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# Toward an Inclusive Systemic Uplift of Smallholder Productivity and Resilience

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Results and Lessons Learned from a Hybrid Market-Led and Farmer Uplift Approach in Potato and Rice in Uganda

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Final Report of the Resilient and Efficient Agricultural Chains (REACH-Uganda) Project, 2016 - 2021

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International Fertilizer Development Center

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# Abbreviations and Acronyms

<b>BugiZARDI</b>	Buginyanya Zonal Agricultural Research and Development Institute
<b>CATALIST</b>	Catalyzed Accelerated Agricultural Intensification for Social and Environmental Stability
<b>CSA</b>	Climate-Smart Agriculture
<b>DLS</b>	Diffused Light Store
<b>EKN</b>	Embassy of the Kingdom of the Netherlands
<b>EPIA</b>	End-of-Project Impact Assessment
<b>FaaB</b>	Farming as a Business
<b>GAP</b>	Good Agricultural Practice
<b>IFDC</b>	International Fertilizer Development Center
<b>ISB</b>	Integrated Seed Business (from plantlets to basic seed and/or QDS)
<b>LSB</b>	Local Seed Business (from basic seed to QDS)
<b>MTR</b>	Mid-Term Review
<b>QDS</b>	Quality Declared Seed
<b>REACH-Uganda</b>	Resilient Efficient Agribusiness Chains in Uganda Project
<b>VSLA</b>	Village Savings and Loan Association

# Foreword

The Resilient Efficient Agribusiness Chains in Uganda (REACH-UGANDA) project was an almost five-year market systems development project implemented by the International Fertilizer Development Center (IFDC) and funded by the Embassy of the Kingdom of the Netherlands (EKN) in Uganda from 2016-2021. The project combined creating a market-led investment portfolio of public-private partnerships with direct training support to 40,000 farmers to improve productivity and resilience (farmer uplift).

Despite the COVID-19 pandemic which affected the last 18 months of implementation, the REACH-Uganda was able to contribute strongly to its goal to strengthen the efficiency and inclusiveness of the agricultural market system, while contributing to improved household resilience and productivity for rice and potato farmers in Uganda.

IFDC would like to thank its Government of Uganda partners who were instrumental in providing guidance and support, particularly the Ministry of Agriculture, Animal Industry and Fisheries and the National Agricultural Research Organization. REACH-Uganda also benefited from the technical support and advice provided by consortium partner Cardno in the development of a strong market-led investment portfolio. Included in our thanks are also the staff and leaders of the ISSD Plus, AVSI SAY and SNV TIDE projects.

Finally, IFDC would like to thank the EKN for their funding, support, and patience during the entire lifetime of this project. This started with the design of REACH-Uganda as a hybrid market systems project, its mid-term review which introduced some key changes, and the end of project impact assessment in late 2020. IFDC would particularly like to thank the input and advice provided by Josephat Byaruhanga, Anno Galema, and Joris van Bommel for almost the entire duration of the project and, most recently, Hans Raadschilders in its final stages. In addition to the EKN Team, IFDC would also like to note the contribution of its own staff who have worked diligently and enthusiastically throughout the lifecycle of the project.

The REACH-Uganda project has improved the lives and livelihoods of thousands of rice and potato farmers during difficult times. This report is an opportunity for the reader to reflect on how this was done, where change and transformation has taken place, and how this can be taken forward and improved in future programming.



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# Introduction

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- 1.1 The purpose of REACH-Uganda: make farmer uplift systemic

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  - 1.2 Value of a hybrid approach: facilitating systemic inclusion

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  - 1.3 REACH-Uganda results against indicator framework

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  - 1.4 Implementing REACH-Uganda during the COVID-19 pandemic

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This final report of the Resilient Efficient Agribusiness Chains in Uganda (REACH-Uganda) project reflects on almost five years of implementing a hybrid approach that combined creating a market-led investment portfolio of public-private partnerships with direct training support to smallholder farmers to improve productivity and resilience (farmer uplift). REACH-Uganda was designed and implemented by the International Fertilizer Development Center (IFDC), with technical support from Cardno and funded by the Embassy of the Kingdom of the Netherlands (EKN) in Kampala, Uganda.

REACH-Uganda was implemented from 2016-2021 in the two main value chains of rice and potato with the overall objective “to strengthen the efficiency and inclusiveness of the agricultural market system while contributing to improved household resilience and productivity in selected value chains in Uganda.” This was to be achieved through two objectives:



### Objective 1

Agribusinesses, service providers, and farmers benefit from better market system functions (market activities).



### Objective 2

Enhanced resilience and productivity of market-oriented farmers in the commodity value chains (pre-market/farmer uplift; activities).

The project worked with 26 private sector partners and two key public sector institutions, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the national agricultural research organization (NARO), in three regions in Uganda - Eastern, South-Western, and Rwenzori, and was expected to impact over 40,000 farmers with a budget of €19.6m (€13.3 EKN contribution and €6.3 partner contribution).

This report is arranged as follows:

## 1 Chapter One

Chapter One briefly recalls how the REACH-Uganda project succeeded the EKN-funded Catalyzed Accelerated Agricultural Intensification for Social and Environmental Stability (CATALIST) project, and what it was set out to achieve. Whereas the CATALIST project focused on farmer uplift, accompanied by some investment in service delivery, the REACH project was expected to make this uplift more systemic. Chapter One also discusses the merits of a hybrid approach and in which context this is most appropriate. Both are relevant to interpret REACH-Uganda's performance. Chapter One also reflects on project delivery under COVID-19, which has influenced REACH-Uganda results. REACH-Uganda results against logframe indicators are presented in Annex 1.

## 2 Chapter Two

Chapter Two looks at the investment portfolio developed by REACH-Uganda. The Chapter will zoom in on four business models and the inclusive pathways to systemic change they open up. These business models proved themselves during the REACH-Uganda project, also in times of COVID-19. Chapter Two will show a comprehensive Theory of Change for all investments including results. Annex 2 provides an overview of all REACH-Uganda investments and their key achievements. Annexes 3 to 8 contain analyses of the economic feasibility of the main business models promoted by REACH-Uganda.

## 3 Chapter Three

Chapter Three looks at direct REACH-Uganda service delivery to smallholder farmers in the form of training programs conducted and support to group formation. Farmers were trained on Farming As A Business (FAAB), Good Agricultural Practices (GAP), Climate Smart Agriculture (CSA) and resilience strategies. The chapter discusses the results that have been achieved in terms of farmer yields, income and household food security and analyses farmer resilience.

## 4 Chapter Four

Chapter Four summarizes the results and lessons learned from REACH-Uganda in ten key takeaways. This chapter will reflect on what worked, the synergies generated by the hybrid approach, as well as the next steps needed to further systemic smallholder inclusion, productivity, and resilience.



## 1.1

# The purpose of REACH-Uganda: make farmer uplift systemic

Both the REACH-Uganda Mid-Term Review (MTR) and End-of-Project Impact Assessment (EPIA) paid attention to how REACH-Uganda evolved from CATALIST, as this process reflects the lessons learned from ongoing Dutch involvement in rice and potato.



As the EPIA remarked:

*CATALIST worked with farmer groups to lift their productivity and improve their understanding and capacity to engage with markets, primarily through the provision of training, and through demonstrations of good agricultural practices. Many of the farmer groups engaged in CATALIST continued into the REACH-Uganda project. As CATALIST progressed, both IFDC and the EKN grew to appreciate that more emphasis needed to be placed on the specific value chains and markets as drivers of system performance. In consequence, the concept emerged of a project that would merge the 'push' or 'uplift' needed by market-focused poor farmers and groups, with the 'pull' or 'outreach' needed by the key value chain and broader market actors to engage with farmers in these contexts. Although such 'hybrid' development approaches ... are in their infancy, there is a growing appreciation of their relevance in the many development contexts in which there is a confluence of shallow markets with tiny and often remote farming enterprises."*

(EPIA, 2021, p. 2)

The lessons learned from CATALIST and REACH-Uganda are that smallholder gains in productivity and resilience are supported when smallholder farmers become embedded in supportive, inclusive systems, which will always be a mixture of public, private, and civil society in nature.

Farmer uplift can start this change process, but ideally it is complemented by systemic interventions. Messages need to be followed by access to inputs and services, and real-life examples from early adopters (not just demonstrations) that convince others they can do this too. Farmer uplift programs can deliver an innovation package, but the more a project becomes entrenched in delivery, the more difficult it is to exist without the many functions the project has taken on over time, causing a collapse upon retreat.

If development is about sustainable positive change, then kernels of positive change, such as farmers aspiring to a more productive and resilient way of farming, ideally become encapsulated in more enduring local systems made up of local actors. When CATALIST gave way to REACH-Uganda, EKN and IFDC confirmed their desire to put farmer uplift on a more sustainable and systemic trajectory.

To achieve this, REACH-Uganda targeted the inclusion of 40,000 smallholder farming households in emerging value chains (market systems) in potato and rice, completion of uplift programs for 36,000 farmers (of the 40,000 households), and investment in infrastructure (roads, irrigation) in support of this.



## 1.2

# Value of a hybrid approach: facilitating systemic inclusion

Since the commencement of REACH-Uganda, market systems and market system development have replaced the previously more common references to value chains and value chain development. The distinction may appear subtle but does refer a different “mental map” for farmer uplift. Value chain development tends to be strongly associated with support to lead firms to cut out traders, shorten the value chain, provide relevant inputs and services directly to smallholders, and buy from them, offering a better, fairer price. Essentially, the lead firm takes on (takes over) the role of the development actor, offering a complete innovation package. The challenge with this model is threefold:

- This model is only economical for value chains in which the cost of lead firm involvement is offset by quality gains. If lead firm investment in services, inputs, and supervision/coordination yields a much higher quality product (e.g., fresher flowers; fresher milk), then both smallholders and the lead firm benefit. Where such quality gains cannot be realized or are not rewarded by consumers, the model becomes uneconomical, and alternative business models in support of systemic farmer uplift must be considered.
- Lead firms that can take on many functions and manage the risks associated with dealing with smallholders cannot be found in every country and every value chain, even if the business model would be economical. Alternative actors (public, private, or civil society) to support systemic farmer uplift must be considered.
- Lead firm outreach rarely exceeds more than a few hundred to a few thousand farmers. Again, a more diverse range of business models and actors in support of systemic farmer uplift must be considered.

Market systems development opens up the search for systemic solutions for farmer uplift to a much broader range of actors and models. If well implemented, the approach is neutral about which actors and models it intends to support. The choice should be dictated by examining the local context and applying good development principles (see Box 1).

### Box 1

#### Good development principles for inclusive systemic development

- ✓ Identify partners with a shared vision of inclusive growth.
- ✓ Build on local agendas and (emerging) solutions relevant for, in this case, farmer uplift, i.e., productivity and resilience.
- ✓ Provide support with a clear mutual commitment of time and resources.
- ✓ Strengthen the partner's incentives and capacity for success.
- ✓ Do this by being flexible and responsive in the change process.
- ✓ Remain informed through continuous learning and a search for scale.
- ✓ Implement a rolling exit, as success in one part of the system will likely influence another part to achieve an inclusive and sustained change process, in this case focused on farmer uplift.



What is implied in these principles is the willingness to work with a wide range of development stakeholders and the acknowledgement that development contexts vary significantly between countries, regions, commodities, and topics. Market systems development typically results in a diverse portfolio of interventions or partnerships. No partner offers a complete innovation package, but the combination of partners amounts to a large number of beneficiaries able to manage their livelihoods in a different, better manner. Building this portfolio is a medium-term effort (approximately eight years, two project terms).

A hybrid approach becomes important when one recognizes that small local actors are the best drivers of long-term systemic inclusion. Project “push” can help a local partner’s “pull” to gain traction. Thus, a hybrid approach can help narrow the gap between what system actors can deliver and what their local smallholder clients need, facilitating inclusion, but always informed by a system vision not dependent on donor funding.

REACH-Uganda's success can be measured in terms of whether (i) the sum of the hybrid approach is more than its parts and (ii) better functioning, more inclusive systems in potato and rice are emerging. Chapter 3 presents the evidence for this.

### 1.3

## REACH-Uganda results against indicator framework

REACH-Uganda results against the indicator framework are presented in detail in Annex 1. REACH-Uganda has achieved strong results against all key indicators. Farmers have benefited from significantly higher yields, revenue, and income, attributable to potato and rice. REACH-Uganda business partners have shown significant business expansion and increases in turnover. Some of the highlights were:



Additional income of **€2,413,523** was generated for **11,763** farmers through 14 private sector partnerships.



**352** full-time equivalent jobs created, with an additional income of **€190,272**.



At the farmer level yields have increased in potato from 3.07 mt/acre to 4.15 mt/acre (**35%**) and in rice from 0.6 mt/acre to 1.36 mt/acre (**126%**). These are significant gains although still below the expected target.

Thus, farming has become productive (the uplift) and better embedded in relevant services, which makes it systemic.



Net income increased for potato farmers from €383 to €689 and rice from €182 to €301 per acre per season. This was an **80%** increase from baseline, compared to the target of 20%.

The “dissonance” in REACH-Uganda's performance against indicator framework relates to farmer (business) groups. Farmer business groups (an amalgamation of several farmer groups)<sup>1</sup> have only demonstrated a modest relevance in the uplift process. Collective action can be extremely important to mobilize savings and create bulk markets, but farmer groups or an aggregated structure cannot always perform the many diverse functions farmers need access to in order to become more productive. Farmer groups are one solution among many, and thus have relevance, but are not necessarily the cornerstone suggested in the REACH-Uganda indicator framework. Chapters 2 and 3 discuss the results in more detail.



