



**ISSD PLUS PROJECT
CLOSE OUT REPORT
APRIL 2021**

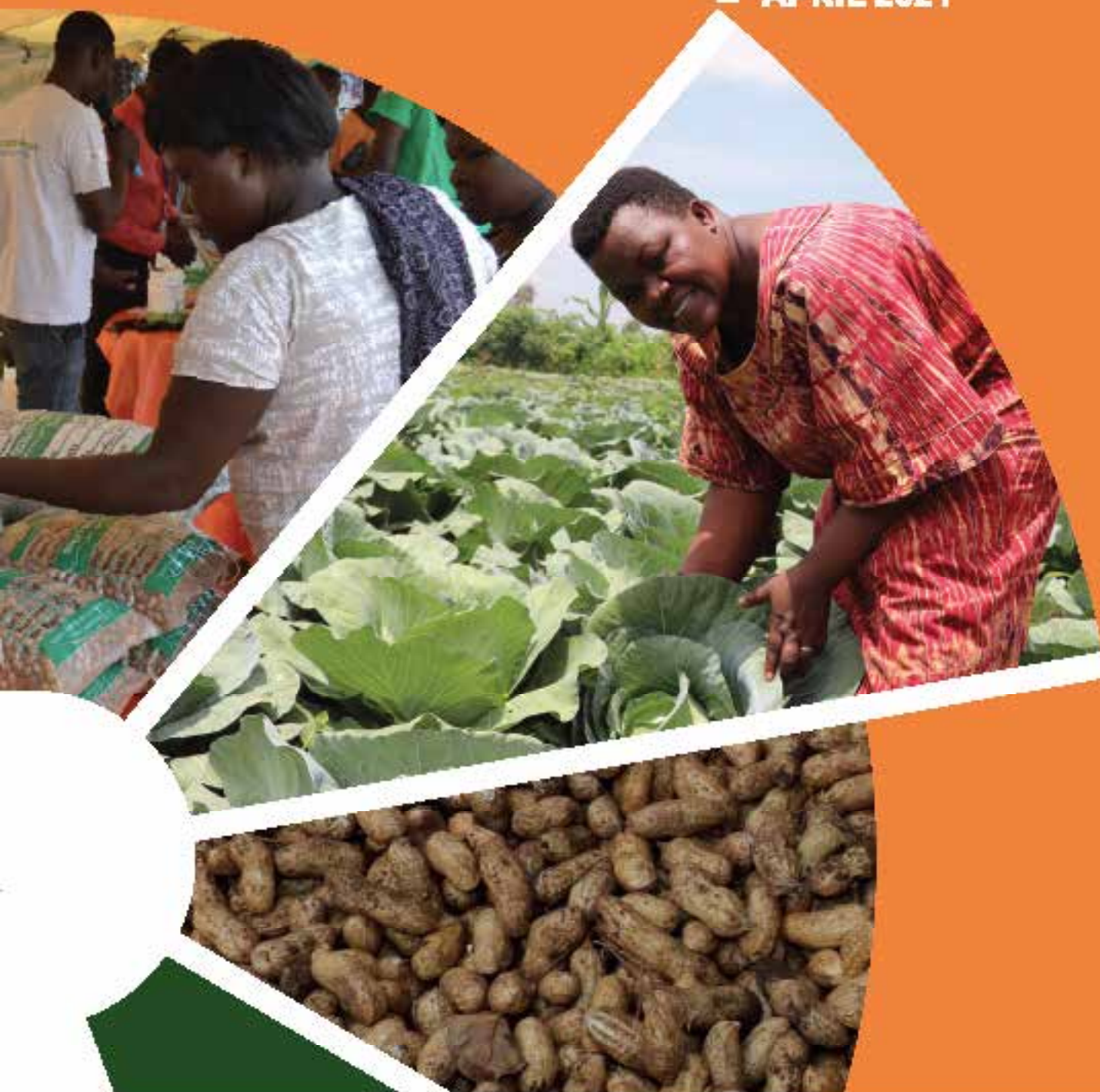




TABLE OF CONTENTS

LIST OF ACRONYMS	04
ABOUT THE ISSD PLUS PROJECT	05
SUMMARY OF ISSD PLUS PROJECT ACHIEVEMENTS	08
SEED SECTOR GOVERNANCE.....	10
EARLY GENERATION SEED SUPPLY	13
QUALITY DECLARED SEED PRODUCTION	20
PROMOTING UPTAKE OF QUALITY SEED	32
PROMOTING USE OF QUALITY VEGETABLE VARIETIES	39
WHERE THE SEED SECTOR STANDS TODAY	49
KEY LESSONS LEARNED	50
CONSIDERATIONS FOR THE FUTURE.....	50

LIST OF ACRONYMS

AO	Agricultural Officer
ACDP	Agribusiness Cluster Development Programme
DAO	District Agricultural Officers
DCIC	Department of Crop Inspection and Certification
DLG	District Local Government
EGS	Early Generation Seed
EKN	Embassy of the Kingdom of the Netherlands
GALS	Gender Action and Learning System
HOSPA	Horticulture Sector Professionals Alliance
IFDC	International Fertiliser Development Centre
ISSD	Integrated Seed Sector Development
ISSIMI	Integrated Seed Sector Information Management System
LSB	Local Seed Business
LSB-T	Local Seed Business Trainer
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MT	Metric Tons
NARI	National Agricultural Research Institutes
NARO	National Agricultural Research Organisation
NIGI	Nutrition and Income Generating Initiative
NSCS	National Seed Certification Services
NSP	National Seed Policy
NSS	National Seed Strategy
OPV	Open Pollinated Varieties
PPH	Plant Protection and Health
S4S	Seed for Seeds
STTS	Seed Tracking and Tracing System
ToT	Training-of-Trainers
ToR	Terms of Reference
USTA	Uganda Seed Trade Association
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WUR	Wageningen University & Research
QDS	Quality Declared Seed
ZARDI	Zonal Agricultural Research and Development Institute

ABOUT THE ISSD PLUS PROJECT

The Integrated Seed Sector Development Plus project (ISSD Plus) aimed to support the development of a vibrant 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 2015–2021. It was 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, WCDI), in partnership with the National Agricultural Research Organization (NARO) and Wageningen Plant Research (WPR). The other critical implementing partner is 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.

Limited access to and use of quality seed of improved crop varieties, requiring seed sector transformation.

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 20%. 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 characterized by numerous bottlenecks that hindered the prevalence of a pluralistic and market-oriented seed sector that favors production and marketing of quality seed of all crops.

There was thus the need for sector transformation to foster pluralism through policy reforms to support alternative seed delivery systems that complement the existing formal channels. At the same time, all related challenges across the seed value chain needed to be addressed in a systemic way. The challenges included: access to sufficient quantities of quality basic seed (early generation seed - EGS) as an input for quality seed production; access to affordable quality assurance services for quality seed growers; and at farmer uptake level, access to sufficient volumes of quality seed and sufficient awareness about quality seed.



An integrated approach to seed sector development

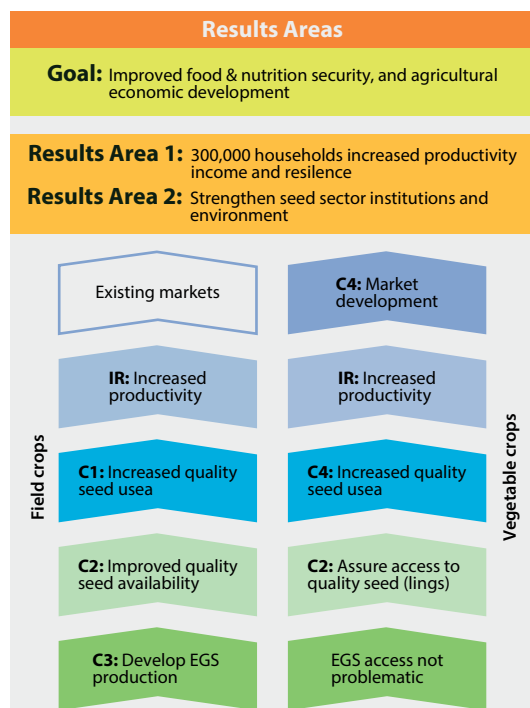


Figure 1: Intervention logic of ISSD Plus

The objective of ISSD Plus 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 yield as a direct result of the use of quality seed by small and medium-scale farmers as opposed to farmer saved seed.



The use 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 satisfy the increasing quality seed demand, 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 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 projects's interventions in EGS supply ('EGS component'; C3 in Figure 1).

ISSD Plus 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 quality vegetable varieties. 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 development of the new seed policy and specific seed regulations. ('Governance component'). 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.

SUMMARY OF ISSD PLUS PROJECT ACHIEVEMENTS

Component	ISSD Plus project achievements
Early Generation Seed (EGS) supply	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 six ZARDIs and six 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 three basic seed production models
	Supported MAAIF-NSCS to institutionalize the quality assurance framework for basic seed production
	Supported MAAIF-NSCS to develop a digital Seed Tracking and Tracing System (STTS) App which is an integral component of quality assurance along the entire seed value chain
	Established 250 active local seed business farmer groups (LSBs) across 63 districts in Uganda
	LSBs disseminated 59 varieties of 14 self-pollinating crops within rural farming communities
Quality Declared Seed production	4,220 farmers trained in seed production technology (53% are female and 24% are youth)
	LSBs sold 9,897 MT of QDS between 2017 and 2020 within local farming communities (48% of this was roots and tubers)
	An estimated 11,014 MT and 5,498 MT of iron rich beans and vitamin A-rich sweet potato respectively was produced from the QDS sold
	70% of the groups in active seed production received seed field inspections at least once in a season and 68% of them had their seed laboratory tested at Kawanda National Seed Testing Laboratory
	A total of 53 QDS stores of 60MT capacity were constructed (28 of these of these with support from the ISSD Plus project, 22 from other project partners and 3 by the LSBs themselves)
	53% of the top leadership positions in LSBs are occupied by women which represents a 23% increase from the situation before project intervention
	Supported LSBs to establish in-house sustainability systems including LSB Associations and Clusters, LSB Trainers, Gender champions and LSB Committees
Promoting uptake of quality seed	17 district local governments were integrating QDS production and marketing support activities within their activity budgets by 2020
	LSB farmers earned a total of UGX 19.9bn in incomes from QDS sales
	Created awareness on quality seed to over 64,000 people in rural communities through seed fairs and road shows interventions
	Reached over 11 million rural people through a mass media campaign on quality seed use
	By 2020, 35% of the farmers in the zones of project operation had adopted QDS
	By 2020, 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)
	It is estimated that 326,719 farmers planted 205,416 acres of land with QDS. This resulted in an additional agricultural production of 143,663 MT therefore additional income of UGX 178bn in the agricultural sector
	A total of 0.4 MT of true red beauty variety was produced by National Semi Arid Resources Research Institute (NaSARRI)

Promoting use of quality vegetable varieties

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

Reached over 7.8 million rural people through a mass media campaign on use of the quality vegetable varieties

53% of the vegetable farmers in locations of project operation had knowledge of at least one of the quality vegetable varieties promoted by the project

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

Partnered with Finca Verda Ltd to successfully test trial of a low-cost hydroponics systems that eliminates use of nematicides in lettuce production

Partnered with Milk Weed Biologicals Ltd to develop national protocols protocols for the use of biological control agents. A total of 11 agents were identified and one reached trial stage

Seed sector governance

Influenced development of three seed sector related policies/regulations and two of these were passed (National Seed Policy and Seed and Plant (QDS) regulations)

Disseminated the National Seed Policy and National Seed Strategy to 729 participants in 139 districts of Uganda



In the sections that follow, the project shares major achievements over the past four years of the project. We organize the sections according to the project component areas of intervention.

