives tested	2	2	100%	Zonal (LSB & ZARDI) and central (FSE) initiative

Project strategy	Key performance indicators	Target	Achievements	Extent of achievements	Comments
	Volume of foundation seed produced annually (MT)	80 MT	>136.2 MT annually	>100%	This excluded potato
	Proportion of foundation seed fields inspected and seed samples meeting minimum standards	30% 75%	100% seed fields under models are inspected 100% seed samples meet minimum standards	>100%	The project facilitated MAAIF to conduct the seed field inspections and seed testing. 100% of seed fields under models were inspected and 100% of the seed samples tested met minimum standards
	% of LSB foundation seed demand met	75%	70%	93%	
<b>Output 2.3: Seed sector challenges innovatively addressed and seed sector knowledge embedded</b>					
	Type of seed sector related policies/regulations influenced by ISSD	3	4	>100%	These included the NSS, NSP, PHH and PVP
	Extent to which stakeholders are actively taking up roles to strengthen seed sector	4	3	-	
2.3.1: Innovation projects- novel solutions to sector bottlenecks (vegetable, QDS, uptake)	Successful innovation projects addressing bottlenecks and mainstreamed	9 veg 16 uptake 10 QDS	2 veg 1 uptake 0 QDS	<1%	After various attempts to source innovation ideas from partners, the project came to a conclusion that the innovation grant activity didn't have the potential to yield expected results. A major adjustment made therefore was re-allocation of the grant funds to other activities and this decision was endorsed by the midterm review
2.3.2: Lobby and advocate for cabinet approval of national seed policy, and support for QDS & EGS options and vegetables	Number of meetings/workshops on policy issues	23	18	78%	-
	No. and type of information materials disseminated	4	5	>100%	These included the NSS, NSP, NSP-popular version, PPH, QDS regulations
2.3.3: Organise regular zonal and national MSPs (including national seed stakeholder meetings)	Number of MSPs conducted annually	12	4	33%	The zonal MSP activity was not as successful as envisioned because of minimal commitment from stakeholders. Based on experiences from the previous project this project gave stakeholders the major role of keeping the MSPs active for ownership and therefore sustainability
2.3.4: LSG-SOP vegetable farmers skilling approach embedded within the relevant existing institutions	Number of institutions approached for embedding	8	4		None of the institutions approached had capacity to take on the practical skilling course as a standalone. It was therefore decided to drop the idea of institutional embedding.

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## Appendix 2 LSB categorization criteria and scoring

The ISSD Plus project developed criteria for grading LSBs into four performance classes i.e. A, B, C+ and C- with the 'A's being the best and the 'C-' being the weakest. Find the criteria in Table 2.1, and the scoring scale in Table 2.2.

**Table 2.1** Criteria for categorizing LSBs

No.	Categorisation parameter	Minimum parameter
1	Average acreage under seed production per season	Minimum 20 acres
2	Average gross revenue earned per season	Minimum UGX 20,000,000
3	Access to business assets	Access to appropriate storage space Access to sufficient land
4	Experience in seed Production (How long the LSB been in seed production)	6 consecutive seasons of seed production
5	Joint bulking and marketing	Consistently done for the last four seasons

**Table 2.2** Scoring scale for LSB categorisation

Category	Explanation	Minimum score
Category A	Have a minimum of 5 of the above parameters	5
Category B	Have at least 4 of the above parameters	4
Category C+	Have a minimum of 2 the above parameters	2
Category C-	Less than 2 parameters	<2

## Appendix 3 Overview of QDS quality assurance stages

Find in Figure 3.1 the different stages for quality assurance of Quality Declared Seed (QDS). In comparison to certified seed QDS follows a less rigorous regime for the first stage of quality assurance, which is seed field inspection. For the field inspection a minimum of one inspection is required per season, with 10% of the seed fields inspected per LSB per season.



**Figure 3.1** Quality assurance cycle for QDS

Seed lots aggregated at designated LSB stores are then sampled by the National Seed Certification Services (NSCS) for laboratory testing at the Kawanda National Seed Testing Laboratory. The NSCS focuses on the minimum standards for parameters of variety purity, germination and moisture content as prescribed by the regulations. Table 3.1 compares QDS and certified seed minimum standards. QDS seed lots that meet the minimum standards are certified and green tamperproof labels are issued for each seed package.

**Table 3.1** Comparison of quality seed standards for QDS and certified seed

Crop/inspection frequency	Certified seed	QDS
Minimum Purity (%) for cereals	99	98
Minimum Purity (%) for legumes	98	98
Minimum germination (%) for cereals	98	98
Minimum germination (%) for legumes	80	75
Minimum number of field inspections	4	1
Proportion of field-inspected seed plots (%)	100	10

The ISSD Plus project has been guiding the different stages of quality assurance stage ensuring that QDS was certified as required by the Seed and Plant (QDS) Regulations.

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