Food security improved from **55% to 62%** due to improvements in yield, income, and crop diversification.



At the business level, additional turnover from partnership interventions cumulatively increased by €4,865,438, which was a **40%** increase annually.

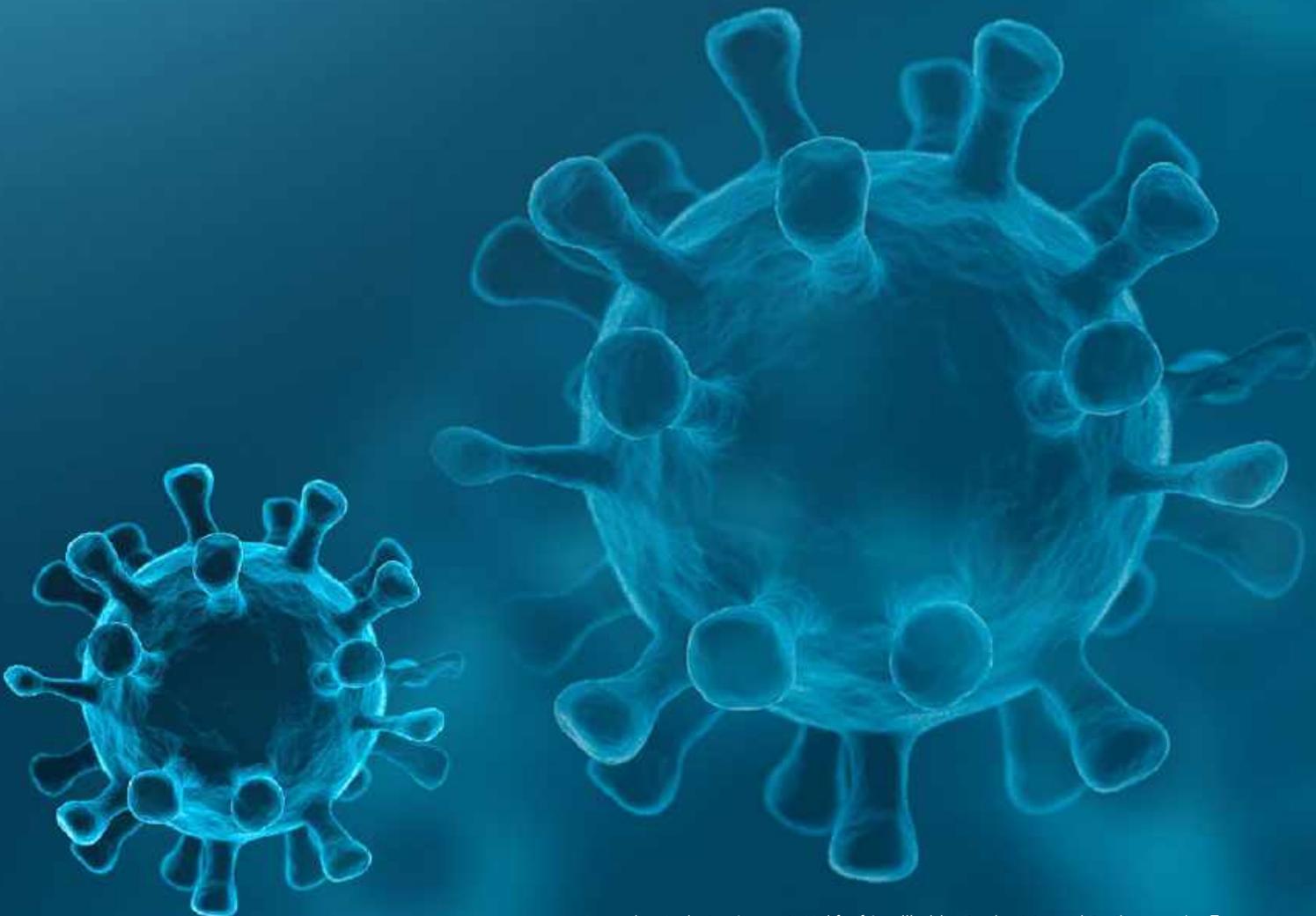
<sup>1</sup> The Farmer Business Group was an aggregated structure developed by the project which typically was a merger of several farmer groups focusing on collective action, especially in relation to supply chains.

## 1.4

# Implementing REACH-Uganda during the COVID-19 pandemic

The COVID-19 pandemic hit REACH-Uganda at an inopportune time when many of its 26 public-private partnerships were in the midst of investing in new business models and rolling these out to reach smallholder farmers. None of the partners dropped out during the pandemic, a testament to their resilience, but their ability to contribute financially was weakened. However, all were able to complete their plans by June 2021. Effectively, this further shortened the REACH-

Uganda implementation window, which was tight to begin with. As indicated above, it takes time to observe broad-based systemic inclusion. A reset of many of the partnerships after the MTR in October 2018 further impeded this but did provide more focus. The results from the systemic pathways presented in this report are still emerging and will continue to mature in the years to come in scope and scale of results.





# REACH-Uganda investment: four business models that are essential to smallholder productivity

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- 2.1 Model 1: REACH-Uganda progress toward establishing a local seed potato industry

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  - 2.2 Model 2: REACH-Uganda progress toward establishing a local high-value seed potato industry

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  - 2.3 Model 3: REACH-Uganda progress toward expanding multi-stage milling for clean, affordable local rice

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  - 2.4 Model 4: REACH-Uganda progress toward establishing a local rice seed industry

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  - 2.5 REACH-Uganda work on the enabling environment

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  - 2.6 REACH-Uganda progress in last-mile agrochemical distribution

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  - 2.7 REACH-Uganda progress in promoting access to agri-finance

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  - 2.8 REACH-Uganda investment in infrastructure

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  - 2.9 REACH-Uganda cumulative results and investment portfolio impact
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This chapter looks at the investment portfolio developed by REACH-Uganda focusing on four business models and the inclusive pathways to systemic change they open up. It also covers two models on access to finance and agrochemical last-mile distribution that were developed by the project but were not full systemic pathways. Furthermore, the enabling environment aspects of infrastructure (roads, irrigation) and the business enabling environment are discussed.

Systemic smallholder uplift starts with identifying sustainable business models at farm level and the industries supplying them. These business models vary between countries and sectors – they represent what system actors in the local context are ready for. REACH-Uganda developed comprehensive strategies for its work in potato and rice, that identified bottlenecks that were restricting the development of the sectors, which formed the key strategic areas or pathways the project would engage in. These are summarized in the two figures below for rice and potato.

Figure 1

REACH-Uganda Potato Strategy.

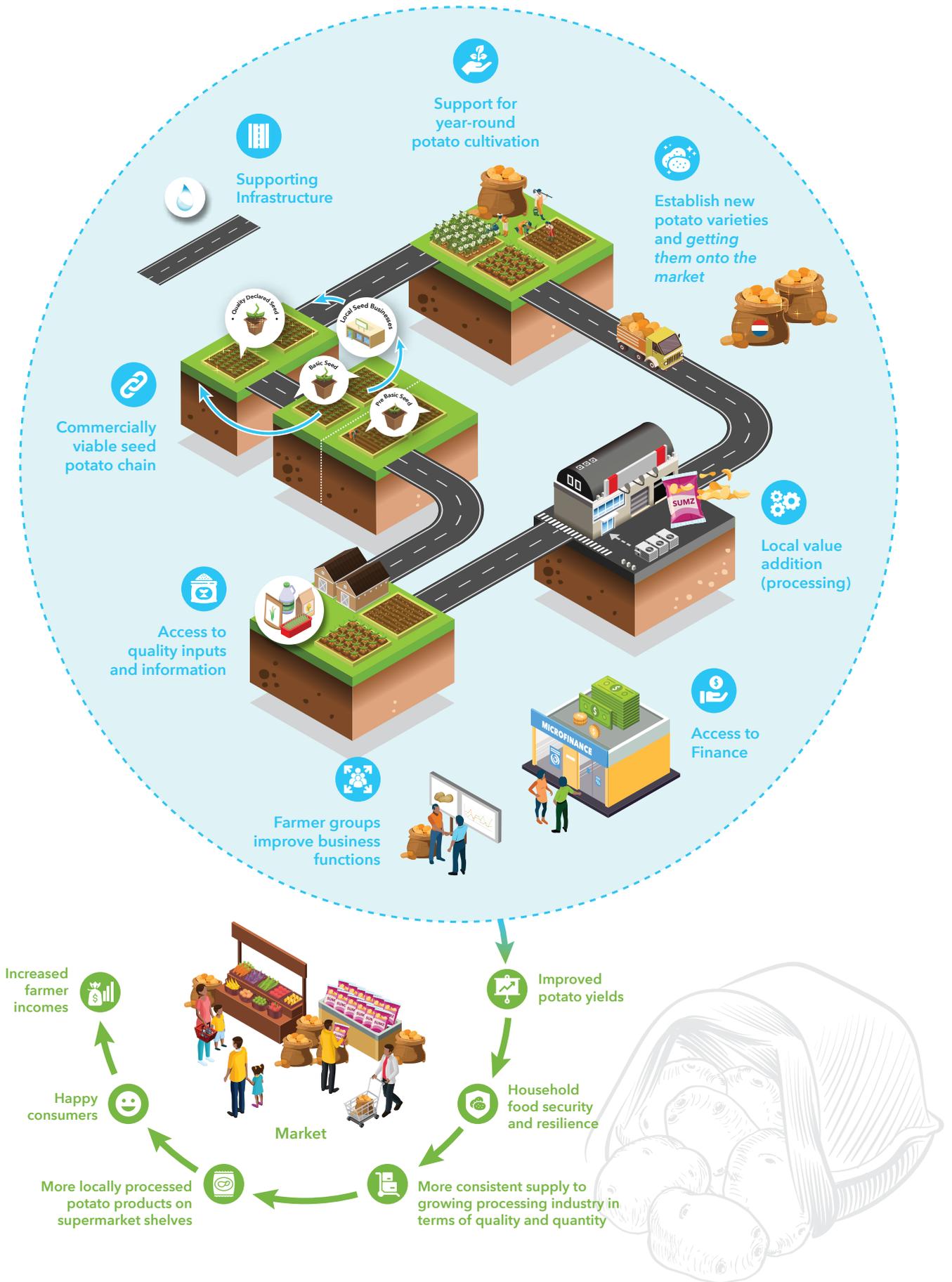
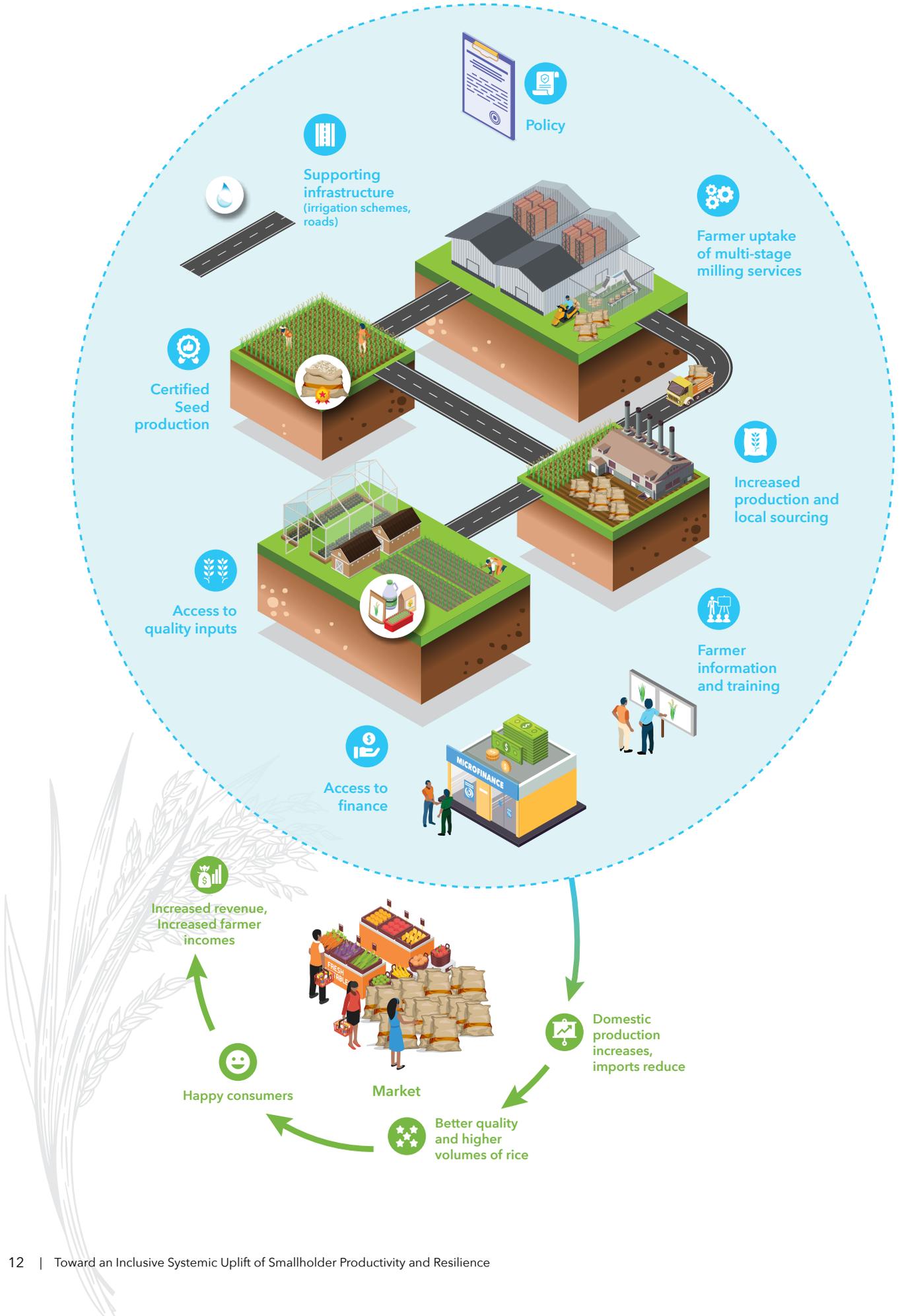


Figure 2

REACH-Uganda Rice Strategy.