SEED SECTOR GOVERNANCE

Supportive enabling environment created for the seed sector

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.

Seed policy and regulatory framework effectively supported for seed sector governance

ISSD Plus and USAID Feed the Future Enabling Environment for Agriculture (USAID-EEA) supported MAAIF in lobbying for cabinet approval of the National Seed Policy (NSP) and National Seed Strategy (NSS) of 2018; these two frameworks are critical for seed sector governance. Considering that the NSP is 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.

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 District Local Governments (DLGs).

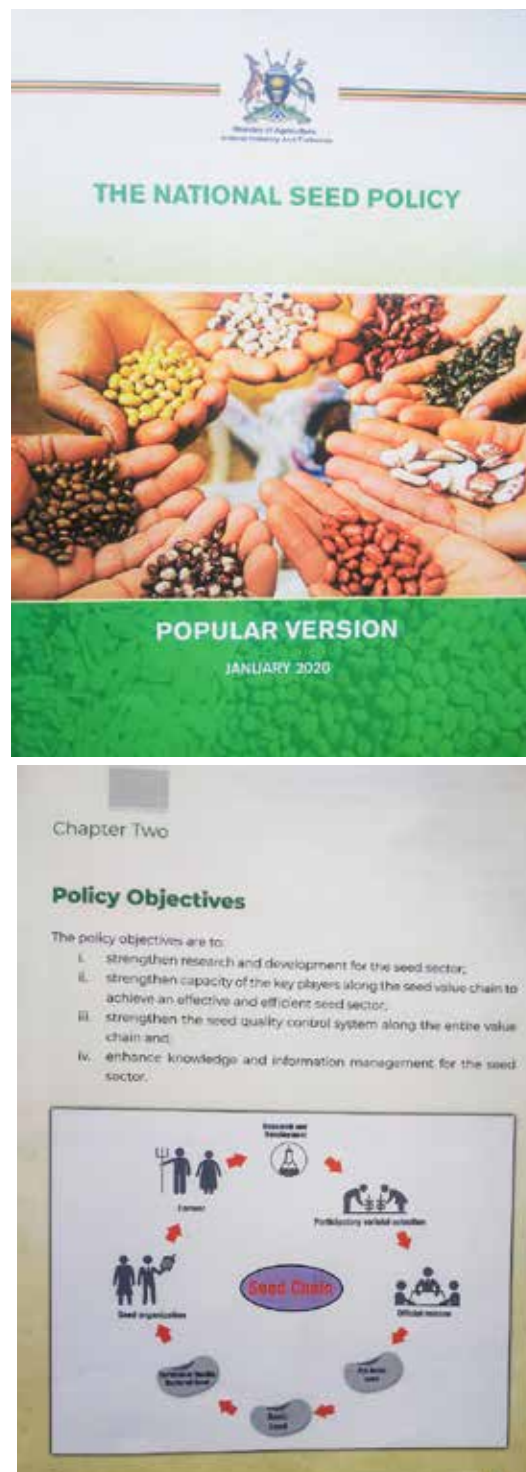


Figure 2: Extract of the National Seed Policy popular version

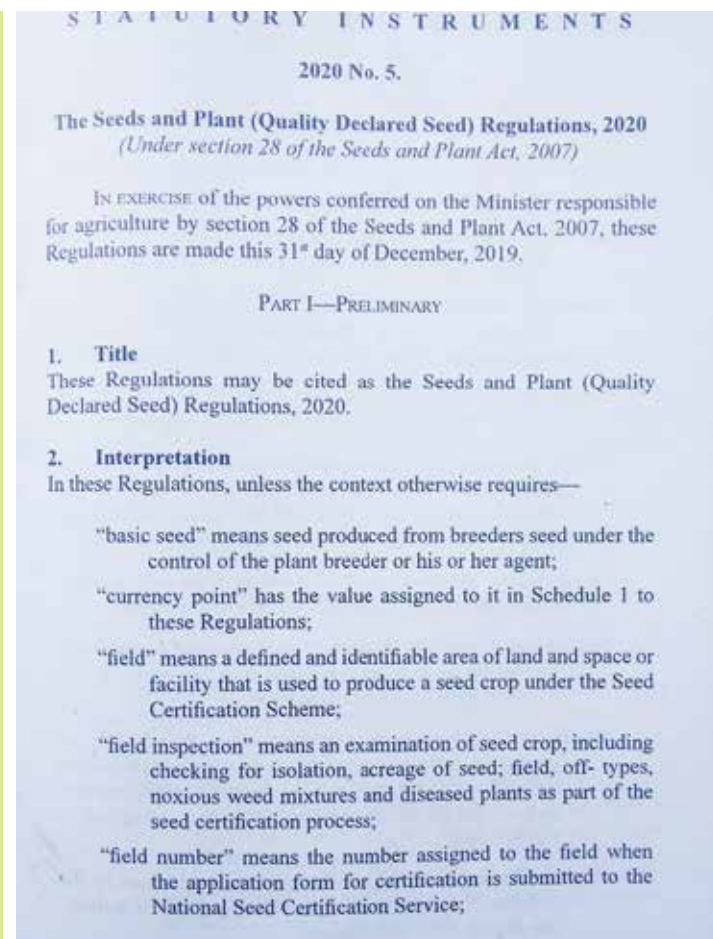
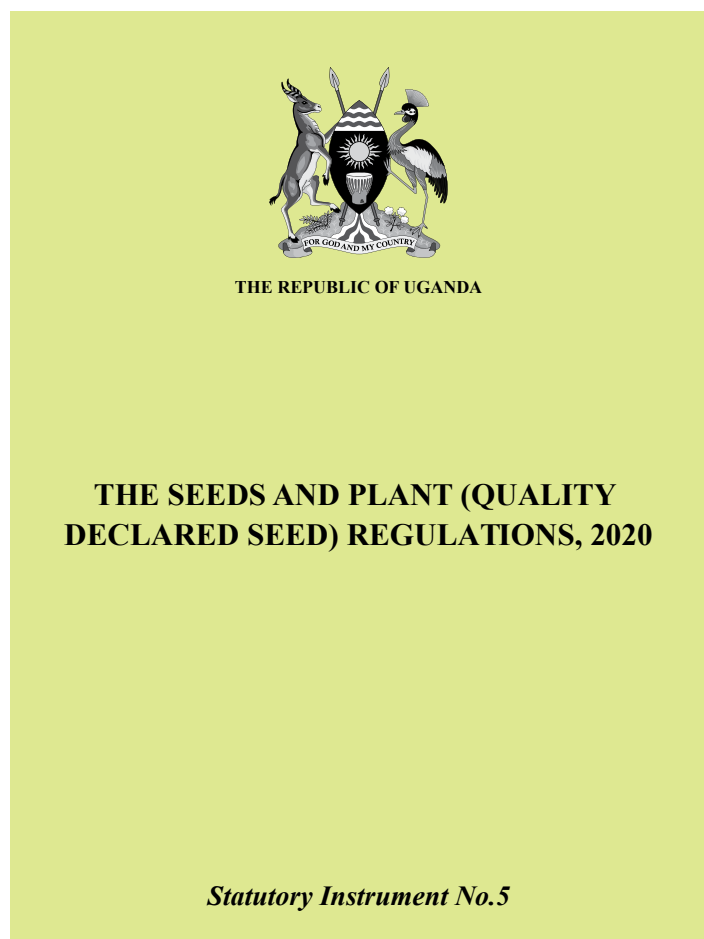


Figure 3: Extract of the Seed and Plant (QDS) regulations, 2020

Dissemination of the National Seed Policy and National Seed Strategy created understanding for DAOs and farmer representatives

The project in partnership with MAAIF and Uganda Seed Trade Association (USTA), conducted a country wide dissemination of the NSP and the NSS. The dissemination targeted District Agricultural officers (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, 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. Farmers were also able to understand that it is only when they buy quality seed (QDS or certified seed) that they can contribute to crop productivity for increased food and nutrition security and household income.

Support to the development of other seed related regulations also strengthens seed sector growth

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 enacted 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).



Figure 4: 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)

Overall, the project has been 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.

EARLY GENERATION SEED SUPPLY

Sustainable access to quality EGS, particularly basic seed, remains a significant challenge in producing the much-needed quality seed (certified and QDS) for food security crops in Uganda. NARO through its National Agricultural Research Institutes (NARIs) is currently responsible for production and supply of EGS in the country. However, due to challenges in human and financial resources, these institutions are not able to meet the increasing demand from quality seed multipliers. This triggered interventions at this stage of the seed value chain.

Increased availability and access to quality basic seed through different business models

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 Zonal Agricultural Research and Development Institutes (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.

A central basic seed enterprise, Seed for Seed (U) Ltd, established to boost basic seed in the country

Together with NARO, the project financed the operationalization of the Seed for Seed (S4S) (U) Ltd as a subsidiary of NARO Holdings

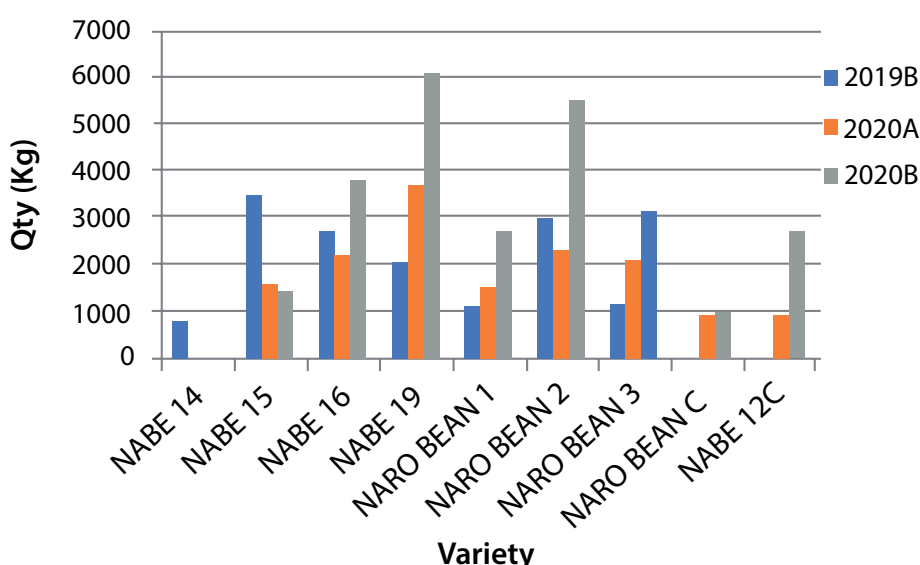


Figure 5: Bean basic seed sales by variety by S4S (U) Ltd

Ltd with four full time staff headed by a business manager. This company has a five-year business plan (2020-2024), which is a medium-term strategy for sustainable EGS production and commercialization. S4S (U) Ltd is based at Kigumba farm in Kiryandongo district where 30 acres of land have been developed for basic seed production. On the farm is a 60 MT capacity cold room facility to boost safe storage of the basic seed produced. Plans to install an irrigation system that will enable basic seed production throughout the year are underway. Figure 5 and Figure 6 illustrate the various bean basic varieties grown by this model and its major clients by volume of basic seed they purchase.