Typically, the pathways for systemic uplift become clearer as implementation of these strategies progresses; some actors and models get traction, others less so.

Annex 2 contains the details of the entire REACH-Uganda investment portfolio. The 26 partnerships were established under Outputs 1.1, 1.2 and 1.3 of the project indicator framework. Within this portfolio, the following pathways for systemic uplift can be identified:



### A seed potato industry for the multiplication of local seed potato for unsegmented, generic market demand, centered around local screenhouses multiplying close to farmers.

Integrated seed businesses (ISBs) source plantlets from public and private tissue culture laboratories and screenhouse material from national suppliers. In turn, they supply farmers with quality declared seed (QDS) or sell basic seed to local seed businesses (LSBs) that supply farmers with QDS after multiplication. This pathway should ultimately serve the bulk of potato farmers in Uganda. Key supportive business models and industry activity relate to the last-mile distribution of agrochemicals, agri-financing, and QDS certification.

Annexes 5 and 6 contain feasibility analyses for ISBs supported with subsidies and loans, respectively. These justify providing limited smart subsidies to allow farmers to establish ISBs, which demand significant investment, working capital, and land to become profitable.



### A seed potato industry for the multiplication of imported, high-value (e.g., Dutch) potato varieties for niche markets, centered around larger agribusinesses with the ability to import certified basic seed.

These agribusiness multiply basic seed for their own use or for distribution to smallholders, often outgrowers. During potato cultivation, quality standards (in terms of size, appearance) must be achieved to meet niche market demand. This pathway is more lead firm driven and includes fewer smallholders but is important to satisfy the demand from the hospitality and potato-processing industry and supermarkets. At the same time, it is a profitable and attractive business proposition for those farmers that can meet the requirements. A key supportive industry activity is the registration of new potato varieties so that these can be legally grown in Uganda.

Annexes 7 contains feasibility analyses for Dutch seed potato production from imported material Annex 8 for farmers cultivating Dutch ware potato.



### A local rice milling industry for sourcing, milling, and wholesaling clean, affordable local rice, centered around multi-stage mills with the ability to provide value-adding services to smallholders (e.g., transport, drying, credit).

Multi-stage mills are more efficient and provide better quality rice that better conforms to consumer demand compared to primitive single stage mills. Value-adding services further increase the attractiveness of multi-stage mills for smallholders. Key supportive business models and industry activity relates to the last-mile distribution of agrochemicals, agri-financing, and a clear import policy.



### A seed industry for the multiplication of local rice varieties for local consumer demand.

Currently, smallholder farmers have virtually no access to clean or certified seed. Local self-pollinated varieties are multiplied in very small quantities in public research institutions and by few private sector actors. Unclear import policies prevent the industry from taking more shape. Annex 9 contains a feasibility analysis of rice seed production.

REACH-Uganda also supported two cross-cutting industries, working in support of the pathways described above:

- Last-mile distribution of agrochemicals.
- Access to agri-finance.

Finally, REACH-Uganda facilitated improvements to the **business enabling environment** and improvements in **infrastructure** in support of these pathways. Results achieved for each of these, as well as aggregated results, are discussed below.



## 2.1

### Model 1

# REACH-Uganda progress toward establishing a local seed potato industry

Potato is an important cash and food security crop in Uganda. However, its potential is far from being realized, and its production is at risk due to poor cultivation practices and changing weather patterns. REACH-Uganda's potato strategy focused on several key challenges in the sector that must be addressed to bolster its potential. The constraint that stands out is the near total absence of an organized local seed potato supply chain. The near absence of clean potato seed – at the start of REACH-Uganda only 9%<sup>2</sup> of demand was met – resulted in farmers being dependent on planting material susceptible to diseases, low yields, and low returns. Also, the lack of potato varieties suitable for processing hampered the development of a local potato processing industry.

The reasons why these challenges persisted are understandable. Potato is a relatively costly crop to grow if a farmer invests in clean seed; it can represent over 40% of their production cost. Smallholders may be tempted, perhaps out of necessity, to economize on seeds. This saves them money in the short run but causes them to lose out in the long run. Potato loses its vigor relatively quickly; seed should not be recycled

more than three times (ideally less). Poor-quality seed and relatively high costs for agrochemicals to control diseases, followed by low yields and returns, result in little savings and set the farmer up for another low investment cycle the following season.

Investing in seed can also be risky in a market in which little clean seed is available and good seed is difficult to distinguish from degenerated seed. An agricultural research organization can supply the market but in a limited manner. Commercial seed potato multiplication is feasible but requires technical skill and financial resources, which banks are not willing to provide. Until recently, donors were apprehensive about providing smart subsidies to allow commercial actors to establish viable business models.

REACH-Uganda stepped into this gap to reinforce potato farmer uplift with access to seeds, inputs, irrigation, and financial services to create a system in which potato farming becomes more productive, more sustainable, and more resilient, where farmer uplift can take root.

<sup>2</sup> Figure from UBOS 2018 on farmers reporting access to quality seed. The source of this seed is unknown therefore it cannot be assumed to be clean seed.



## Business model(s) supported

Under Output 1.8 of the project indicator framework, REACH-Uganda supported a clean seed supply chain that consisted of commercial tissue culture laboratories supplementing efforts by the NARO KaZARDI to supply clean plantlets to a new category of integrated seed business (ISBs). The ISBs were equipped to multiply plantlets into basic seed, which would then be multiplied further by local seed businesses (LSBs) to produce QDS or individual seed multipliers and then sold to farmers. Where possible, ISBs and LSBs would also invest in access to water to prevent erratic weather from hampering seed multiplication. ISBs can shorten the business cycle by selling mini-tubers or pre-basic seed, instead of basic seed, to LSBs or other seed multipliers, or can lengthen it and fetch higher returns by producing QDS themselves.

The advantage of this system is that local seed companies, often emerging from local lead farmers or lead-farmer groups, can produce clean seed close to farming communities. Because potato seed is bulky and distinguishing between clean seed and degenerated seed is difficult, short, localized supply chains are preferred. In this manner, a tight-knit, locally relevant clean seed production and distribution system can be established. During CATALIST, the first investments in screenhouses (needed to grow mini-tubers) were undertaken through a sub-grant to KaZARDI, but only during REACH-Uganda did this become more systematic, with a focus on a business model and linkages to suppliers and clients.

### The challenges with this seed system are that:



Tissue culture laboratories must be able to supply sufficient plantlets on time; it all starts with them.



Managing ISBs requires technical skill, working capital, and land to conduct several rounds of multiplication (Figure 3). Few local farmers, groups, or business owners would be able to operate an ISB.

Figure 3 Seed multiplication process.



Plantlets planted in **screenhouse**, with mortality rate of 10%, 1,440 plantlets will survive.

Plantlets take 4 months in screen house to mature and produce mini-tubers and 3 additional months for sprouting.



With a ratio of 1 plantlet:10 mini-tubers, 1,440 plantlets will produce 14,400 mini-tubers.

Mini-tubers take 4 months to mature when planted in **open field** to produce **pre-basic seed** and 3 additional months for sprouting.



With a ratio of 1 mini-tuber: 0.25 kgs of pre-basic seed; 14,400 mini-tubers will produce 3.6 mt of pre-basic seed.

Pre-basic seed takes 4 months to mature when planted in **open field** to produce **basic seed** and 3 additional months for sprouting.



With a ratio of 1 kg pre-basic seed: 6 kgs of basic seed; 3,600 kgs of pre-basic seed will produce 21.6 mt of basic seed.

Basic seed takes 4 months to mature when planted in **open field** to produce **quality declared seed** and 3 additional months for sprouting.



With a ratio of 1 kg basic seed: 7 kgs of Quality Declared Seed (QDS); 21.6 mt of basic seed will produce 151.2 mt of QDS.

QDS takes 4 months to mature in the open field to mature and an additional 3 months for sprouting.

REACH-Uganda promoted this system of mini-tuber production from in-vitro plantlets, a technology that was approved and available in Uganda and had proven to work under the CATALIST project, (albeit with significant technical backstopping). In 2018 International Potato Center (CIP) started to pilot another rapid multiplication

option of apical cuttings and in 2019 trained some ISBs how to propagate cuttings from plantlets. Although this is not yet an officially approved seed class, some of the ISBs have adopted the technique to supplement a temporary shortfall in plantlet supply.

The tissue culture laboratory to ISB to LSB chain may in the future also be relevant to the multiplication of imported seed potato varieties (as import of basic seed is costly). For more details on this chain, the rationale for the model chosen, and REACH-Uganda's strategy to

unlock the seed potato market in Uganda, refer to Annex 4 "Promoting Uganda's Food and Nutrition Security, One Potato Screenhouse at a Time."

Box 2 gives a summary of how the chain has worked with the ISBs supported under the project.

## Box 2

### Matrices for establishing an ISB

To establish a fully functioning integrated seed business, the following matrices are important to note:

- 1** A low-cost screenhouse of 120 m<sup>2</sup> and a diffused light store of 134 m<sup>2</sup> cost approximately €6,139 and €8,314, respectively.
- 2** The 120 m<sup>2</sup> screenhouse has a planting capacity of 1,536 plantlets that can be purchased at the commercial price of €0.3 per plantlet for a total of €461. However, ISBs have adopted a technology of propagating plantlets to rooted apical cuttings, mainly to reduce the cost per plantlet by 50% but also to operate the screenhouse at the optimal level. This means farmers do not need to purchase 1,536 in vitro plantlets; instead they buy 768 and propagate these to reach the full capacity of the screenhouse. Due to the challenge of access to plantlets, propagation of apical cuttings is addressing a supply gap challenge (discussed further below).
- 3** Plantlets take over four months in the screenhouse to produce mini-tubers, with an average yield of 13 mini-tubers per plantlet to yield a total of 19,968 tubers. At this level, the seed potato is not only expensive but also insufficient in quantity to meet the demand (see Annex 5 for breakdown of costings for mini-tubers).
- 4** To address the challenge of quantity and cost, generation I seed is multiplied to produce pre-basic seed (generation II, at a rate of 0.3 kg per mini-tuber to yield a total of 6 mt). At this level, the unit cost of production is €0.2/kg, and an ISB selling this at €0.6/kg would have a profit margin of €0.4/kg. At present, only one ISB has adopted this model of producing and selling pre-basic seed.
- 5** To benefit from economies of scale, ISBs multiply pre-basic seed to produce basic seed at a rate of 1 kg of pre-basic to 6.6 kg of basic seed, yielding a total of 39.6 mt. Production per unit cost is reduced by over 30% as compared to pre-basic seed (see Annex 5 for breakdown of pre-basic and basic seed costs). At this level, the unit cost of production is €0.14/kg, and an ISB selling this at €0.6/kg would have a profit margin of €0.46/kg.
- 6** ISBs stop at basic seed level. Seed potato production requires a substantial amount of land to allow the proper two-year rotational period to break the disease cycle before the next planting. For example, an ISB with a 120 m<sup>2</sup> screenhouse, producing all the levels (mini-tubers to basic seed) would require over 25 acres of land for the two-year rotational plan.

The supply gap in seed potato is mainly attributed to the limited number of ISBs. REACH supported ISBs predominantly sell basic seed to LSBs, individual seed multipliers, and some institutional buyers. LSBs are community-based farmer groups that produce seed potato and sell within their farming communities. They buy basic seed from ISBs and multiply it into QDS at a rate of 7 kg per 1 kg of basic seed.

\*Eight ISBs were supported under REACH; however, an additional four have been supported by IFDC under GIZ-funded Promotion of Nutrition-Sensitive Potato Value Chains (PNSP) project in the Elgon region.



## Capacity to respond to market demand

REACH-Uganda partnered with eight ISBs to ramp up the production of certified seed potato (t). ISBs were identified and selected through a screening process based on several key criteria, including their capacity to

cost share between 30-50% of the investments, which included a screenhouse, a diffused light store (DLS), and irrigation.

**Table 1:** Status of Integrated Seed Businesses and Local Seed Businesses at the end of 2020.

Partner, type, location	Partner financial contribution cumulative €	Main inputs	Seed produced and sold (cumulatively)
CKB, Kabale District, Kigezi sub-region, ISB	11,526	<ul style="list-style-type: none"> <li>• Screenhouse of 240 m<sup>2</sup> with capacity of 3,400 plantlets installed.</li> <li>• DLS with 52 mt storage capacity completed.</li> </ul>	<ul style="list-style-type: none"> <li>• 31.55 mt of pre-basic and 257.23 mt of basic seed produced.</li> <li>• 1,801 mt of QDS benefiting 2,251 farmers.</li> <li>• Additional turnover of €88,967.</li> <li>• 27 full-time equivalent jobs created with €18,695 as additional income.</li> </ul>
Muyambi, Kabale District, Kigezi sub-region, ISB	7,692	<ul style="list-style-type: none"> <li>• Screenhouse with a capacity of 3,400 plantlets installed.</li> <li>• DLS with 38 mt storage capacity completed.</li> </ul>	62,747 mini-tubers produced, 15.6 mt of pre-basic seed produced, this will be replanted to produce 102.96 mt of basic by 2022. Eventually a total of 192 mt of basic seed will be produced by 2023.
Bitamba, Kabale District, Kigezi sub-region, ISB	3,876	<ul style="list-style-type: none"> <li>• Screenhouse with capacity of 3,400 plantlets installed.</li> <li>• Constructed 134 m<sup>2</sup> DLS with a storage capacity of 40 mt.</li> </ul>	Produced 31,345 mini-tubers, expected to yield 7.6 mt of pre-basic seed and eventually 50.16 mt of basic seed by 2022.

Partner, type, location	Partner financial contribution cumulative €	Main inputs	Seed produced and sold (cumulatively)
Maziba, Kabale District, Kigezi sub-region, ISB	3,829	<ul style="list-style-type: none"> <li>• Screenhouse with capacity of 3,400 plantlets installed.</li> <li>• DLS with 40 mt storage capacity completed.</li> </ul>	<ul style="list-style-type: none"> <li>• 122,054 mini-tubers produced 12.5 mt of pre-basic seed produced.</li> <li>• Additional income of €3,194 from sale of pre-basic seed.</li> </ul>
KFRC, Rubanda District, Kigezi sub-region, ISB	16,472	<ul style="list-style-type: none"> <li>• Screenhouse with capacity of 1,600 plantlets installed.</li> <li>• DLS with 72 mt storage capacity constructed.</li> </ul>	<ul style="list-style-type: none"> <li>• 61,912 mini-tubers were produced.</li> <li>• 17.65 mt of pre-basic and 148.1 mt of basic seed produced.</li> <li>• 1,037 mt of QDS benefiting 1,296 farmers.</li> <li>• Additional revenue of €35,786.</li> </ul>
Chemonges, Kapchorwa District, Elgon region, ISB	6,509	<ul style="list-style-type: none"> <li>• A screenhouse with capacity of 3,400 plantlets installed.</li> <li>• DLS with 40 mt storage capacity completed.</li> </ul>	Expected to produce 17,600 mini-tubers. 4.4 mt of pre-basic and 29.5 mt of basic seed.
Mengya Integrated Farmers' Association (MIFA), Kween District, Elgon region, ISB	16,338	<ul style="list-style-type: none"> <li>• Installed two screenhouse units with a capacity of 3,400 plantlets.</li> <li>• DLS with 60 mt storage capacity completed.</li> <li>• Gravity irrigation system with drip demonstration installed.</li> </ul>	Expected to produce 32,300 mini-tubers, 8 mt of pre-basic, and 52 mt of basic seed.
Welishe Stephen, Mbale District, Elgon region, ISB	4,328	<ul style="list-style-type: none"> <li>• A screenhouse with a capacity of 1,600 plantlets was constructed and installed.</li> <li>• DLS with of 90m<sup>2</sup> with storage capacity of 27mt</li> </ul>	30,000 mini-tubers produced. Expected to produce 7 mt of pre-basic seed and eventually 43 mt of basic seed.
Kapchesombe Green Change Farmers' Cooperative (KGCF), Kapchorwa District Elgon region, LSB	11,587	<ul style="list-style-type: none"> <li>• DLS with 60 mt storage capacity completed.</li> <li>• Sourced 3.86 mt of basic seed for multiplication into QDS.</li> <li>• Installed irrigation system serving 30 farmers.</li> </ul>	<ul style="list-style-type: none"> <li>• 26.5 mt of QDS was produced and sold to 22 farmers.</li> <li>• Additional turnover of €3,152.</li> </ul>

All eight ISBs have completed their investments in screenhouses, DLSs, and where applicable, access to water. As a result, the eight ISBs now have a combined

seasonal production capacity of 23,600 plantlets (or 306,800 mini-tubers) and storage capacity of 492 mt of seed.



## Progress to date

During 2021, the cumulative results of work undertaken during 2019 and 2020 began to deliver tangible benefits. The eight ISBs produced and sold 53 mt of pre-basic seed and 115 mt of basic seed in the first season of 2021, which will be multiplied into 808 mt of QDS by LSBs or individual seed multipliers. This represents 5%<sup>3</sup> of the national market demand for seed, which is projected, factoring in the second season, to stretch to 10% by the end of 2021.

Cumulatively since 2019, 405 mt of basic seed has been produced up to end of season 2021A, which has reached 3,546 farmers with QDS. Assuming all factors remain constant, by 2023 the screenhouses will collectively produce 586 mt of basic seed per annum, which after multiplication by LSBs will serve the complete seed needs of 5,127 farmers. **This equates to 26% of the estimated national demand per annum.**<sup>4</sup>

The supply of tissue culture plantlets, however, has not kept up with the expansion of ISBs. Despite REACH-Uganda's efforts to broaden the sources of plantlet supply, it continues to be dominated by the NARO KaZARDI. Discussions with screenhouse owners revealed a number of reasons behind this: its proximity in southwest Uganda to 60% of the ISBs, competitive pricing structure, and after-sales technical assistance offered to purchasers of tissue culture plantlets. Production of rooted apical cuttings by ISB operators (although 30% less productive than plantlets) has enabled the rapid bulking of planting materials for screenhouses, helping to overcome supply chain shortages.

**Table 2:** Demand and supply of plantlets (2019-2021).

Year	Demand from ISBs	Supply
2019	9,216	5,600
2020	27,648	9,627
2021	27,648	14,100 <sup>5</sup>

Overall, the plantlet supply sector has only been able to meet 45% of demand in the last three years as per Table 2. Performance of private sector laboratories remains below par. Analysis of the sector by the project found that a number of bottlenecks remain. These include lack of availability of suitably qualified technicians and difficulty in sourcing the mother plants needed to generate cuttings. REACH-Uganda partnered with Agromax to address this vacuum, with orders made by five ISBs in 2019/20 (see Annex 2 for details). Agromax was unable to complete most of these orders and only supplied plantlets to two GIZ-

PNSP project-supported ISBs in Elgon. After a series of technical setbacks, Agromax has since indicated that they are ready to fully engage with the sector again. One step Agromax has taken to address longstanding issues is completely revamping the tissue culture facility to eliminate contamination. In addition, Agromax has sought to improve its delivery channels by purchasing a dedicated truck and linking with NARO Buginyanya Zonal Agricultural Research and Development Institute (BugiZARDI) to establish a regional plantlet receipt center in eastern Uganda.

<sup>3</sup> 115 mt of basic seed x 7 = 808 mt of QDS x 1.5 (based on a farmer using clean seed every three seasons)/23,900, which is the total national demand per annum = 5%.

<sup>4</sup> 586 mt of basic seed x 7 = 4,102 mt QDS x 1.5 (based on a farmer using clean seed every three seasons)/23,900, which is the total national demand per annum = 26%.

<sup>5</sup> Only includes data up to end of project; further orders may have been fulfilled in the final quarter of 2021.



## Impact on smallholder farmers

The performance of this seed is much better than home-saved seed, with the average yield of QDS at 4.35 mt/acre compared to 3.13 mt/acre. This has been a contributing factor to the improvements in yields, as discussed further in Chapter 3.



## Next steps to solidify an inclusive resilient pathway for systemic change

Starting a seed potato production business requires a substantial amount of money (just under €15,000) to invest in structures, such as a screenhouse and DLS, while at the same time retaining sufficient operational capital to run the business. If sufficient land and resources are available, it is more profitable for an ISB to produce and sell basic seed rather than stopping at pre-basic.

Financial analysis shows that investing in seed potato production can be a viable business if farmers have access to loans from financial institutions with favorable terms and conditions, such as longer grace periods and lower interest rates. These are not readily available on the market. Even the best case scenario is prohibitive for a potential entrant ISB (see Annex 6 on ISB loan scenario).<sup>6</sup>

With a negative cash flow for three consecutive years, smallholder farmers who wish to start seed potato production have had challenges in accessing loans from a financial institution to invest in new agricultural startup projects (refer to Annex 6 'cash flow and payback period sheets'). Given the perceived agricultural risks, no startup ISBs have secured a loan from a financial institution so far. If a financial institution decided to offer a loan, this would require significant collateral, such as land, which many smallholder farmers may not be in a position to afford.

REACH-Uganda has learned that a subsidy de-risks the investment while acting as an incentive for farmers to mobilize additional resources to invest in a project of this nature. Based on the economic analysis of ISBs over the past three years, REACH-Uganda recommends that,

to scale up and replicate this model, farmers receive a subsidy for a low-cost screenhouse of 120 m<sup>2</sup> and DLS of 134 m<sup>2</sup>, with the donor and farmer each contributing 50% of the total investment (see Annex 5). Whether this can stimulate further scaling up of the model through "crowding in" remains to be seen.

Scale up of this model would need to go hand-in-hand with improvements in the tissue culture supply chain. Experience has shown that, given the delicate nature of plantlets, a logistical operation closer to the region is critical to avoid damages and customer dissatisfaction. Endeavors such as the Agromax decentralized approach should be encouraged. The involvement of BugiZARDI in Elgon would be critical to making it work on par with the network developed by KaZARDI and ISBs in Kigezi.

ISBs were developed by the project to meet local demand. This recognizes that farmers have difficulties differentiating between good or bad quality seed. In this scenario, trust between ISB operators and their clients is vital. Often, this is based on personal relationships or recommendations. The work undertaken by the project to date has focused on Kigezi and Elgon, although approximately 50% of the national seed potato market exists outside these regions. Institutional buyers from the Government of Uganda are providing a ready market for seed potato produced by ISBs and are exporting this material outside its immediate region of production. Going forward, the rollout of a strategy that sees the ISB approach replicated in other regions with high concentrations of farmers would help counter this. For more discussion on lessons learned on the ISB model please refer to Annex 4.

<sup>6</sup> Best interest rate is at 12% per annum (cheapest on Ugandan market offered only by Uganda Development Bank). The loan has a grace period of one year, and interest accrued in year one is paid in year two. Each year has two payments. The loan period is five years, paid in four years, with a total of eight installments (two installments per year), and is interest computed over five years.

## 2.2

### Model 2

# REACH-Uganda progress toward establishing a local high-value seed potato industry

This model focuses on the importation of Dutch seed by commercial actors to support the emerging potato processing sector. REACH-Uganda partnered with four commercial farms, Namakwaland, Clarke Farm, FICA Seeds, and Kakie International, and two Dutch seed breeders, Agrico and HZPC, to commercialize the

production of Dutch seed potato varieties in Uganda to target the high-value processing sector. A fifth partner, New Bukumbi Coffee, with outreach to a network of farmer cooperatives in Rwenzori, was added on the market side. Partnerships developed under this model relate to Output 1.7 in the project indicator framework.



## Business model(s) supported

Although there was an emerging demand in the niche processing sector, risks were also abundant. These included the high cost and logistics of importing seed, an unsupportive regulatory environment, and limited capacity in modern production techniques using mechanization in potato-growing areas of Uganda. As such, REACH-Uganda sought to partner with established commercial farms and seed companies that could manage some of the risks but also tap into the opportunities associated with this higher value segment with its high-quality demands (size, shape, consistency). For a commercial farm starting from scratch, establishing key infrastructure, such as land, irrigation, storage, machinery, and equipment, would require an initial capital investment of over €300,000, with recovery period of over four years on the investment.

The four commercial farms identified and selected had some of these prerequisite resources available - large land holdings, mechanized production, and human resources. A model in which basic seed material from

the Netherlands was imported and multiplied in Uganda was supported. In discussions with seed companies in the Netherlands, this was the earliest seed class available for importation; the companies were initially hesitant to provide earlier generation material due to issues of royalties and varietal protection, as Uganda was a relatively new and unestablished market.

Through partnership agreements, the project co-funded several key infrastructure developments, including cold storage facilities, irrigation, and some potato-specific equipment (see Table 4). The financial contribution by the partners was €595,515, with REACH-Uganda contributing €719,953. Furthermore, to improve the regulatory environment, efforts were made to register the four partners as commercial seed entities and develop licensing agreements with breeders. The investments were designed to have downstream multiplier effects at farmer level, with better access to good quality seed that could be sold into a growing premium market.



## Capacity to respond to market demand

The demand for potato from the processing sector in Uganda is approximately 5,000 mt, which could rise to 22,000 mt in the future if projected investments materialize. Several commercial restaurant chains (Café Javas, Java House, KFC) are importing Dutch varieties from Kenya, South Africa, or Egypt to meet their processing needs. Other firms, such as Sumz and Chicken Express, have sourced smaller volumes of Dutch varieties from Ugandan growers and supplemented these with local potato varieties. New players in the market as of 2021, including Holland Fair Foods, Veris Investments, and Kisoro Potato Processing Industries Ltd. (KPPIL), are targeting the use of Dutch varieties as their first priority and are highly reluctant to use local varieties. These three are not buying potato currently but are making investments in preparation to start operations in 2022.

Based on the current size of the market, the four commercial farms could satisfy the current demand of 5,000 mt through production of seed to sell to farmers to produce ware. Based on projected demand, it is anticipated that Dutch varieties could have a market share of approximately 74%, or 16,000 mt, of the processing sector within the next two years. In this scenario there is still sufficient installed capacity at the four commercial seed production farms to meet local demand - presuming they continue to expand their businesses.

Three Dutch potato varieties have reached the market to date - Markies, Taurus, and Panamera. Markies and Taurus have gained higher acceptance in the market, as they are suitable for processing. Panamera is a table potato and competes with popular local varieties; its light color is less appealing in the local table market. Other issues with the three varieties are their limited tolerance of late blight, which demands significant investment in pest and disease control. In the future, other more blight-tolerant varieties, such as Sarpo Mira, which is registered in Uganda, could boost options for smallholder farmers.