Training and startup funds enhanced ZARDI-led production and delivery of basic seed

The project supported training of directors, agronomists and farm managers in each of the six ZARDIs in the principles of seed business management; an essential skill needed for effective implementation of the ZARDI-led EGS production and delivery model. ISSD Plus also provided startup funds for the basic seed businesses in these ZARDIs.

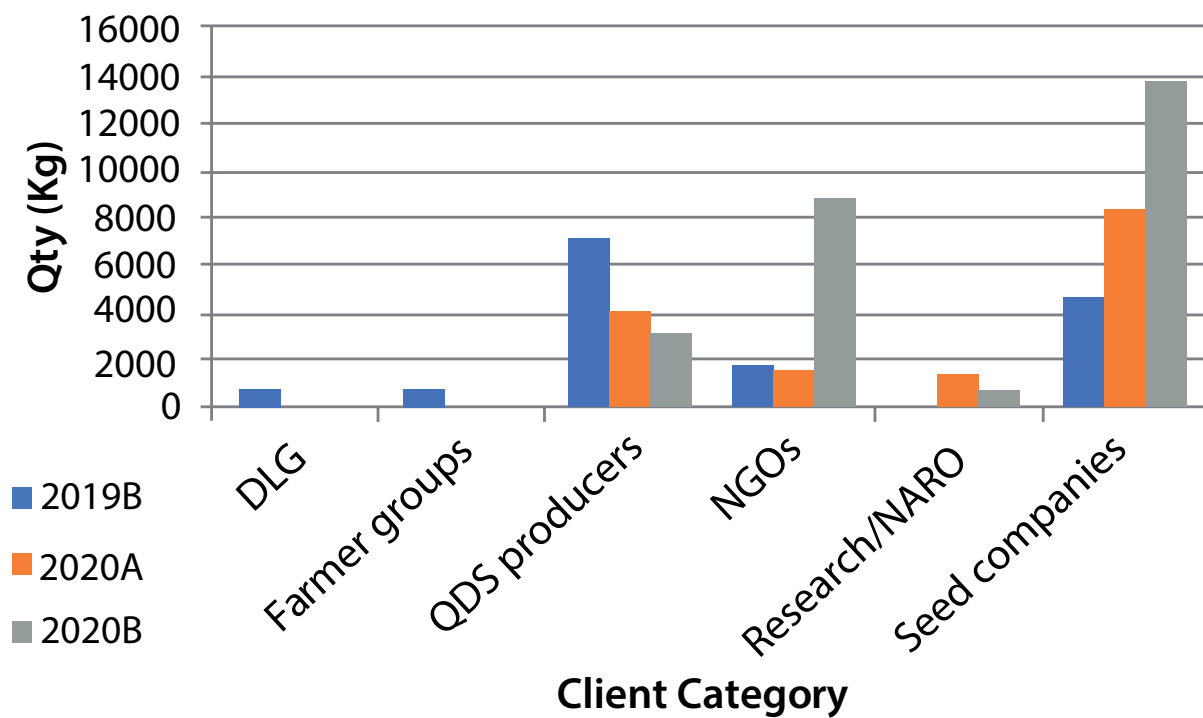


Figure 6: Market diversity for Basic seed sales by S4S (U) Ltd (2019-2020)

ZARDIs involved in basic seed production

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



Figure 6: Buginyanya ZARDI team and ISSD representative monitoring basic seed production field for potato in Eastern Uganda (Aug 2020)

Training, startup and guidance for LSBs ensured LSB-led model for basic seed production

The project also trained six qualified LSB farmer groups in basic seed production and business management and financed startup of their basic seed businesses. The project facilitated respective crop breeders from NARO to guide, supervise and monitor these LSBs for quality control purposes. To date, all these LSBs more than doubled their basic seed production volumes since the start

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
Agieramach odyebo women's group for development (West Nile) - Potato

The three complementary EGS models perform effectively and can sustainably produce and market basic seed

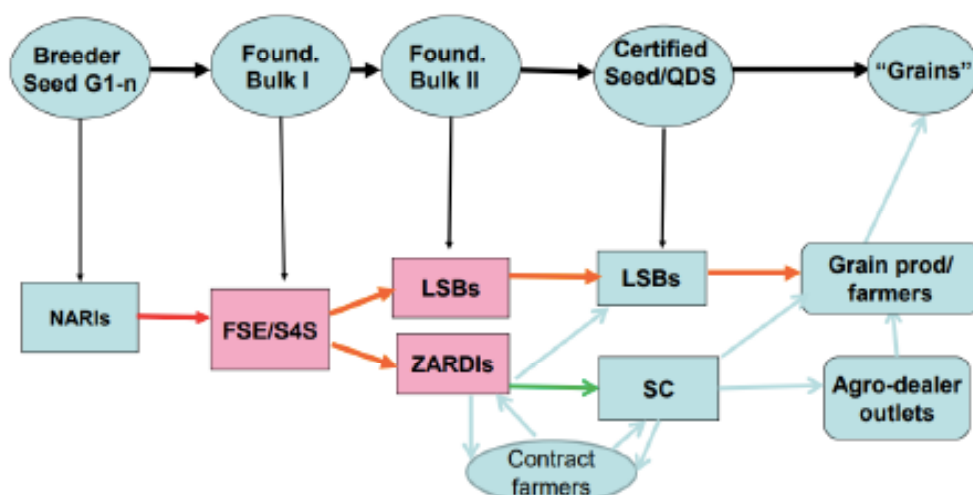


Figure 8: Institutional framework to enhance quality seed production and marketing

Figure 8 shows how the three models are integrated in the quality seed institutional framework to ensure diversified sources of basic seed for seed producers.

Under the three models, a total of 269 MT of quality basic seed of beans, groundnut, soybean, rice and 358 MT of potato was produced and marketed. For beans, this met over 80% of the

basic seed demand as estimated.

All three EGS models are performing effectively under their unique operational environments. The ZARDI-led model has shown 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

the operations of all the EGS producers and complement their efforts by producing high quantities of high quality bean, groundnut and soybean EGS for seed growers. The LSB model generated significant revenue for the basic seed growers involved while the other two models are operating on cost recovery basis. This indicates that these models can sustainably produce and market basic seed which will ultimately scale up production of quality seed (certified seed and QDS).

Strengthened the quality assurance system for basic seed

Institutionalisation of the quality assurance framework for EGS raised trust levels in the quality of basic seed

Due to limited financial and human resources, the NSCS had devolved quality assurance of basic seed to crop breeders at the NARIs. However, challenges of quality (variety mixtures) became a common concern by the quality seed growers. Through project facilitation, NSCS started conducting field inspection and sampling of basic seed produced under the three models. This institutional change has raised trust levels in the quality of basic seed by the seed growers. By 2020, all basic seed produced was undergoing field inspection and laboratory testing with 100% of it passing the purity and germination tests.

Seed tracking and tracing system established to enhance coordination in the seed sector, but requires further rolling out

The project provided financial and technical support to NSCS to develop a digital Seed Tracking and Tracing System (STTS) App. This 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. For effective operationalization 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. This will be an important module of the envisaged digital Integrated Seed Sector Information Management System (ISSIMI) necessary for efficient coordination in the seed sector. Figure 9 illustrates the different seed production stages that the STTS App will be monitoring and how

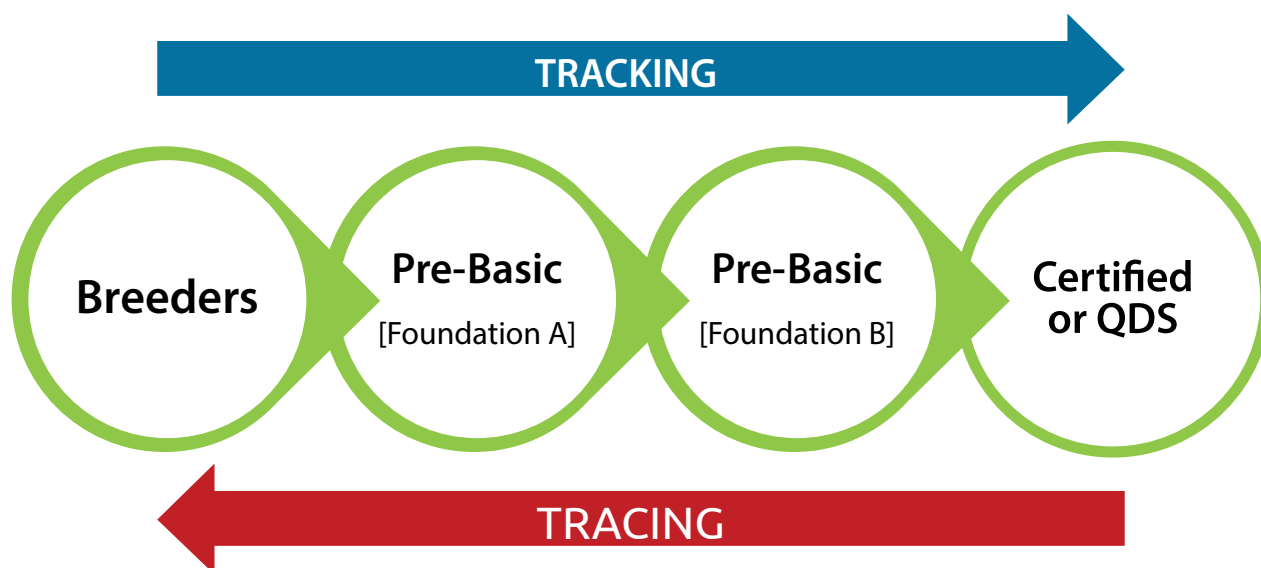


Figure 6: Tracing of seed in the seed value chain

System for estimating basic seed demand tested

Basic seed demand estimation critical in planning for production of quality seed.

Basic seed demand estimation for the seed sector is critical in planning for production of quality seed along the seed value chain. 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.



Figure 7: Dr. John MacRobert, Seed business consultant WCDI, Netherlands facilitating training on seed business management and Seed demand forecasting for ZARDIs and Makerere University (July, 2018)

Estimation of basic seed demand guided the EGS models

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 11 presents LSB basic seed demand and what was supplied in 2017B clearly showing large deficits.

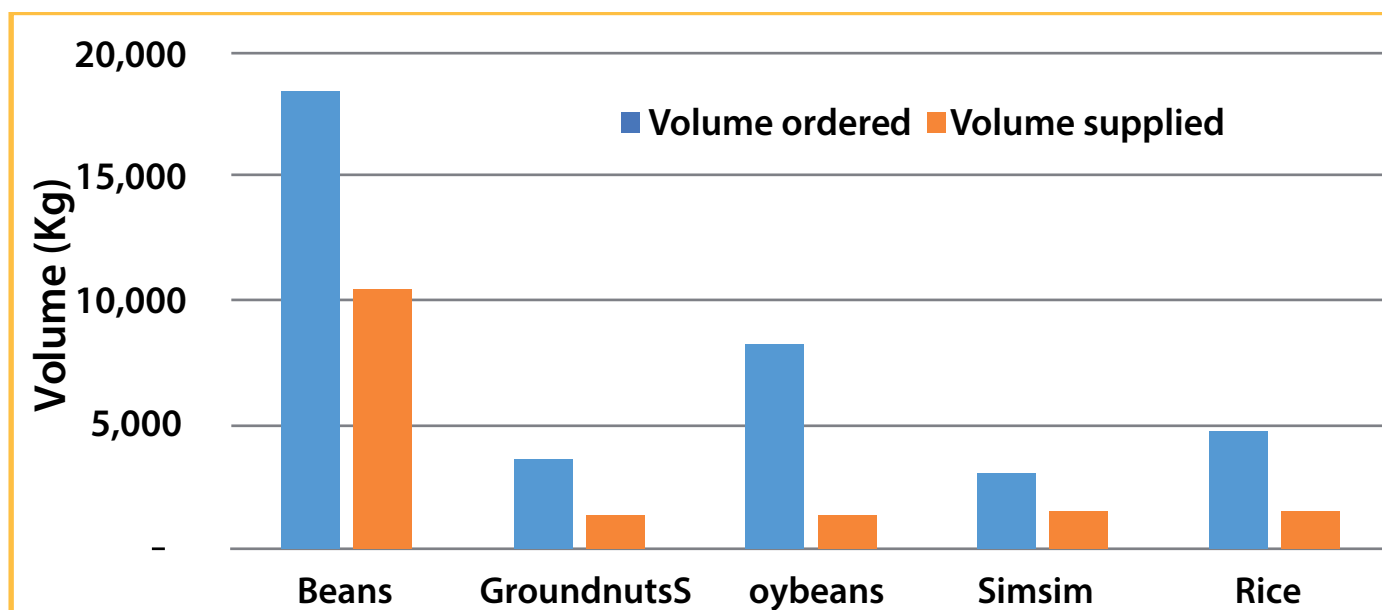


Figure 8: LSB Basic seed demand and supply for selected grains crops in 2017B

Figure 12 and Figure 13 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.

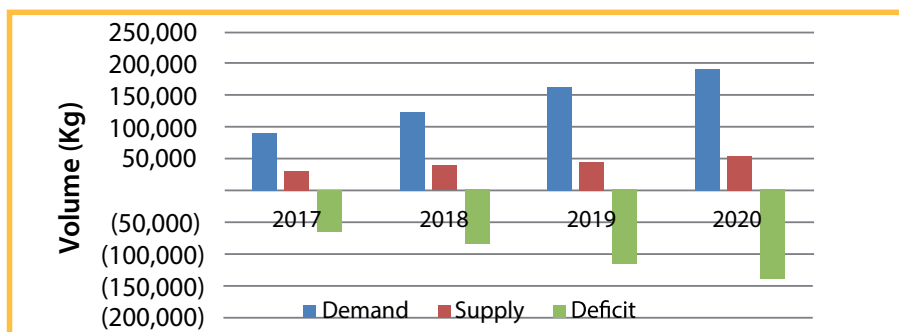
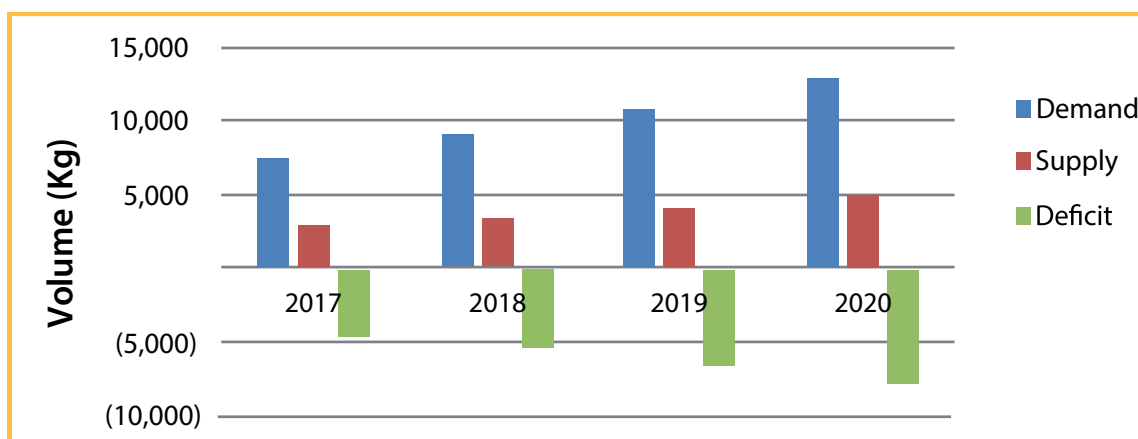


Figure 9: Bean basic seed demand projections made for seed companies and LSBs 2017-2020

Figure 10:
Groundnut basic seed demand projections for seed companies & LSBs 2017







QUALITY DECLARED SEED PRODUCTION

Improved availability and access to quality seed through the Local Seed Business model

The QDS system and LSB methodology ensure a sustainable supply of QDS in communities

QDS is a seed class meant to bridge the gap in supply of quality seed of mainly open-pollinated crops that is in most times not adequately catered for by the certified seed class. These are important food security crops namely legumes (beans, cowpeas and green gram); oil seed (groundnut, soybean and sesame); small cereals (finger millet, rice and sorghum); pasture (chloris gayana); and roots and tubers (cassava, solanum potato and sweet potato). The seeds/planting materials of these crops have low seed multiplication rates, low seed replacement rates, and some are bulky and perishable. This makes their seed production and marketing less attractive for seed companies compared to high value hybrid maize and sunflower. Trained farmer groups organised as Local Seed Businesses (LSBs) are however able to produce and market QDS of these crops in their communities sustainably within their context given their different business setup. Through the QDS system, LSBs are supplying farmers with quality

seed for 14 open pollinated crops and over 59 varieties that were released NARO.

Currently, Uganda is one the countries with the most advanced QDS systems which hinges on the LSB methodology as introduced by the Integrated Seed Sector Development (ISSD) Uganda in 2012. To date, 250 LSBs are actively operating in 63 districts in the six zones of project operation. The LSB farmer groups make up a total of 4,220 trained seed growers of which 53% are females and 24% are youth.



QDS is a seed class meant to bridge the gap in supply of quality seed of mainly open-pollinated crops that is in most times not adequately catered for by the certified seed class.

MAJOR SEED CROPS GROWN BY ZONE

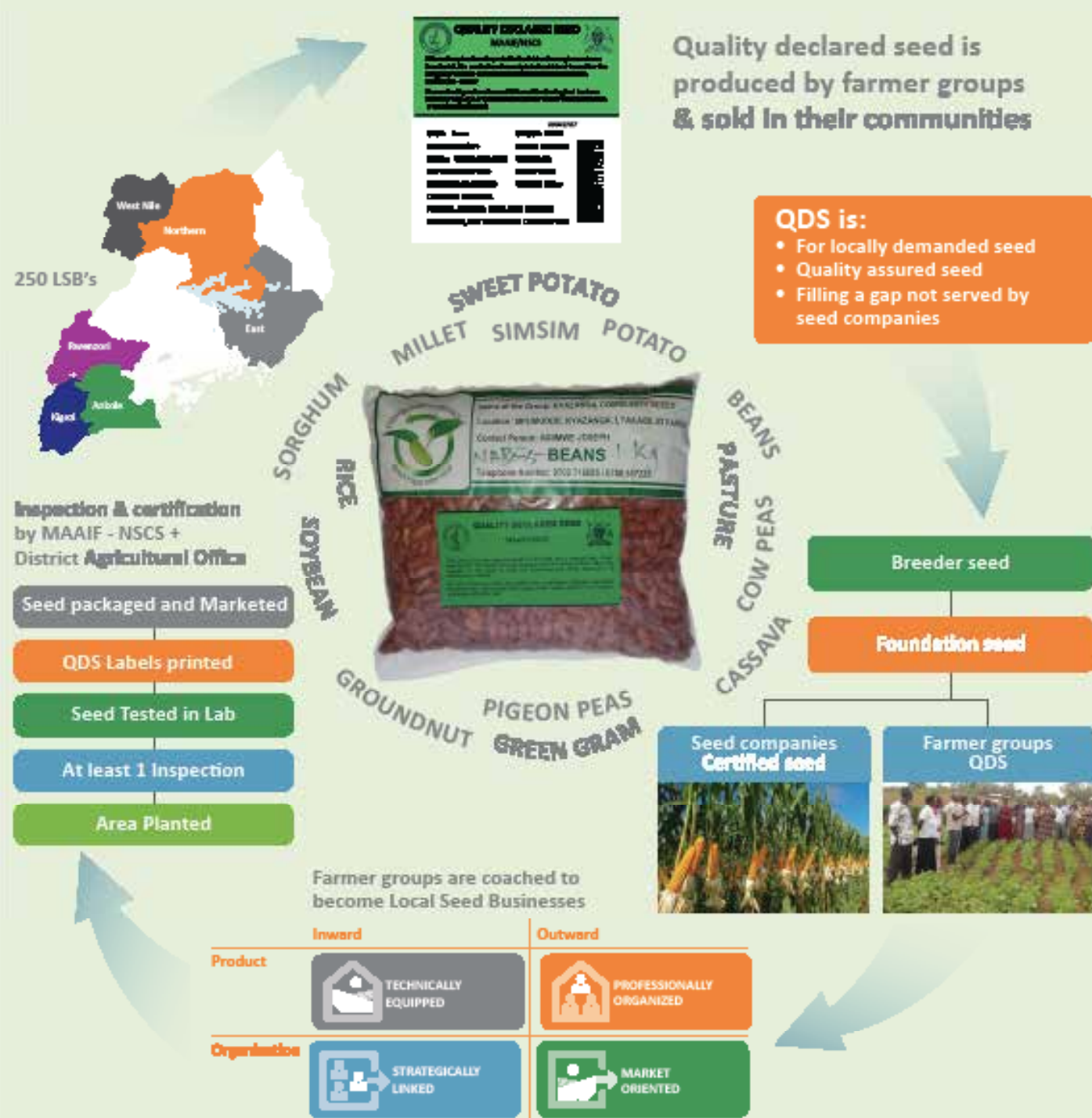
North - rice, groundnuts, sesame, beans, soybeans, pigeon peas and cassava cuttings
West Nile – As in North plus potato
East - soybeans, groundnuts, potatoes, beans
South West – Beans, pasture
South Western highlands – potato, climbing beans
Western Highlands – Beans

Integrated Seed Sector Development in Uganda

www.issduganda.org

The Integrated Seed Sector Development Uganda programme aims to contribute to the development of a vibrant, pluralistic and market-oriented seed sector, providing more than 100,000 smallholder farmers access to affordable quality seed of superior varieties. This will contribute to an increased income of smallholder farmers and an increase in the number of seed households that can seed and feed others.