## Progress to date

All five<sup>7</sup> partners that have produced Dutch potato at scale were able to secure a market for their produce in 2020. A total of 602 mt of ware potato (153.8 mt of Markies, 324.4 mt of Taurus, and 124.10 mt of Panamera) at an average yield of 8 mt/acre was sold to processors including PFIL, Café Javas, Kampala Fried Chicken, and the open market. The average price for potato in this market is UGX 1,300-1,400, which is approximately UGX 500-600 higher than the average price for local varieties. However, this represents only 17% of the market current market for ware. Once it was established that the processing sector had an appetite for these three varieties, the four partners could then focus their efforts on the seed chain which brings smallholder farmers into the equation.

With support from REACH-Uganda, a total of 150 mt of basic seed<sup>8</sup> (75 mt of Markies and 75 mt of Taurus) was imported for the Netherlands for multiplication by Highgrow Namakwaland, Clarke Farm, and FICA Seeds.

COVID-19-related shipping delays impacted this process from several perspectives. Seed orders were received later than anticipated, which saw planting take place in April rather than early March. Compounding this issue, shipping delays also delayed the final delivery date for irrigation equipment to Clarke Farm.

All four farms were inspected and met the required standards of the National Seed Certification Service of MAAIF to operate as producers and sellers of seed potato. This is essential to ensure that seed planted on the farms can be inspected and certified. For seed breeders to receive royalty payments, the crop needs to be sold as certified seed. The certification records from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) also provide an important check for the breeders to ensure that the royalty payments they receive correspond to the total volume of certified seed produced.

<sup>7</sup> New Bukumbi Coffee is the fifth commercial partner in Rwenzori that has focused on ware production through its network of cooperatives rather than seed production.

<sup>8</sup> The basic seed imported was an earlier class of seed potato (7) which could be multiplied twice as seed compared to the initial importation which was class 9.

**Table 3:** Financial contribution and outputs by commercial farm partners 2017-2021.

Partner, type, location	Cumulative financial contribution partner (€)	Main inputs	Seed/ware produced and sold/distributed
Namakwaland, Masaka District, Central region	391,793	<ul style="list-style-type: none"> <li>84 mt of Markies and Taurus seed potato imported from Netherlands.</li> <li>Installed 2 x 80 mt potato cold chain storage units.</li> <li>25 mt of elite material for multiplication into seed potato.</li> </ul>	<ul style="list-style-type: none"> <li>449.1 mt of ware produced (165.8 mt of Markies and 283.3 mt of Taurus).</li> <li>Total sales: 153.8 mt of Markies in local markets and 242.4 mt of Taurus to PFIL. Additional turnover of €130,908.</li> <li>20 mt of seed harvested and stored with a further 137 mt of seed potato expected.</li> </ul>
Clarke Farm, Kyenjojo District, Rwenzori sub-region	47,210	<ul style="list-style-type: none"> <li>Installed 2 x 80 mt potato cold chain storage unit.</li> <li>25 mt of Panamera imported to produce ware.</li> <li>25 mt of elite material for multiplication into seed potato.</li> </ul>	<ul style="list-style-type: none"> <li>159 mt of Panamera ware potato produced, 110 mt sold, earning an additional turnover of €28,973.</li> <li>56 mt of certified seed potato produced; 6 mt sold and further 50 mt to be sold to farmers.</li> </ul>
Kakie International, Kabarole District, Rwenzori sub-region	42,539	<ul style="list-style-type: none"> <li>12.5 mt of Panamera received and planted to produce ware potato.</li> <li>25 mt of Markies and Taurus imported to produce ware.</li> <li>Installed 2 x 80 mt potato cold chain storage unit.</li> </ul>	<ul style="list-style-type: none"> <li>8.4 mt of Panamera produced.</li> <li>4.8 mt of ware potato sold to the open market, earning an additional turnover of €1,146.</li> <li>109.38 mt of ware potato expected to be produced.</li> </ul>
New Bukumbi Coffee Ltd, Kabarole District, Rwenzori sub-region	29,304	<ul style="list-style-type: none"> <li>Imported 37.5 mt (25 mt Taurus and 12.5 mt Panamera).</li> <li>An additional 87.5 mt of Dutch potato varieties (50 mt of Taurus, 25 mt of Markies, and 12.2 mt of Panamera) imported for production of ware potatoes.</li> <li>Constructed an ambient store with capacity of 200 mt and equipped with storage crates.</li> </ul>	<ul style="list-style-type: none"> <li>Farmers yielded 160 mt and sold 106 mt of Taurus and 38 mt of Panamera to NBC.</li> <li>NBC supplied 82.9 mt of Taurus variety to PFIL, and 9 mt was sold to other local markets, earning an additional turnover of €27,067.</li> </ul>
FICA, Kyenjojo District, Rwenzori sub-region	84,299	<ul style="list-style-type: none"> <li>Imported 25 mt of Markies and Taurus elite material for multiplication into seed potato.</li> <li>Installed 2 x 80 mt potato cold chain storage unit.</li> </ul>	168.9 mt of seed potato produced: 97.1 mt of Markies and 71.8 mt of Taurus. Once sold, this will benefit 211 farmers in 2022.

Despite these setbacks, overall crop performance was satisfactory and 224 mt of certified seed was produced with a further 157 mt expected. This will supply

approximately 476 farmers in total by season 2022A. These farmers will be free to sell the ware potato back to the commercial farms or sell it on the open market.



## Impact on smallholder farmers

At full capacity, these partnerships will enable 1,241 potato farmers to have access to better quality Dutch seed potato by 2024. A small amount of seed has already been sold on the market by Clarke Farm and most farms will sell seed at UGX 3,000/kg. The potential impact for the smallholder farmer is high. The average yield recorded so far by farmers linked to project partner New Bukumbi Coffee (NBC) was over 7 mt of ware potato. With a unit cost of production of €0.14/kg and unit selling price of €0.31/kg in the processing market, a farmer could earn a margin of €0.17/kg in premium markets (see Annex 8). However, if the farmers sold their produce in the local market, the margin is negligible.<sup>9</sup>



## Next steps to solidify an inclusive resilient pathway for systemic change

Even without the subsidy that REACH-Uganda has provided on seed, the importation of basic seed from the Netherlands is still a profitable business for the commercial farms. If yields reach the current average of 8 mt/acre, seed can be sold for UGX 3,000, which is four times the cost of production. Therefore, although importation is expensive, the bigger hindrance is perhaps in the import/export regulatory requirements and the lead time, which can create delays and may not always be timely for the planting seasons.

If the size of market remains at around 5,000 mt, at full production capacity of close to 1,000 mt of seed annually, the four commercial firms can satisfy the market demand. Three of the commercial farms plan to do this through selling seed to farmers who produce ware potato. Clarke Farm plans to engage farmers in an outgrower scheme and Namakwaland and FICA Seeds intend to sell seed to farmers on the open market. If the market grows to the anticipated level of 16,000 mt for the imported variety, then these farms would need to expand their operations and infrastructure or leave room for other commercial farms of similar size to enter the market.

Scaling would be achieved in a shorter time frame if early generation material could be accessed, or foundation seed could be produced locally. Two seed companies have already provided earlier class of basic seed (that can be multiplied twice as seed), which is advantageous for quantity of seed production. Furthermore, on partner FICA Seeds, a private seed company with key infrastructure (tissue culture lab) and a substantial amount of clean land, is in position to take the lead in ensuring that the foundation seed potato can be produced locally. Negotiations are currently taking place between FICA Seeds and HZPC for a potential arrangement for FICA to multiply foundation seed locally. This will start with a proposed fact-finding visit by HZPC in 2022.



<sup>9</sup> They make a profit of €0.03/kg in the local market; if they sell to an intermediary, such as New Bukumbi Coffee, they make a profit €0.12/kg.

## 2.3

### Model 3

# REACH-Uganda progress toward expanding multi-stage milling for clean, affordable local rice

This model focuses on the impact of better access to multi-stage mills and their associated services for smallholder farmers.

Rice is another important and fast-growing cash crop that has high potential for smallholder farmers in Uganda. At the start of the project farmers were losing out on value at the harvest and milling stages from overdrying and use of inefficient milling services that generate a higher percentage of broken kernels, resulting in financial losses for the farmer.



### Business model(s) supported

At project baseline, 80% of farmers in eastern region used single stage mills for reasons of convenience, credit, and limited awareness of other options. However, farmers using single stage mills suffer more losses due to lower recovery rates (by at least 10%) and often become entrenched in a cycle of indebtedness, which prevents them from investing further in their agricultural production.

Investments in multi-stage mills have been made in eastern Uganda over the last decade; however, these are often underutilized, running at less than 10-15% capacity. Multi-stage mills offer multiple advantages

to farmers. In addition to a price premium for paddy, multi-stage mills offer services such as drying facilities, moisture content measurement (important to prevent kernel breakage), and advice on drying and post-harvest handling. Some of the advice to farmers was delivered through embedded village agents who operated on commission and in some cases were prefinanced.

The project was able to offer a business proposition to both millers and farmers through strengthening supply chains, so that more farmers could benefit economically and millers could improve their productivity and turnover.



## Capacity to respond to market demand

REACH-Uganda partnered with five multi-stage mills – Diners Group Limited, SWT, Kibimba Ltd., Richards Group of Companies (RGC), and Lwoba Holdings. The five partners invested a total of €4,123,461 in areas of their business model such as logistics, infrastructure, technology upgrades in their milling systems, digital sourcing, product marketing, and extension and

promotion of their services. The total investment by REACH-Uganda was €332,359. Despite challenges in the business enabling environment, they have been able to adapt their business models and continue expanding their supply chains, albeit on a reduced level after the economic impact of COVID-19.

**Table 4:** Financial contribution and outputs by multi-stage mill and rice seed partners 2017-2021.

Partner, type, location	Cumulative financial contribution partners (€)	Main partnership inputs	Outcomes - rice, sourced produced, and sold
RGC, rice processor, Tororo District	43,101	<ul style="list-style-type: none"> <li>Multi-stage mill procured.</li> <li>3 moisture meters purchased.</li> <li>Drying yard expanded.</li> <li>Training of village agents in post-harvest handling.</li> </ul>	<ul style="list-style-type: none"> <li>Sourced and milled 515 mt of paddy.</li> <li>396 farmers milled with multi-stage mill.</li> <li>333 mt of milled rice sold. Cumulative turnover €199,336.</li> </ul>
Diners Group Limited, rice processor, Mbale District	30,015	<ul style="list-style-type: none"> <li>2 field extension agents recruited.</li> <li>A 12 mt truck procured.</li> <li>215 tarpaulins purchased and distributed to farmers.</li> <li>2 motorcycles purchased.</li> </ul>	<ul style="list-style-type: none"> <li>Sourced 1,999 mt from 828 farmers.</li> <li>Milled and sold 1,275 mt.</li> <li>Cumulative turnover of €850,088.</li> </ul>
Lwoba Holdings, cooperative rice scheme, Butaleja District	9,222	<ul style="list-style-type: none"> <li>2 field agents recruited.</li> <li>Concrete drying yard constructed.</li> <li>Training in post-harvest handling of paddy.</li> </ul>	<ul style="list-style-type: none"> <li>2,989 mt sourced from 570 farmers, 360 of whom were from Manafa river basin.</li> <li>1,894 mt rice milled and sold.</li> <li>Cumulative turnover of €1,110,113.</li> </ul>
SWT Tanners Ltd., rice value chain, Bulambuli District	3,948,784	<ul style="list-style-type: none"> <li>500 acres opened and cultivated.</li> <li>Produced 328 mt of paddy from SWT nucleus farm in 2021.</li> </ul>	<ul style="list-style-type: none"> <li>Cumulatively, produced 665 mt from own farm.</li> <li>Sourced 4,022 mt of paddy from 5,070 farmers.</li> <li>Milled and sold 1,819 mt.</li> <li>Created 266 full-time equivalent jobs earning an average income of €104,363.</li> <li>Additional turnover of €1,748,355.</li> <li>5.4-km access road developed, improving access to market for a minimum of 8,391 community people.</li> </ul>

Partner, type, location	Cumulative financial contribution partners (€)	Main partnership inputs	Outcomes - rice, sourced produced, and sold
Pearl Seeds Ltd., seed company, rice seed production, Wakiso District	48,933	<ul style="list-style-type: none"> <li>0.9 mt of foundation seed procured.</li> <li>Seed processing unit installed with 2 mt capacity seed cleaner.</li> <li>Demonstration plots set up for marketing seed.</li> </ul>	<ul style="list-style-type: none"> <li>Produced, processed, and cleaned 9 mt of seed crop.</li> <li>Sold 6.5 mt to 542 farmers; this seed yields on average 1.6 mt/acre.</li> <li>Planted 2 mt on their farm and stored 500 kg.</li> <li>Additional turnover of €6,209 from sale of rice seed.</li> </ul>
Kibimba Ltd., rice processor and seed producer, Bugiri District	43,406	<ul style="list-style-type: none"> <li>1.3 mt of foundation seed procured.</li> <li>2-mt seed processing unit installed with cleaner, grader, and packaging.</li> <li>20 demo plots were established.</li> <li>4 field extension workers recruited.</li> <li>2 motorcycles purchased.</li> </ul>	<ul style="list-style-type: none"> <li>Produced 194.4 mt of clean seed.</li> <li>Sold 7.9 mt to farmers and seed companies, benefiting 631 farmers.</li> <li>Planted 83.7 mt on their farm and stored 103 mt.</li> <li>Additional turnover of €7,740 from seed sales.</li> </ul>



Whereas Diners Group Limited was the only partner sourcing directly from farmers in 2019, in 2020/21 RGC, Lwoba Holdings, and SWT were able to adjust to the value proposition presented by the project. Only Kibimba Ltd. remained more restricted to their own farm activities due to the economic downturn. Despite the considerable milling capacity available (the five companies have a total milling capacity of 338 mt/day)<sup>10</sup> the mills use significantly less than 50% of their capacity.