QDS: High quality seed for and by farmers



QDS production by local seed businesses

Since 2017, LSBs have brought quality seed for OPV crops closer to more farmers in the zones of operation. Overall, LSBs sold 9,897 MT of QDS between the period of 2017 and 2020 within local farming communities; 48% of this being roots and tubers. Crops including beans, rice and soybean, are the most preferred enterprises for these farmer groups. Other seeded crops and the roots and tubers remain important enterprises for specific value chains or regions. Figure 15 indicates the volumes of QDS produced by crop.

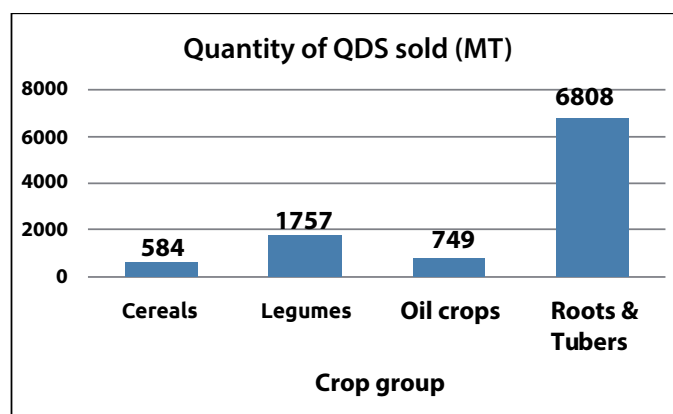


Figure 11: QDS volumes sold over the project period

Climate smart crop varieties successfully disseminated within farming communities



Figure 12: On station Participatory Variety Selection (PVS) for beans at Rwebitaba ZARDI in Rwenzori zone

LSB methodology supported the testing and dissemination of officially released varieties

The biggest hinderance to crop production for all smallholder farmers in Uganda is the reduced yields resulting from effects of climate change (floods, droughts,

unreliable weather patterns). Over time, NARO has responded to this situation by releasing climate smart crop varieties but these usually remained on the shelves because of the limited variety promotion conducted within farmer communities. Through the LSB methodology, most of these officially released varieties have been disseminated in the local communities as QDS which has greatly exposed more

farmers to the varieties. As part of product promotion, these seed growers endeavor to establish demonstration plots that compare farmer varieties and the varieties released by NARO. For instance, through demonstration plot activities in Rwenzori, farmers selected NAROBAN 1, NAROBAN 2 and NABE 16 as the most drought tolerant bean varieties.

Implementation modalities for quality assurance of Quality Declared Seed strengthened

Decentralized seed field inspection by DAOs well established

Alongside the rollout of QDS production activities across 3 additional zones, the ISSD Plus project also made significant strides in institutionalizing QDS quality assurance to reinforce aspects like decentralized seed field inspection as conducted by DAOs. The project did this by supporting MAAIF to train 64 DAOs and 159 AOs in field inspection procedures relevant to seed production. DAOs were also given reference inspection guides which are a summary of the seed certification handbook. At the moment, 175 of the LSBs received field inspection services seasonally with minimal intervention by the ISSD Plus project. With this decentralization, LSBs receive the field inspection services timely and they spend less money accessing it making it affordable. All the services offered by the DAOs are audited by MAAIF/NSCS every season to ensure adherence to the seed quality assurance standards.

Form SR 13A
No. 04811

THE REPUBLIC OF UGANDA
Ministry of Agriculture, Animal Industry & Fisheries
National Seed Certification Service

OFFICIAL SEED TEST RESULTS CERTIFICATE

Date Received:	15/2/21	TEST NUMBER:	001
Lot Number:	163/M/332/20B		
Crop Species and Variety:	SESAME INDICUM	SSAME 2	Weight of Lot: 100
Country of Origin:	MIPKAO FARMERS OBOGRI	(As stated by Seed Inspector)	

RESULTS OF THE ANALYSIS

PURITY (P)				GERMINATION CAPACITY (G)								PURITY (%)	Moisture (%)
Pure Seed (%)	Heat Matter (%)	Other Crop Seeds (%)	Weed Seeds (%)	1st Count (%)	Final Count (%)	Heat (%)	Proch Ungerm-inated (%)	Rotated or dead (%)	Abnormal (%)				
99.9	0.1	0	0	0	0	0	0	0	0	0	0	0	0
%	%	%	%	Days	%	Days	%	%	%	%	%	%	%

NOTE: Marketable not marketable

Special Test

Paid

Deposit

Government

Unpaid

National Seed Testing Laboratory

Copies to:

- 1) Seeds Dealer/Merchant
- 2) Technical Administrator

Figure 13: A sample laboratory test result report

Challenges with quality assurance processes that follow field inspection force LSBs to sell most stock without the green tamperproof label

Inspection of a QDS field (minimum 12 acres) costs UGX 12,000 to an LSB
Schedule 4 of The Seed and Plant (QDS)

Although the subsequent QDS quality assurance stages (seed sampling and label acquisition) required significant involvement of the project to effectively run, 170 groups had their seed sampled for laboratory testing in 2020. Of the 179 seed samples picked by NSCS, 159 of them met the minimum standard of germination and purity which is a commendable standard by LSBs. In 2020, 33 LSBs utilised the green QDS tamperproof label which indicates that there is still a major challenge at this stage of the quality assurance process. Because of delays in receipt of the lab seed test results, most of the QDS stock is sold off before the green labels can be requested for by the LSBs. Figure 18 summarises the quality assurance cycle for QDS.



Figure 14: Quality assurance cycle for QDS

Infrastructure development for Quality Declared Seed production supported

Majority of QDS produced is now bulked centrally at different stores which also eases seed sampling

Over the four-year period, 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 with partners, 22 additional LSB groups received stores from other partners,

including the Agribusiness Cluster Development Project (ACDP), the Northern Uganda Resilience Initiative (NURI) and the International Fertilizer Development Centre (IFDC), while three other groups established central bulking points for QDS by themselves. Support in store construction has improved seed bulking by LSBs and eased 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.

Figure 15 below: Kamwenge Tukorerehamwe LSB store (Rwenzori)



Fostered development of gender inclusive seed farmer groups



Figure 16: LSB female farmers of Omutima Gwa Ruhira LSB participating in weighing of QDS to be marketed

Gender mainstreaming requires continuous efforts to bring about mindset change; gender champions support this

The project paid special attention to women as primary beneficiaries in the QDS business. 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, and 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.

Gender mainstreaming led to positive effects at household and community level

LSB farmers noted that the main impact of the gender mainstreaming activities by the

project has been 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 intervention of ISSD Plus. The increase in women's voice has gone beyond LSB groups as seen with various women that have taken on local council leadership positions in their communities. Regarding women economic empowerment, LSB members indicate that one major change is that more men now allow their wives to market farm produce which has allowed them to also earn an income.

“

In African society it's uncommon for men to carry out house work, including cooking, cleaning, looking after children etc. They think that it's a role of women while men are more visible in work outside the home. I realized that my wife was over burdened with core roles after attending the gender champion training organized by ISSD Plus in 2019. Before I would spend most of my time with friends drinking alcohol not mindful of core roles in my family. But now I am transformed and I am a gender champion doing any kind of domestic work, teaching others on gender mainstreaming at LSB and household level. People are realizing their mistake like me. Levels of alcoholism, gambling and poor planning has reduced.

In the group Maicayo Aye Konyi in Nwoya District there are a lot of changes where both women and men work together now as a household, they plan jointly, make decisions jointly but also support women with the household and garden work. We have constructed a store, and women are accepting top leadership positions in the group. The women requested for women loans from the sub county of which they were given UGX 10.8 million. All these achievements came in after the gender training. Special thanks go to the ISSD Plus project for this great intervention.

OJOK PATRICK
MAICAYO AYE KONYI IN NWOYA DISTRICT

Demonstrated sustainability of the LSB model

The LSB methodology is a viable business venture

One underlying principle of the LSB methodology is that QDS production and marketing activities are run as a business hence ISSD Plus did not have to give any handouts (inputs) to seed growers. In this way, farmers are motivated by the comparatively lucrative seed business to be able to meet all costs related to production and marketing of QDS while still making a reasonable profit; this makes the model self-sustaining. The project focused on strengthening these groups to ensure that they were professionally organized; strategically linked; technically equipped; and market oriented.

It specifically put efforts on areas like resource mobilization, utilization of modern farming technologies, productivity enhancement, mitigation of effects of climate change and mechanization to empower LSB operations.

There is ready market for QDS crops at community level

Its uniqueness is in the ability to satisfy an inherent demand for quality seed of open pollinated crops that are not regularly supplied under the certified seed system. Since most farmers were initially accustomed to obtaining quality seed mainly for crops like maize, sunflower and exotic vegetables, the idea

of consistently using quality seed for crops like legumes, oil seed, roots and tubers is totally new but welcomed for the value it adds to crop yields. Because production of QDS is done within local communities, it is easier for farmers to access it and to hold seed growers accountable to any quality related issues that may arise following purchase. These unique aspects of QDS present an opportunity for a continuous market for the product.

Local support systems in place for LSBs

During the course of the project, ISSD Plus supported LSBs to develop several support systems and strategic linkages for better



Figure 17: LSB Trainer conducting training in Rwenzori

integration into the seed system. One of the most important strategies was internal group trainers composed of trained QDS committee leaders, LSB-Trainers and gender champions to continue voluntarily providing regular coaching and monitoring support to fellow group members. The project also supported LSBs to establish units for coordinating the QDS production activities within the different zones. Groups started off with the zonal LSB Association model which eventually transformed into the cluster approach that is considered more effective in coordinating the seed growers. At the moment the different zones have a number of clusters

that are either enterprise based or locality based (district) and leaders of these units play critical roles in coordinating basic seed access, quality assurance services and joint QDS marketing.

Lobbying and advocacy for support to LSB approach contributed to expansion of the scale of QDS production



Figure 18: Lalyeng LSB (North) with equipment from NAADS

Being a community-based model, the project prioritized lobbying and advocacy for the support to the LSB approach to be embedded into the District Local Government through strategic linkage with actors like District Production and Marketing Officers (DPMOs), District Agricultural Officers (DAOs), and sub-county Agricultural Officers (AOs). By 2020, 17 district local governments had integrated QDS support activities within their activity budgets which is to benefit LSBs within those districts. DLGs projects including the Vegetable Oil Development

project (VODP), National Agricultural Advisory Services (NAADS) and the Agribusiness Cluster Development Project (ACDP) have also supported LSBs with mechanization equipment like tractors, among others, to expand the scale of QDS production. Value chain players like IFDC through the REACH project have also provided support to potato seed growers in accessing quality basic planting materials.

A number of NGOs and companies across the project zones of operation continue to take special interest in the LSB methodology because the QDS system has

the potential to complement their interventions in the food value chain. As a result, they have continued to offer capacity building support to seed growers as needed. This is evident in the Northern region which has a fast-growing soybean and sesame value chain.

These diverse support systems will ensure continuity of LSB operations even beyond the ISSD Plus project period

“

The LSB methodology has been a welcome and timely intervention in our work with farming communities. Under the VODP project, our main objective was to increase the production and productivity of oil seeds in the project areas. The biggest challenge to realizing this was the question of quality seeds that could increase production especially for soy beans. The model came in handy and LSBs were able to supply the much-needed quality seeds, although compared to demand it is still a drop in the ocean.

And this was made possible by the technical and financial support provided by ISSD Plus. This project has the technical knowledge and depth required in building partner's capacity and equally the LSBs for seed production is a very scientific process.



Because of the interventions of ISSD Plus, production by the LSBs has tripled over the period owing to increased number of farmers enrolled, increased acreages planted and increased adoption of technical input. This support should continue for these gains to be maintained and broadened.

EMMANUEL AKENY
PROJECT COORDINATOR, ALL NATIONS
CHRISTIAN CARE (ANCC) IN LIRA DISTRICT

The LSB methodology is embedded in a recognized institutional framework

Since 2012, the LSB methodology has received considerable attention from stakeholders including government, development partners and policy makers among others. The QDS seed class as

produced by LSBs is now recognized in the National Seed Policy (MAAIF, 2019) and guidelines on its production and marketing are defined in the seed and plant (QDS) regulations which were recently gazetted. With such an enabling environment in place, LSB operations to produce QDS are expected to continue even without project presence.

Investing in seed production improved livelihoods and the business acumen of LSBs

LSB activities complement food production activities hence diversify income to the LSB farmers

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 introduces a longer marketing cycle which allows

for continued earning beyond the peak food selling periods. The QDS volumes sold between 2017 and 2020 earned the LSB groups a total of UGX 19.9bn. Seed producing groups like Lalyeng 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 a rice milling machine for value addition.



Figure 19: Lalyeng LSB (North) with equipment from NAADS

Investment in equipment helped to reduce drudgery in seed production activities which increased the QDS volumes produced especially by women

Like any other business, there is need for seed growers to attain specific levels of product volumes in order to break even. For the LSB farmers, obtaining the break-even QDS quantities is hampered by the drudgery involved in conducting activities like planting, seed drying, seed cleaning and packaging. In response to this, 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 have 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 affordable equipment using retained seed business profits. The different investments have improved the operations of farmer groups by allowing for timely completion of production activities, reduced drudgery especially for women groups and expanded QDS production volumes.

“

Way back, we used hand hoes while planting seed. This was because the seed planters were expensive and more so not accessible in their area. With a hand hoe it would take three days to plant an acre of land since we had to use the rope to measure the line before digging the holes. This meant that if we were to do the same for every member, it would take us a whole month to complete planting.

However, in 2018, the group got a seed planter from ISSD Plus project and since then, life has not been the same again. The planter cost UGX 750, 000 and since receiving it, our work has been eased. The planter is working well and we are also complimenting it with a planting rake that makes six lines at a go hence with an acre of land it takes us only one day to make holes in lines and then plant. Forever ISSD Plus will be remembered for all the things they have done for our group.



Members of Ngee Cani using planting rake for planting rice.



Patrick Okello
Ngee Cani LSB in Nwoya District



PROMOTING UPTAKE OF QUALITY SEED

Increased awareness on quality seed use for open pollinated field crops

Farmers need to be convinced of the value of investing in quality seed

It is through the utilisation of quality seed that all efforts in seed sector development see their intended results. Quality seed has a major impact to agricultural productivity through increasing crop yields. Alongside efforts to avail quality seed to farming communities through the LSB approach and formal seed sector networks, the ISSD Plus project stimulated a mindset change to quality seed use through various promotional activities. These activities were intended to create awareness on the availability of quality seed of several crops and varieties within local communities. Because farmers have an underlying

fear for fake seed on the market, the promotional activities also emphasized the quality attributes of both QDS and certified seed. Additionally, since affordability is a major consideration when it comes to adoption of technologies by farmers, the project emphasized the out-weighting benefits of quality seed as compared to what is spent purchasing it.

A diversity of interventions are needed to create farmer awareness and mindset change

The project set out to bring quality seed closer to farmers through strategies like seed fairs held within popular local markets right before each planting season. These were held alongside roadshow events which are an educational-entertaining approach to impacting knowledge to big crowds.

A total of 149 road shows and 145 seed fairs were conducted over the project period in 149 sub-counties of LSB operations. These two types of promotional events attracted approximately 64,000 people who received the quality seed use message. The project further engaged 149 subcounty agricultural officers, 50 community

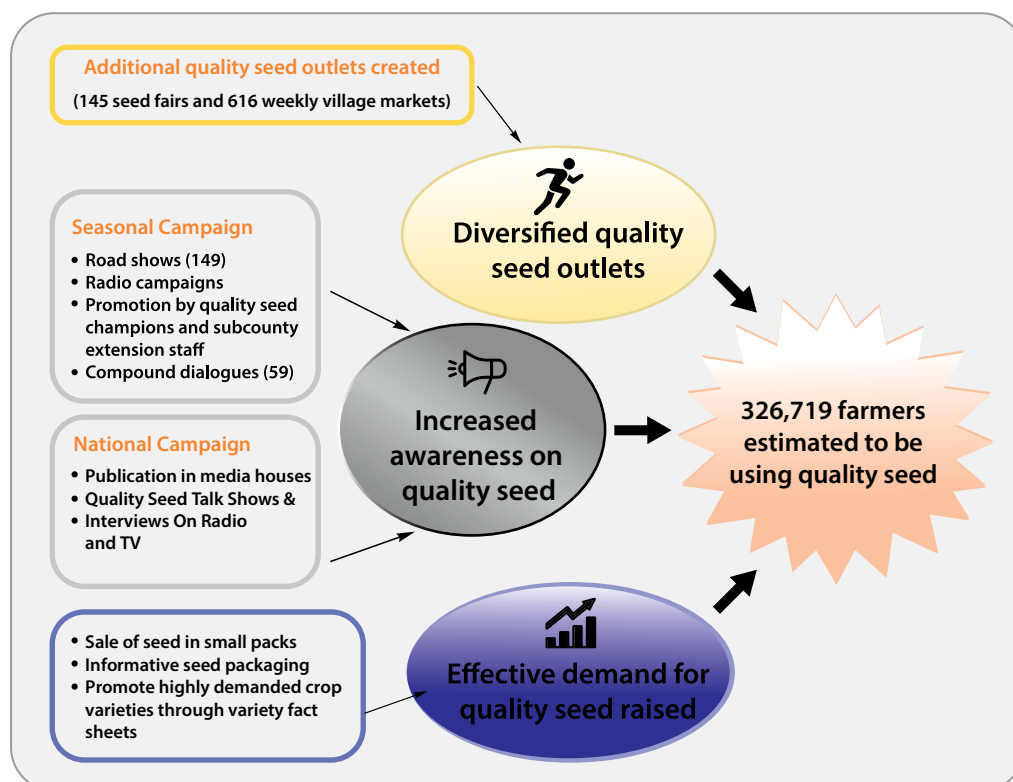


Figure 20: How the project influenced adoption of quality seed

champions in door-to-door promotion of quality seed use at household level. During each of the above promotional interventions, the project distributed learning materials like 'variety fact sheets' to farmers as a way of making the various varieties known to them; this gave them more options to choose from for each crop of interest. Through mass media promotion on 11 local radio stations in the six zones, the project also reached out to a unique audience (percentage of individuals exposed to an advert expressed as an absolute number) of 11,170,254 people (Advertising review by Reelforge Uganda LTD).

With the onset of the COVID-19 pandemic, the project modified its awareness creation strategies by introducing 'Compound dialogues' to share information on specific subject matter, this case being quality seed use. These dialogues involved fewer farmers (20) making them more impactful for mindset change than mass events like road shows. The project conducted a total of 115 dialogues in partnership with the NIGI project for 2,320 farmers; 43% of these being women.

LSB-led quality seed promotion is more sustainable and less costly

Considering the need for continued mindset change beyond the project period, LSB farmers took on community-led seed fairs as a way of further expanding the market for their QDS product.

These seed farmers additionally took up the weekly village market approach which involves the sale of quality seed in local food markets that operate regularly in a particular locality. These marketing activities are considerably less costly to the seed producers and much easier to organize on a regular basis because transport and location set up costs are negligible. Through these promotional initiatives in the four-year period, the project empowered farming communities with knowledge to make informed decisions on the kind of seed to plant.



Figure 21: A roadshow in Bunyangabo-Kisomoro (Rwenzori)



Figure 23: A compound dialogue led by Mukatooma Bashijja Bakyara Tukolerehamwe LSB, in Kashasha, Rubanda district (2020)



Figure 22: A fact sheet for the NARO Bean 1 variety



Figure 24: A seed fair organised by Latyeng Farmers Group in Gulu district (March 2021)



Figure 25: A weekly village market organised by Latyeng Farmers Group in Gulu district (March 2021)

Increased utilization of quality seed by farming communities

Studies show increased adoption of Quality Declared Seed

Interventions aimed at creating awareness and availing more quality seed were ultimately intended to influence farmer adoption of quality seed within project areas of operation. The project made an assessment of farmer's adoption of QDS through a study conducted in September 2020 ('Access to seed study'). This study further explored farmers' satisfaction with the QDS product based on the four elements of quality seed adoption (availability; access to users; quality of the product and its affordability). This assessment provided insights into the accomplishments reached. The study showed that by 2020, 35% of the farmers in the six zones of project operation had adopted QDS.

Increased quality declared seed use resulted in more food production and supply of nutrient rich food

Based on QDS volumes bought by farmers over the four years, the project estimated that 326,719 farmers planted 205,416 acres of land with quality seed which resulted in an additional agricultural production of 143,663MT. The project

further estimated that this additional agricultural production resulted into an additional UGX 178bn earned within the sector.