There is no further need to invest in any additional multi-stage mills in the market. The five partners can absorb over 90% of the paddy that is currently milled at a national level by multi-stage mills when operating at full capacity - only 26% of paddy is currently milled by multi-stage mills countrywide. What should be done is to engage more farmers to benefit from existing multi-stage mills and their services to increase this percentage.

<sup>10</sup> Diners Group Limited 30 mt, SWT 200 mt, Kibimba Ltd. 48 mt, RGC 30 mt, and Lwoba Holdings 30 mt).



## Progress to date

As a result of this, the quantity of paddy supplied from smallholder farmers directly increased from 2,865 mt in 2020 to 4,892 mt in 2021. At firm level, this has led to year-over-year improvements in turnover as a result of a consistent supply of higher quality rice. In

2021, total turnover from rice milling was €2,470,606, which doubled from 2020, further demonstrating that partners have seen value in the business model and the investments made are being fully utilized.



## Impact on smallholder farmers

These partnerships are also bearing fruit at the farmer level. Through expanded supply chains, 6,654 rice farmers from 457 farmer groups have sold rice to partners and benefited from other embedded services, such as drying facilities and moisture meters. These

farmers have been able to attain a price premium that is 19% higher than when selling to local single stage mills which combined with more efficient milling services results in an additional income of €929,874, which translates to an additional €140 per farmer.



## Next steps to solidify an inclusive resilient pathway for systemic change

Although the transition to the use of multi-stage mills by farmers has taken time, the rice partners remain committed to the model and expect that the trend toward direct sourcing will continue, with expansion to almost 10,000 farmers supplying paddy to multi-stage mills by 2022 and 18,000 by 2024. Current projections estimate that 26% of farmers in the eastern region will be utilizing multi-stage mills by 2024 versus the baseline of 20%.<sup>11</sup> Single stage mills, however, still have a strong support base that needs to be eroded by multi-stage mills if higher numbers of smallholder farmers are to benefit from better opportunities for in future.

One of the reasons for the positive trend with REACH-Uganda-supported farmers, where 60% of farmers were using multi-stage mills, is the development of a more extensive network of village agents who were able to reach more farmers and increase the quantity and quality of supply to the multi-stage mills. Two partners, Diners Group Limited and RGC, have adapted this model for their own purposes but attribute their increase in sourcing to the awareness creation and farmer contact realized by these agents.

<sup>11</sup> The figure of 26% is total rice farmers in eastern Uganda. For REACH-Uganda 60% are now using multi-stage mills compared to 20% at baseline.

## Model 4

# REACH-Uganda progress toward establishing a local rice seed industry

This model focuses on the pathway of establishing a lowland rice seed industry in eastern Uganda to produce higher yielding certified seed.

With no commercial production of lowland rice seed in Uganda, a key starting point for the rice pathways was the seed sector. Clean seed is one of the key determinants of productivity in rice, but in the absence of any certified or clean lowland rice seed on the market, farmers have continued the practice of recycling seed with disappointing results. Further, a lack of homogeneity in the harvested crop reduces the overall quality and sales price for farmers.



### Business model(s) supported

The project established partnerships with Kibimba Ltd. and Pearl Seeds Ltd. to boost the availability of improved varieties of lowland rice seed in Uganda. Commercial partners were required to ensure that scale could be achieved with a higher yielding variety (Wita 9) and that quality standards could be met in the industry given the complete absence of any commercial lowland rice seed production in the country.

The models adopted by the partners were slightly different. Kibimba Ltd. opted to grow the rice seed on its own farm, whereas Pearl Seeds' production is done by selected outgrowers in four rice-growing districts. Pearl Seeds identified outgrowers with land who were willing to grow rice seed, and provided them with inputs (foundation seed, fertilizer, chemicals, etc.). The outgrowers were then trained in agronomy and crop management. Pearl Seeds buys the harvested seed from the outgrowers, which is transported to the seed processing facility for processing, storage, and marketing/sale to farmers for production of paddy rice.



### Capacity to respond to market demand

The current output of the two partners can support production of 256 mt of seed per annum. The current demand for certified seed in eastern Uganda is approximately 8,000 mt. Based on this the two partners will only cover 3% of the estimated demand at the

present level of operation. However, if they reach full potential, it will increase to 20%. As such, there is still room for other players in the market, although experience in Upland rice with the seed market has shown that uptake can be slow.



## Progress to date

REACH-Uganda co-funded the cost of seed cleaners, as well as promotional and marketing activities, while partners invested in other machinery and inputs, such as mechanical dryers, housing units, and foundation seed. Both partners have been able to get their seed production and cleaning operations up and running. Cumulatively, 203 mt seed has been grown from foundation seed and cleaned, and 70 mt of seed has been stored. Pearl Seeds, as a registered seed company,

has been able to move quickly from production through to certification and sale, whereas Kibimba Ltd. is still engaged with MAAIF over its registration status and is therefore unable to sell certified seed at present. At the same time, the current state of limbo in the rice sector has restricted the planned developments of Kibimba Ltd. in seed production; instead, it is focused on its own paddy production for the time being.



## Impact on smallholder farmers

Through these two partnerships, over 13 mt of clean seed has been sold to 1,173 farmers at a cost of UGX 4,000-5,000/kg. For farmers who have bought the seed, the impact on yields has been significant. The yield per acre of clean/certified seed is 24% higher than home-saved seed, as observed over the last two years.

Although the cost is two times higher than home-saved seed, in real terms this is only UGX 25,000 per acre of production, which is minimal compared to the benefit gained. For the seed outgrowers under the Pearl Seeds model, the enterprise is profitable, with net income at €411 per acre of seed produced at the current price.



## Next steps to solidify an inclusive resilient pathway for systemic change

Economic analysis shows that investing in rice seed production using the outgrower model is a viable and sustainable business model. Partnership with an established actor, such as Pearl Seeds, is more efficient due to their experience in seed business, network of established distribution channels, and existing

registration status as a seed company. Pearl Seeds plans to continue with rice seed production as they anticipate a higher demand for rice seed of 500-1,000 mt per year, to supply farmers in both northern and eastern Uganda by 2023.

## 2.5

# REACH-Uganda work on the enabling environment

This section discusses the main enabling environment bottlenecks that were identified by REACH-Uganda and its partners and how they were addressed.

The main bottleneck identified in the policy environment for potato was in seed inspection and certification. At the policy level, there were no specific guidelines or protocol for seed potato inspection or certification in place; rather, potato was included in the general crop inspection guidelines. Through discussions with industry stakeholders, MAAIF and CIP were able to spearhead the development of a protocol, which was supported by REACH-Uganda, ISSD, and others. This provides the guidelines for all seed potato classifications in Uganda. For imported varieties of seed, there were no registered commercial seed potato producers in the country, which is a necessary precondition for breeders to provide materials for multiplication in Uganda. REACH-Uganda was able to support the four commercial producers on the seed protocols and guide them through the process of registration as seed producers with MAAIF. All the four commercial farms (Clarke Farm, Namakwaland, Kakie and FICA Seed) were officially registered, have gone through the inspection process for one season. Three of them now have seed that has been certified.

They also have breeder agreements with either HZPC or Agrico, which have a provision for royalties.

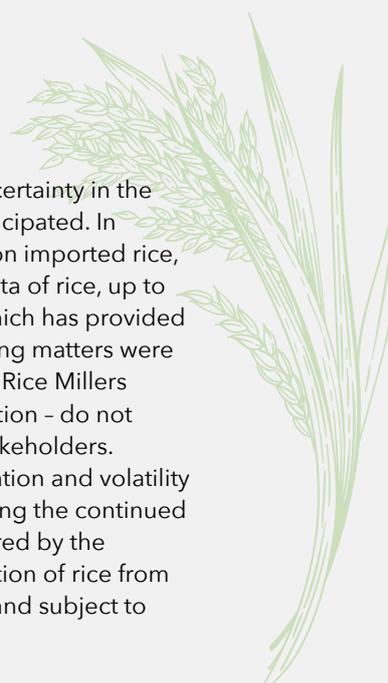
Similarly, there were capacity gaps in the inspection system at the local level. District Agricultural Officers have generally taken on this function for crops, but without specific knowledge of seed potato inspection. In collaboration with ISSD and PNSP, REACH-Uganda supported the training of 67 local seed inspectors on seed potato quality assurance in Kigezi and Elgon regions, with a specific focus on QDS. Subsequent to the training, potato was removed from the list of QDS crops in Uganda, but it has since been integrated into the inspection and certification protocol as class II seed. With the rollout of the new protocol, there will be an important role for local seed inspectors in monitoring crop performance, although final testing and certification will be conducted centrally under National Certification and Inspection Services of MAAIF.

In rice, the enabling environment was challenging and affected business investments and operations in the sector. The approach taken by the REACH-Uganda project at this level is discussed Box 3.

### Box 3

#### Rice importation duties: A case of “do no harm”

In rice, the tumultuous nature of the policy environment resulted in uncertainty in the industry, with the surge in domestic production not taking place as anticipated. In 2019, there was a reversal in the policy of the Common External Tariff on imported rice, with the Government of Uganda allowing importation of a specific quota of rice, up to 50,000 mt. This rice flooded the domestic market at cheaper prices, which has provided a disincentive for both farmers and millers to invest. Further complicating matters were divisions within the rice sector itself. The three platforms in the sector – Rice Millers Council, Rice Association of Uganda, and Rice Business Sector Association – do not present a unified voice, each promoting the differing interests of its stakeholders. Therefore, the project faced a difficult balancing act given the politicization and volatility of this issue. The decision was made to remain impartial while supporting the continued efforts of partners in the sector and to provide information when required by the platforms to support any lobbying efforts. As of mid-2021, the importation of rice from Tanzania had begun to decrease; however, the situation remains fluid and subject to regional rice production fluctuations and political interference.



## 2.6

# REACH-Uganda progress in last-mile agrochemical distribution

This section discusses the models promoted to improve last mile agrochemical access by smallholder farmers. In addition to access to clean seed, the intensification approach promoted better access to crop protection products and fertilizer. This was done through two

models, which were not developed as full systemic pathways: promotion of crop-specific fertilizer for rice and potato and enabling safe and correct use of agrochemicals through promotion of the spray service provider (SSP) model.



### Promotion of crop specific fertilizer

For fertilizer, the project partnered with Grainpulse Limited for the promotion of access to crop-specific fertilizer, which had been developed from soil analysis and tailored to the specific nutrient needs of rice and potato. The blended products had recently entered the market, although their outreach in rural markets had been limited. Through the partnership, 42 district- and sub-county-level stockists were selected and trained on product knowledge of crop-specific fertilizers, and 72 demonstrations were established to compare Grainpulse Limited's crop-specific fertilizer with the generic ones on the market.



### Progress to date

As a result of the partnership, Grainpulse Limited has been able to improve its distribution networks. An additional 25 agro-input stockists have become established in the areas of Namutumba, Sironko, Bugiri, Kabale, and Rubanda for easier access to the products for the farmers. These stockists have purchased and stocked over 349 mt of potato and rice fertilizer blends<sup>12</sup> and have observed repeat purchases of the fertilizer by farmers. At the same time, market penetration has remained a challenge. Farmers are still unfamiliar with the blended products and unconvinced about their efficacy versus the generic brands on the market.

In 2021, the cost of imported fertilizer increased considerably in Uganda (due to supply chain issues), which may present an opportunity for Grainpulse Limited, as a local blender, to capitalize on this price gap, given that demand is increasing. The general use of fertilizer has increased over the course of the project; in potato, 95% of farmers are using fertilizer, compared to the baseline of 80%, though correct use is much lower. There is opportunity for Grainpulse Limited to capitalize on this demand; however, convincing farmers on their comparative advantage remains a gap. So far price has been the key determinant of farmer preference, as the efficacy has not yet been proven in a widespread manner at farmer level.

<sup>12</sup> Most have stocked potato blends so far. Only a few have stocked rice blends due to its hygroscopicity (rice blends have a tendency to absorb moisture from air); it is only stocked when requested.



## Promotion of access to and safe use of agrochemicals through spray service providers

Under Output 1.6, REACH-Uganda supported the establishment of SSP networks to promote better access to and correct use of crop protection spray services at the community level. SSPs are 60% youth and as part of the community can develop a tight-knit inclusive network of client farmers. A knowledgeable SSP can provide immediate hands-on advice to a farmer on safe handling and correct use of agrochemicals.

In total, 137 SSPs (of which 84 were youth) were trained on correct use and safe handling of agrochemicals, business skills, and financial literacy and were able to form associations in three districts (Bugiri, Kabale, and Kanungu). To develop awareness of the benefits of the SSP model, REACH-Uganda supported market activation and promotional activities of the associations, including demonstration gardens, field day events, and radio talk shows. In addition, efforts were made to link the associations to registered agro dealers.

### Progress to date

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The effectiveness of the associations depends heavily on the capacity of the leadership and the business acumen of its members. Bugiri Spray Service Provider Association has made significant strides in developing a network of clients within and outside the district (897 farmers) and were able to establish their own inputs shop, whereas others have been less proactive or have faced governance issues. Farmers who are clients of SSPs report improvements in yield, which they attribute to the effectiveness of the spray service provision in addressing pest and diseases. This is in addition to on-farm advice given by the SSPs for farmers to improve their agronomic practices.

At the end of the project, 53 of the 137 trained SSPs were active, with a number falling away during the economic downturn. The model requires a number of other factors to be in place for it to grow – a more functional supply chain of agrochemicals, more farmers with access to good seed that require the services, more structured extension systems that can use their services. At present, SSPs through their individual networks are making a small profit, though business is insufficient to provide a livelihood on its own. Average net income for SSPs per season is €125. Business opportunities have increased for SSPs who are part of an association that is active in promotion of its services among both farmers and commercial farms, which have higher continuous demand for the services.



## 2.7

# REACH-Uganda progress in promoting access to agri-finance

This section discussed the models promoted under REACH-Uganda to improve access to agri-finance at farmer level. As only one partnership was established, this was not a full systemic pathway; however, some important learnings can be drawn out.

Under Output 1.4 of the project indicator framework, REACH-Uganda employed a two-pronged approach to improve access to finance at the farmer level: access to savings and loans through the informal village savings and loan association (VSLA) approach and working with financial institutions directly. The VSLA approach

is discussed in more detail in Chapter 3 under the Resilience section, as this was a central component of the project's resilience strategy. The VSLA is an important stepping stone from which farmers can graduate into the world of financial institutions, either microfinance or banks, which offer higher levels of credit but also present more challenges for farmers in terms of collateral, bureaucracy, and costs that may prevent them from accessing such facilities to invest in their agricultural production. In this section, access to more formal financing mechanisms is discussed.



## Business model(s) investigated and/or supported

REACH-Uganda engaged a number of financial institutions in discussions on the issues highlighted above. Most discussion did not reach the stage of partnership development, due to the lack of interest of financial institutions in taking on farmer risk in remote rural areas. The institutions often expected that REACH-Uganda would cover their risks, such as farmer engagement, resources for staff, and guarantee of loans.

However, the project was not willing to subsidize the institutions for reasons of market distortion. In the end, the project did establish a partnership with Microfinance Support Centre (MSC), which was interested in expanding their lending base with a competitive group loan product that offered reasonable cost incentives for farmers.



## Progress and experience to date

MSC already had a farmer group loan product but had difficulties in their farmer engagement with it. At a 1% interest rate per month, the MSC loan is more affordable to farmers than a commercial bank rate of at least 2% and it is suitable for rice and potato farmers. However, the model also has limitations. Despite the inclusion of more loan officers, the outreach of institutions such as

MSC is still limited. Over the two years of the partnership with REACH-Uganda, MSC was able to sensitize 62 farmer groups on their loan products and disburse loans to 210 farmers amounting to UGX 336,000,000, or €80,235.<sup>13</sup> Also, loans have not always been timely and have been subject to the bureaucratic system within MSC.

<sup>13</sup> Exchange rate: €1 = UGX 4,187.



## Impact on smallholder farmers

The positive aspect of the model from a smallholder farmer standpoint is that repayment is based on the maturity period of the crop. Encouragingly, the loan repayment percentage by farmers has been good at 95%. The loans have been used to make larger investments in productive assets, such as land, as well as agro-inputs and to cover some household costs.

At the same time, the scale of MSC's footprint in reaching farmers has been limited. One of the important

findings of this partnership has been the challenges of farmer group engagement, which requires a significant investment in time from the financial institution. As such MSC can only develop a limited pipeline despite the attractiveness of their product. Farmer groups still need a lot of sensitization and preparation on proper utilization of funds; however, with the big catchment area for MSC, this has not been handled adequately because of limitations in its staffing level.



## Next steps needed to improve agri-financing

The MSC experience shows that face-to-face contact with farmers remains essential for better understanding of the requirements to ensure the loan process goes smoothly. To some extent, this gap is being overcome by financial actors through digital banking. While this has not replaced the critical nature of the face-to-face

relationship, it could shorten some of the steps and time taken. This should be explored further in future models. Until this gap is bridged adequately through a balance in digital approach and frontline staff, in the absence of more risk-taking approaches by projects, the numbers may not improve significantly.



## 2.8

# REACH-Uganda investment in infrastructure

This section discusses the investments made by REACH-Uganda and partners in improving infrastructure in project areas to enable access to markets, services, and water for production.

## Roads

Under Output 1.9, to support better access to input and output markets and essential services for business and farmers, over 67 km of rural feeder roads were rehabilitated or constructed. These strategic infrastructure interventions were done predominantly in partnership with four District Local Governments,

with one road in Bulambuli (Nalondo-Buriano) done in partnership with SWT. The total investment was €1,769,717, of which the DLGs/partners covered €720,457 and the project covered €1,049,260, as per Table 5.

**Table 5:** Completed roads by district, costs, and financial contributions.

District	Road	Kilometers	Population Reached	IFDC Cost - Actual (UGX)	Public/Private Sector Cost - Actual (UGX)-	Total Cost - Actual (UGX)
Butaleja	Doho 1 rice scheme	10.15	32,895	354,641,200	609,500,000	964,141,200
Kanungu	Rutenga-Kirimbe TC	7.85	13,578	843,532,705	351,700,000	1,195,232,705
Kween	Cheminy-Atar	26.13	30,515	1,626,001,725	841,939,750	2,467,941,475
Rubanda	Ihanga-Kyamabare-Butobore-Nyaruhanga	18.1	72,095	1,132,513,867	410,448,000	1,542,961,867
Bulambuli	Nalondo-Buriano (partnership with SWT to access irrigation scheme)	5.2	7,765	437,296,570	803,470,812	1,240,767,382
<b>Total</b>		<b>67.43</b>	<b>156,848</b>	<b>4,393,986,067</b>	<b>3,017,058,562</b>	<b>7,411,044,629</b>

Over 156,000 community members benefited from the 67 km of rehabilitated/constructed roads, which substantially exceeds the project target of 25 km. There has been a 50% reduction in transport costs and travel times for produce, which improves cost margins for farmers and also reduces losses in transport to market. Furthermore, prices for produce have improved. For potato, prices improved by over 30% as a result of better access to market and less deterioration in quality in highland areas where poor-quality roads would often require produce to be transported on foot. Farmers along these roads have also reported improved access to agro-inputs for crop production.

Additionally, there was a significant improvement in time taken to access social amenities - health centers, schools, extension, and public administrative - from over one hour on average to less than 30 minutes. The communities in the road's catchments attributed this to the improved road infrastructure.

As part of the handover of the roads to the districts, operation and maintenance plans were developed, with resources earmarked to ensure the roads are kept in motorable condition. Two years after handover of the roads, district and sub-county authorities are conducting periodic maintenance, and they have continued to provide benefits to the communities in the road catchments. At the same time, for some of the mountainous roads, such as Kween, the District Local Government will have to continue to improve the specifications of the road by adding more gravel to the surface and further drainage points, given the heavy rainfall and steep slopes, which often lead to rapid erosion of the motorable surface in this area.





## Irrigation

In line with the Government of Uganda rice strategy, REACH-Uganda has supported the shift toward self-sustainability in rice production through strategic public-private and private partnership interventions. With a more conducive business enabling environment from 2017 to 2019, the rice processing industry in Uganda was willing and able to shift away from importation models toward a long-term investment strategy in domestic production. SWT was one of the rice industry players at the forefront of this shift and invested in 5,000 acres of land in eastern Uganda with the aim of producing their own rice for processing through a nucleus farm and later an outgrower scheme. Through the partnership with SWT, the project was able to provide technical support on the design of the irrigated farm and improve access to and from the farm through a 5 km access road. REACH-Uganda also supported the improvement of infrastructure in Doho Irrigation Scheme in Butaleja District through the development of a further 10 km of linkage roads to improve access to uncultivated land within the scheme.

Overall, these efforts have been hampered by the tumultuous nature of the business enabling environment since 2019, when the Government of Uganda suspended import duties on rice, which in turn disincentivized investment in domestic production. As a result of this, the pace of development of irrigated farms in the sector has slowed, with most suspending their infrastructure development in eastern and northern Uganda. Despite this, SWT has adapted its strategy toward incremental cultivation of the farm. A total of 500 acres has been opened and cultivated, producing 665 mt of rice so far, and a further 1,000 acres will be opened by the end of 2021. The scheme has created 266 new full-time equivalent jobs, resulting in an additional €104,363 income. Although the outgrower component has not taken off as planned due to the challenges mentioned above, SWT has been able to expand its supply chain directly from smallholder farmers in eastern and northern Uganda.

In potato, gravity fed-irrigation systems were established with partners MIFA and KGCF. The irrigation system is utilized for potatoes (seed) and other crops such as cabbages, onions, and tomatoes. This has encouraged crop rotation and farmers are earning an extra income from crop diversification. As a result of this, 104 additional farmers are now earning a 68% increase in profits using irrigation in the off-season as compared to the rainfed season. Both partners have plans to increase land for production under irrigation and to encourage other farmers to purchase equipment needed for drip irrigation.





## REACH-Uganda cumulative results and investment portfolio impact

This section shows the cumulative impact of the REACH-Uganda project by 2021 and future impact when all partnerships REACH-Uganda maturity in 2024. Table 6 below shows the cumulative results of REACH-Uganda by the end of the project.

**Table 6:** REACH-Uganda aggregate results 2016-2021.

REACH-Uganda Cumulative results 2021	
Impact - Household Resilience	
<b>Income</b>	√ By June 2021, additional income of €2,413,523 generated for 11,763 farmers through 14 partnerships. Total additional income for farmers from partnerships signed is projected to be €14,528,068.
<b>Jobs</b>	<p>√ In 2021, additional 62 full-time jobs were created, giving a total of 352 full-time jobs created cumulatively: 43 in factory operation management and 309 in on-farm production.</p> <p>√ Total full-time jobs, from partnerships signed, is expected to be 847.</p>
<b>Food security</b>	√ In 2021, 62% farming households are food-secure, which is an improvement from 59% in 2020. This is attributed to yield increments, as well as crop and income diversification. Farmers are able to sell and yet keep enough for home consumption as well as buy extra foodstuffs they do not grow.
Impact - Improved Sector Resilience in 2021	
<b>Lead firm and service provider performance</b>	<p>√ By end of June 2021, lead firm and service providers had increased their sales turnover by €4,865,438 derived from the investments in the completed detailed collaboration agreements.</p> <p>√ By end of June 2021, 23 additional innovative business practices were introduced including cost-effective and practical screenhouses for farmers and business digitalization for marketing and service delivery.</p> <p>√ Lead firms and service providers improved their product quality: Additional innovative business practices were introduced: commercial production of new Dutch potato varieties, commercial seed potato production in eastern Uganda, establishment of cold chain storage units and ambient stores for Dutch seed potato.</p>
<b>Farm productivity</b>	√ Farmer productivity has increased by from 3.07 mt/acre to 4.15 mt/acre for potato (35%) and from 0.6 mt/acre to 1.36 mt/acre (126%) for rice. The average yield per year was 3.97 mt/acre for potato and 1.07 mt/acre for rice. The overall increase in rice is attributed to farm practices that have improved over time related to line planting, increased use of fertilizers, field preparation, weed management, pest and disease management, and post-harvest handling by rice farmers, whereas potato farmers relate more to planting improved early-maturing varieties, and using water catchments, in addition to use of fertilizers and proper management of pests and diseases.

## REACH-Uganda Cumulative results 2021

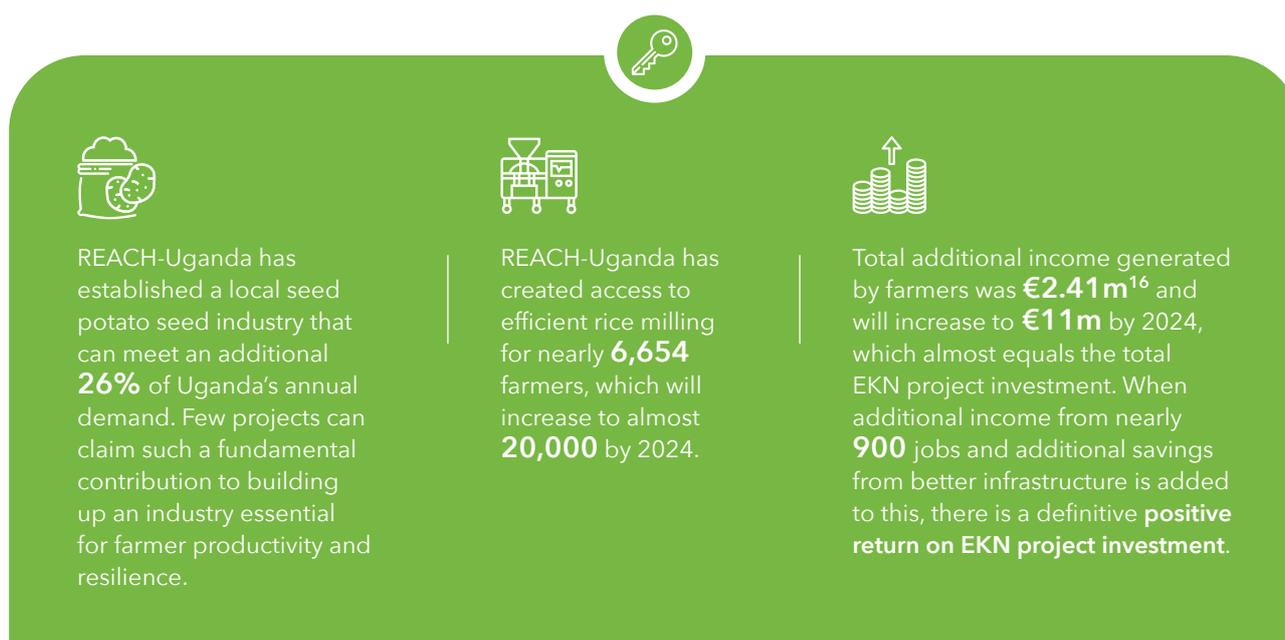
- Farmers adopt resilience strategies**
- ✓ In 2021, all farmers practiced 1 of 10 approaches of CSA, 84% practiced 4 of 10, and 61% practiced 5 of 10 approaches. Commonly practiced CSA approaches were crop and income diversification, planting good seed, planting on time, and using water catchments. Crop diversification was an approach used by 97% of trained farmers (versus 77% of untrained farmers) to improve food security, quality of soils, and provide a backup source of income.
  - ✓ In 2021, 80% of farmers practiced elements of income diversification strategies, 46% of whom were engaged in off-farm small-scale business, reducing their reliance on agriculture as an income source.
  - ✓ In 2021, 50% of farming households practiced joint decision making for the family farm. The average over the course of the project was 58% compared to the baseline of 45%. Joint decision making on planning/budgeting has increased to support agricultural production.