Since part of the QDS that farmers bought included nutrient rich varieties including 'High iron beans' and 'Vitamin D rich sweet potato', the project estimates that farmers produced 11,014 MT and 5,498 MT of nutrient rich beans and sweet potato respectively.

Quality Declared Seed provides more variety options for OPVs

Of the farmers that adopted QDS, a majority of them (64.5%) indicated that LSBs offered them more crop varieties to choose from for OPVs indicating greater dissemination of NARO varieties bred for various productivity and nutritional attributes.

More quality seed has been availed to farmers through the LSB methodology but the volumes are only a drop in the ocean

Timely availability of QDS is critical to improving



Figure 26: Assortment of the most preferred bean seed varieties bought by farmers

access and use of quality seed for smallholder farmers. Supply of QDS has generally been increasing between 2017 and 2020 hence the study analysed its market share to determine the extent to which it is available within the six zones. Note that most LSBs are able to sell off all their QDS during planting. Results in Table 1 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%) and home saved seed and grain from the market was taking the bigger share of the total seed planted. The seasonal differences in the market share of QDS are because for most annual

crops, there is a major and minor season mainly defined by weather conditions, and farmers tend to grow more of the crop in the major season. Thus, the share of QDS for a given crop is low in the minor season compared to the major season

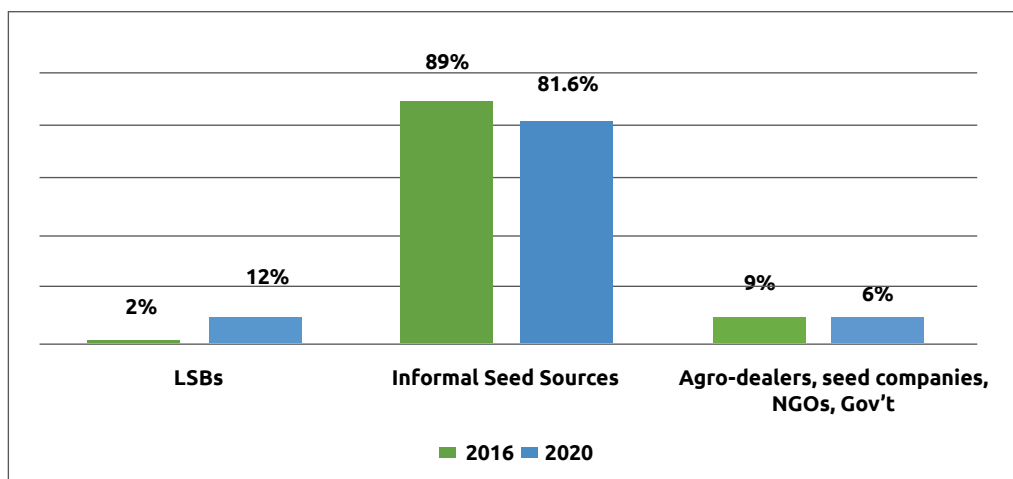
There is increased access to quality seed since QDS is produced within farming communities but LSB presence is still low.

Farmers within communities that have LSB operations gain by easily accessing this quality seed source during the planting season. Although

Table 1: QDS market share by 2019

CROP	2019 SEASON A			2019 SEASON B		
	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. Source: Access to seed household survey report



the informal seed sources still take a lead for OPV crops in farming communities, the project noted changes in the proportion of farmers utilizing QDS certain seed sources as of 2020 (Figure 31). A comparison of the seed source status for OPV crops in 2016 and 2020 indicates that there is 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.

For the various QDS crops grown, only 34.9% of the farmers reported having ready access to QDS. 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 4 groups per district. Considering that more than 80% of Uganda's population depends on farming, the current number of seed producing farmer groups is only a drop in the ocean.

Although farmers spend less reaching the QDS access points, they still consider the seed cost to be high which call for more awareness creation

Farmers within QDS locations spend less money on transportation to LSB stores as compared to those that have to move to trading centers or towns for agro-dealer outlets but they still indicate that the price of QDS is not affordable to them. 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. This difference is attributed to efforts

put into awareness creation in the beneficiary locations.

Of the farmers involved in the assessment, 54.3% of them reported that QDS is expensive and most farmers cannot afford it which makes most of them opt for home saved seed or cheaper grain (used as seed) sold in local markets. This is an indication of the need for continued awareness creation to ensure that farmers appreciate the benefits of using quality seed vis-à-vis the cost.

Responding to market demands

Older groundnut variety successfully re-introduced based upon market demand

Through an innovation grant, the project engaged NARO through 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 resistant 'Serenut' series. In spite of its production related challenges, the market showed high preference for this variety because of its taste attributes. Additionally, companies involved in groundnut value addition like RECO Industries LTD specifically preferred this variety because of its low aflatoxin infestation levels. The project responded to this market demand through the innovation grant and by 2020, 0.4 MT of true EGS for red beauty was being further multiplied by National Semi Arid Resources Research Institute (NaSARRI) and plans for ex situ storage were underway.



Figure 28: Typical Red beauty pods have on average 3-5 seeds per pod

PROMOTING USE OF QUALITY VEGETABLE VARIETIES

Partnering with international companies provides opportunity to professionalize vegetable growing

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 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 are preferred due to their variety attributes that surpass those of open pollinated varieties. 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.



Increased awareness on use of quality vegetable varieties

Combination of different awareness modalities increases farmers' awareness on quality vegetable varieties

To expose the quality varieties to vegetable farmers, the project partnered with the seed companies to set up 402 variety demonstration sites in the zones where they wanted to make presence. Field day events were the climax of the demonstration sites activity and it is on these one-day events that concerned seed companies showcased their range of 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.

The project also conducted 'Vegetable training events' at national level to showcase the quality vegetable varieties and production practices to farmers. Trainers demonstrated the different varieties and critical production practices



Figure 29: A demo field in Luwero

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.

For mass awareness creation, the project also conducted radio campaigns on six local stations to promote the varieties. The radio promotion initiative was estimated to have reached a unique audience of 7,898,543 (Advertising review by Reelforge

Uganda LTD). This 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 had knowledge of at least one of the quality vegetable varieties promoted. Farmers took special interest in varieties of onion, cabbage and sweet pepper respectively as evidenced by a 'vegetable adoption study' conducted.



Figure 30: One of the Vegetable training events in Kampiringisa



Successful transfer of vegetable production technologies facilitated

Quality vegetable seed pays off when utilized in combination with appropriate agronomy investment

High quality seed can only perform to its potential when the crop is treated with the right production practices. Since utilization of the quality vegetable varieties is a considerable investment into the vegetable production business, it was essential to supplement awareness creation with capacity building in major vegetable agronomic practices. Through the 'training sites' activity, the project provided selected farmers with 5-week long in-depth demonstrational training 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. These technologies

were rolled out by the Dutch Seed Centre, East West Seed and House of Seeds to 11,680 farmers on a total of 730 training sites.



Figure 31 : a farmer in Northern Uganda producing seedlings using the tray technology

A woman wearing a traditional red and white patterned dress and a white headscarf is harvesting ripe red tomatoes from a vine in a field. A man in a white shirt and a light-colored hat stands behind her, observing the process. To the right, another person in a blue and orange shirt is partially visible. The field is filled with tomato plants, and the ground is dry and dusty.

The ToT programme also provided sector professionals with improved farmer facilitation skills that would enhance adult learning. The sector professionals indicated that there was an increased adoption of the various extension methods trained although use of demonstration sites as a practical extension method was the most adopted (by 42%). Other adopted extension methods although to a lower extent included regular farm visits and group meetings.

The adoption of improved agronomic practices in vegetable production as promoted by the project, was 23% according to the Vegetable adoption study. The most adopted practice was seedling production (raising seedlings using different media on trays, pots) followed by fertilization (fertilizer application following a specific regime) and trellising (raising tomato plants off the ground using sticks or any other propping methods). The vegetable farmers in the Northern zone had the highest adoption rate of



46% for seedling production particularly raising seedlings on trays, pots using alternative media) practice compared to farmers in other regions. pots) followed by fertilization (fertilizer application following a specific regime) and trellising (raising tomato plants off the ground using sticks or any other propping methods). The vegetable farmers in the Northern zone had the highest adoption

rate of 46% for seedling production particularly raising seedlings on trays, pots using alternative media) practice compared to farmers in other regions.

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



To illustrate superiority of the varieties introduced over OPV varieties, Table 2 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 vegetable 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. These were yields from farmers who used all the advanced recommended practices of vegetable production.

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. 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.

Table 2: Illustration of superiority of the vegetable varieties promoted by the project

Parameter	OPV of tomato	Quality vAriety of tomato	OPV of onion	Quality variety of onion
Production costs per acre (UGX)				
Average cost of seed	40,000	900,000	900,000	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
Yield and price				
Average yield per acre (kg)	5,000	15,000	4,000	12,000
Difference in yield between the quality vegetable variety and OPV per acre (kg)	10,000		8,000	
Average price/ kg	2,000	2,000	2,000	2,000
Earnings				
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
Difference in profit per acre with use of the quality vegetable variety	18,240,000		15,370,000	
Nutritional value				
Protein content in g/kg	8.5		12	
Potassium content in g/kg	2		1	
Additional protein content as a result of using hybrid per acre/ kg (nutrient content in g/kg*difference in yield)/1000	85		96	

“

Solomon Luyimbazi is a proud male onion grower aged 40 years, and a citizen of Matugga village, Mabanda sub county, Kisoro district in Western Uganda. He currently grows red coach, red king and afri-seed onions. Before interaction with House of Seeds in 2017, Solomon used to grow open pollinated onion varieties (Kikutiya and Azela).

When asked about his experience with the quality onion varieties, Solomon said that there is a big difference between the quantities of onion he used to harvest from the local varieties and now with the improved variety, Red coach. During his interview, Mr. Luyimbazi was quoted saying, “I used to harvest five bags from my garden of ‘Kikutiya and Azela’ varieties, but now I harvest between sixteen to eighteen bags of Red coach from the same garden”. Worth noting is that Mr. Luyimbazi affirmed the wide coverage by small quantities of Red coach seed (high seedling rate) compared to the local onions at planting. He was cited saying: “One kilogram of ‘Kikutiya and Azela’ used to plant three gardens but with Red coach, one kilogram can plant nine and half gardens.

None the less, he said that marketing of Red coach variety is easy because of the high quality and long shelf-life of the produce. This has generated for him a steady and higher income than before which has enabled him to increase acreage under vegetable production hence increasing food and income security, and his family’s standards of living. He said: “I have now built

a permanent house, I have milk in plenty for both home consumption and for sale because I bought Friesian cows”. In addition, Mr. Solomon was also quoted proudly saying; “I am far better off than many government workers in terms of financial stability all because of red coach”. Mr. Luyimbazi attributes this series of successful events to the trainings through the demonstration sites set up by House of seeds company and the Red coach variety of quality vegetable seed. However, even with such praises and credit go to House of seeds and Red coach, Solomon has had challenges including; late delivery of seeds, drought yet without irrigation equipment, and less time of interaction between trainers and farmers. For this very reason, Solomon recommended that there should be more trainings and monitoring of farmers to have a complete transition, and that these trainings should thoroughly exploit the farmer’s demands.



SOLOMON LUYIMBAZI

(40 YEARS) FROM MABANDA, KISORO DISTRICT

Successful private sector partnerships

Demonstration and training activities also benefited the vegetable companies

The project supported the vegetable companies through matching grants to establish and/or strengthen their operations in Uganda. This enabled the six seed companies to set up demonstration sites and training sites for exposure of their varieties to the public as a way of increasing awareness and adoption. The project also built capacity of the seed company agronomists through the ToT programme which increased their confidence in providing the necessary technical support for marketing the seeds for the quality varieties to farmers.

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 have also continued to establish their own self-funded demonstration sites for continued visibility and competitiveness in the seed market. They have 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.



A trial of a low-cost hydroponics systems for lettuce production to eliminate use of nematicides

One of the innovation projects to test solutions to systemic bottlenecks in the vegetable sector was conducted in partnership with Finca Verde LTD in Mukono district. The hydroponic systems involves growing the lettuce in a nutrient solution without soil but using low cost materials. It was aimed at eliminating soil born pests on lettuce specifically nematodes thus consequently doing away with the use toxic nematicides. The developed system does not only eliminate nematodes but also soil-borne pests and diseases. It has also eliminated the need for crop rotation so growers can specialize in lettuce production and be consistent on the market with consistent quantities of lettuce on the same area. With the system, ground water is also safe from contamination with any agrochemicals. After its commissioning, 53 lettuce growers received training on the system and two of these replicated the system on their farms.



Experience of an adopter of the lettuce hydroponics system

John Musajjakawa 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.

- Short maturity period of the lettuce.
- Reduced incidences of infestation by nematodes and Cercospora leaf spot pests.
- Eliminated use of pesticides thus increasing food safety
- 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.



John indicates that most of the time, his product did not meet the customers' quality needs because it was always spoiled. After a visit to 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:



Figure 33: Commercial adopter of hydroponics-Mr. John Musajjakawa



Figure 32: Lettuce crop on hydroponics at Finca-verde LTD (2019)

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

The project partnered with MAAIF and Milk weed biologicals LTD (formally Xclusive Biologicals limited) to conduct research that was to result in establishment of National Protocols for licensing Biopesticides and create capacity to massively produce and trade in biopesticides. Biopesticides are of interest because they are the most environmentally friendly crop protection agents and also preserve food safety, yet there is no production of such in Uganda and protocols for licensing them had never been developed.

Under this partnership, Milk weed biologicals LTD successfully subjected one biological agent (*Trichoderma Koningiopsis*) to required field trials. Data were collected and analysed, and results were compiled and submitted to MAAIF for registration. This agent was undergoing registration at MAAIF by end of 2020. Moving forward, MAAIF may use the experience and lessons learned from this partnership to draw appropriate protocols that would support production and trade of Biopesticides



Figure 34: One of the products produced by Milk Weed Biologicals LTD

in the country and ultimately improve food safety assurance within the country.

During implementation of this project, 27 other micro-organisms (mites, bacteria & fungi) were isolated and 11 of these reached the stage of identification. Evident from this research is the fact that there are many of biological control agents existing within Uganda which is a great opportunity that the country could exploit to improve environmental health, farmers' and food safety and image of Ugandan food products on the market thus improve competitiveness.



WHERE THE SEED SECTOR STANDS TODAY

There is need to further strengthen the seed sector

The project conducted an online sector scan to assess the level of performance in terms of seed value chain functions, services and activities in 2020 to get an overview of its status. 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 and 5= meets sector requirements) but 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.

Observations and recommendations made from the quick scan of the seed sector

- Capacity building in policy formulation at the DLG level is key
- 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 seed sector integrated information management system (SSIIMS)
- Utilise tailored communication tools/strategies and translation of the NSP popular version
- DLGs to prioritise seed production and delivery activities and allocate resources
- Improve access to EGS
- Coordinated actions by all stakeholders in the seed sector is essential to enhance stakeholder integrity and transparency
- Enhance seed sector stakeholder coordination by strengthening the National Seed Board and National Seed Certification Services

Assessment on the impact of Covid-19 pandemic on access to quality seed showed major disruptions in the seed sector and encouraged actions for resilient seed systems

Government restrictions on mobility and gatherings as a result of lockdown to prevent 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 an online survey involving key stakeholder as respondents to assess the impact of the pandemic on access to quality seed for the first crop season of 2020 and accompanying

services. 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. In this regard, the project produced seed alerts that contributed to a white paper by the African Union (AU) advising Governments in Sub Saharan Africa (SSA) on

adequate actions to mitigate the impact of the pandemic on access to quality seed for resilient seed systems (<https://au.int/en/documents/20201111/white-paper-covid-19-crisis-and-seed-sector-africa-impact-options-actions-and>). The alerts also contributed to a journal article (<https://www.wur.nl/en/newsarticle/COVID-19-Rapid>).

KEY LESSONS LEARNED

1. The QDS system can bridge the gap of quality seed access especially for open pollinated crops. This is because LSB model is a sustainable and profitable quality seed delivery mechanism for OPVs given the context in which seed is produced, scale of production and proximity to the market

2. There is increased buy-in into the LSB approach by different development partners however, there still exists a gap in as far as embedding the LSB/ISSD approach into existing institutions to take up capacity building for new entrants in to the QDS system/LSB approach

3. Farmer to farmer quality seed promotion is an effective approach through the LSB model which is well placed within local communities.

4. The effectiveness of quality EGS supply requires a transparent and well-coordinated function of the institutions involved (NSCS and EGS producers) and this can be achieved through the implementation of the digitalized seed tracking and tracing system

5. The approval of the policy and regulatory framework alone is not enough to deliver the much-desired enabling environment for seed production and marketing but also requires

proper implementation and monitoring.

6. Partnership with the private sector can increase sustainability of interventions as seen for the vegetable seed companies which have continued with promotion of the superior vegetable varieties even without ISSD support.

7. Building capacities of key seed sector institutions is a critical but protracted process that must continue even beyond the project tenure to sustain the sector transformation.

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 Seed Tracking and Tracing System (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 relevant

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 (District Agricultural Offices, 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 District Local Government (DLG) and MAAIF.

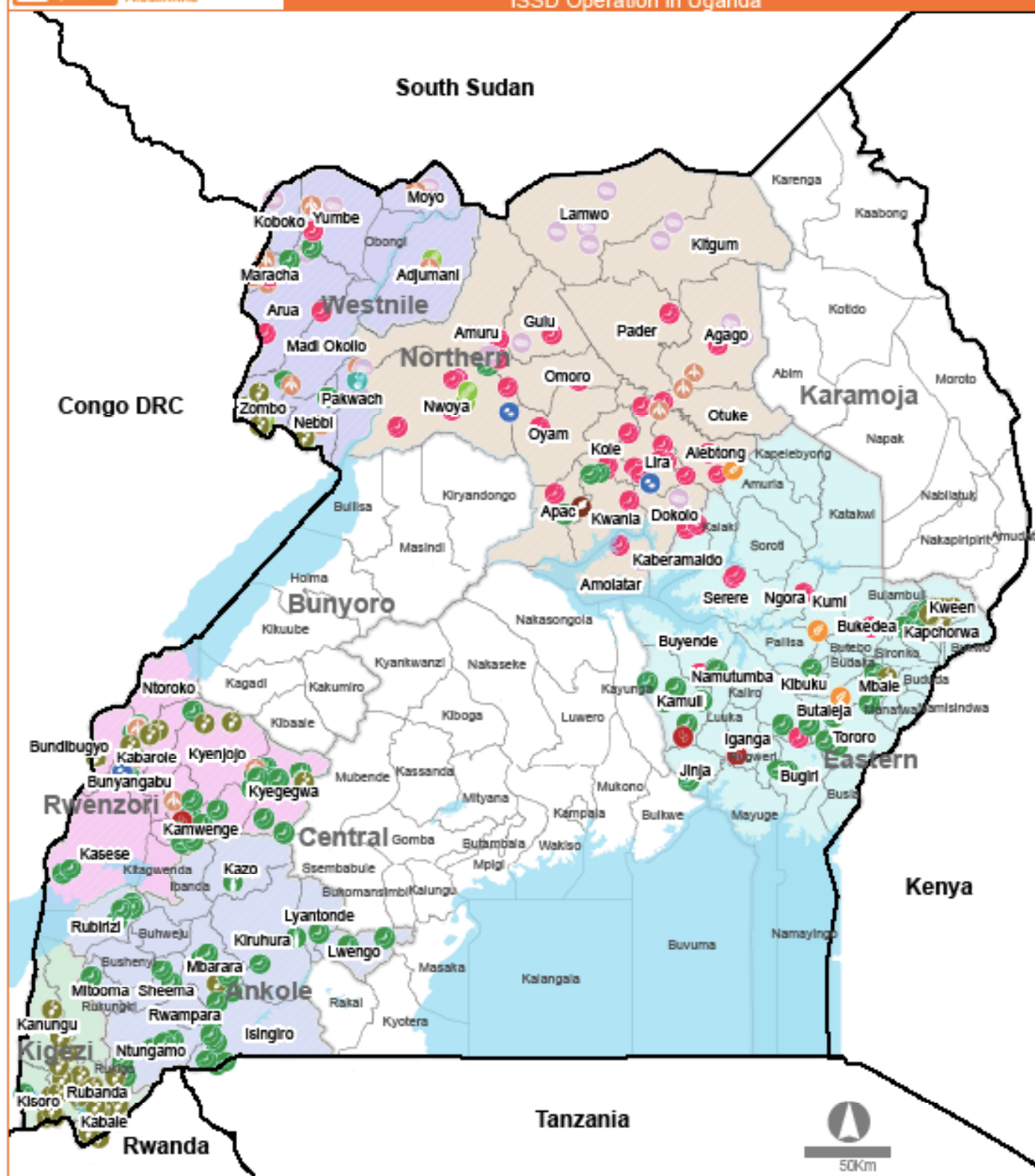
Also at QDS producer level further sensitization and training is needed as well as continued promotion of farmers' uptake of quality seed to expand the QDS marketing.

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 Department of Crop Inspection and Certification (DCIC). This is caused by a passing of the National Seed Policy 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









ISSD PLUS PROJECT CLOSE OUT REPORT APRIL 2021



Studio House, Ground Floor
Plot 5, Bandali Rise, Bugolobi
P.O.Box 20106, Kampala (U)
Tel: +256 775 968005
Email: Info@issduganda.org