### Outcomes - Systemic change pathways

- Improved access to markets**
- ✓ In 2021, 6,654 rice farmers from 457 farmer groups enjoyed better access to markets with premium prices and higher milling returns as a result of collective sales, storage, value addition, and/or linkages with lead firms (multi-stage mills).
- 
- Improved access to inputs and equipment**
- ✓ Partnerships signed in 2019/2020 with Namakwaland, Clarke Farm, FICA and Kakie are expected to produce 496 mt of seed that will be sold to 620 farmers in 2022. At full capacity, these partnerships will enable 1,241 potato farmers to have access to better quality Dutch seed potato by 2024.
  - ✓ Partnerships signed with ISBs will cumulatively produce 10,569.50 mt of QDS, enabling 13,212 farmers to access to better quality inputs (QDS seed potato) by 2023. To date, 2,837 mt of clean seed has been produced, benefiting 3,546 farmers.
  - ✓ 1,173 rice farmers have had access to better clean seed through partnerships with Pearl Seed and Kibimba Ltd. A total of 15,317 rice farmers will have access to 184 mt of quality seed by 2022.
- 
- Improved access to finance**
- ✓ Cumulatively, MSC disbursed 14 loans, creating financial access to 200 farmers amounting to €80,235.
  - ✓ In 2021 an additional 5 farmer group loans approved, worth €21,014, or UGX 88,000,000, were approved at a low interest rate of 1% per month.
  - ✓ 55% of all farmers had access to finance through formal financial institutions, compared to baseline of 27%, whereas 88% of farmers had access to finance through VSLAs.
- 
- Improved access to water for irrigation.**
- ✓ In 2021, SWT produced 328 mt of paddy from 230 acres of irrigated land. Additionally, employment opportunities were created for additional 44 individuals who worked casual laborers and permanent staff on the nucleus farm.
  - ✓ Through the gravity fed-irrigation systems at MIFA and KGCF, 104 additional farmers are now earning a 68% increase in profits using irrigation in the off-season as compared to the rainfed season. The irrigation system is utilized for potatoes (seed) and other crops such as cabbage, onion, and tomato.

Outputs	2021	Cumulative
9. Private sector investment leveraged	€193,448	€5,437,134
8. Private sector innovations adopted	7	23
7. Clean seed potato produced (mt)	594.8 <sup>14</sup>	4,689 <sup>15</sup>
6. Seed multipliers linked to Dutch businesses	1	4
5. Dutch potato varieties introduced	16 varieties were evaluated and have been submitted to the Varietal Release Committee (VRC), which will meet in the third quarter of 2021.	3 varieties under production in Uganda - Markies, Taurus, and Panamera.

Figure 4 shows the REACH-Uganda Theory of Change and the aggregated impact from its investment portfolio. Key takeaways from this are:



<sup>14</sup> Figure includes pre-basic, basic and QDS figures recorded at LSBs.

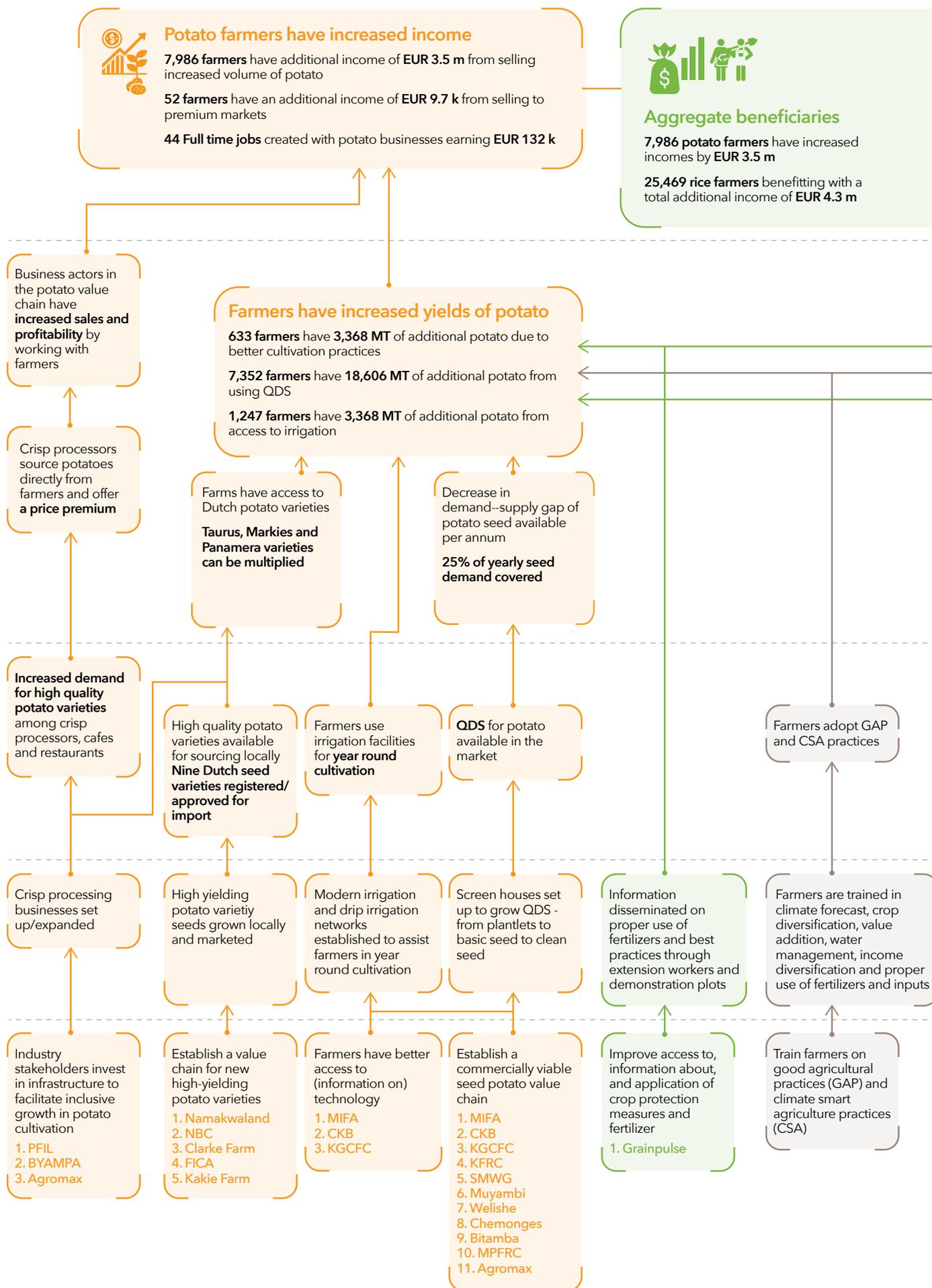
<sup>15</sup> Figure includes pre-basic, basic and QDS figures recorded at LSBs within the full network of LSBs. Some of this seed may have also come through the NARO system.

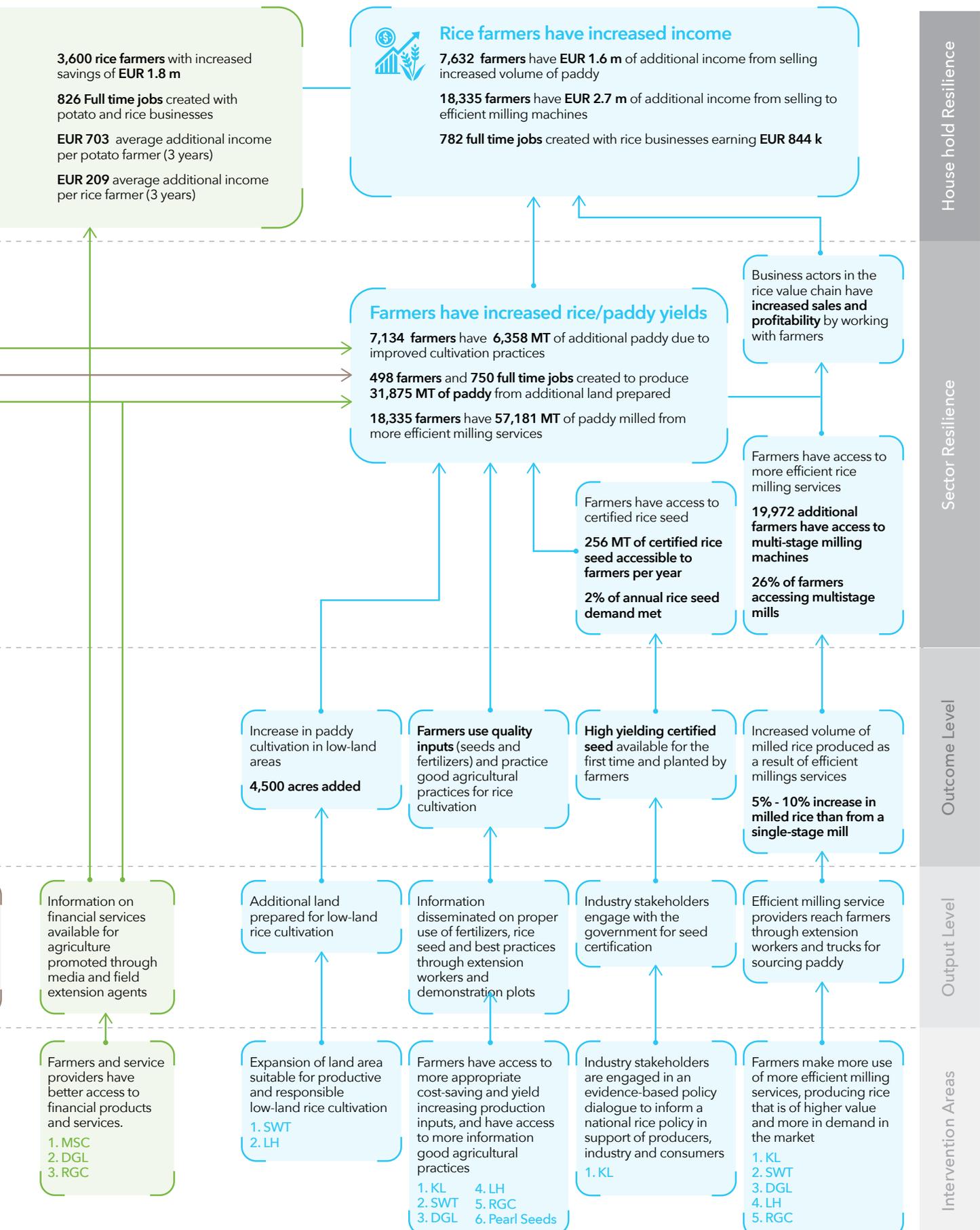
<sup>16</sup> 11,763 farmers.



Figure 4

REACH-Uganda Theory of Change and High-Level Results.







## REACH-Uganda uplift: progress toward household resilience

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3.1 REACH-Uganda progress in  
delivering farmer uplift

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3.2 Smallholders adopt good  
practices, become more  
resilient

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3.3 REACH-Uganda combined  
impact on smallholders

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This chapter discusses the farmer uplift program implemented by the REACH-Uganda project in support of systemic pathways in Chapter 2.

Building off the work done by CATALIST, REACH-Uganda has conducted uplift programs on farming as a business (FaaB), good agricultural practices (GAPs), climate-smart agriculture (CSA), and resilience strategies (which include income diversification, access to finance/savings plans, gender/joint household decision making,

and application of CSA). The farmer uplift program relates to Outcomes 2.1 and 2.2 in the project indicator framework: increased yields to 65% of optimal level (2.1) and adoption and used of resilience strategies (2.2). The program was designed with four measurable components of resilience in mind. (see Box 4).

#### Box 4

### Components of the REACH-Uganda Resilience Strategy

REACH-Uganda defined resilience as the ability of people and systems to resist, absorb, and transform in response to shocks and setbacks.

The project identified four key measurable components that contribute to household resilience: income diversification, climate-smart agriculture, access to finance, and gender dynamics.



#### Income diversification

Improving knowledge of different income sources with the main objective of maximizing profits from various well-established sources of investments.



#### Climate-smart agriculture

A "smart" approach with selected CSA practices allowing for climate shock mitigation and preparation, as well as being economically beneficial to smallholder farmers.



#### Access to finance

Making farmers more bankable and business oriented, promoting VSLAs (including a savings culture), and linking them with conventional financial institutions.



#### Gender

Promotion of joint decision making by spouses in the allocation of resources for social and productive purposes.

The training content was modified based on lessons learned from the CATALIST project, including the need to provide an integrated training of the FaaB and GAP components for ease of learning and knowledge transfer. Furthermore, other key lessons that were incorporated included providing trainers that were more community-based, encouraging more farmer-owned practical demonstration, and ensuring greater flexibility

in timing and duration of trainings based on farmers preferred needs.

In 2018, all of this was incorporated into an integrated training manual, which also covered ancillary crops in addition to rice and potato. A summary of the integrated training manual is provided in Annex 10.

## 3.1

# REACH-Uganda progress in delivering farmer uplift

This section discusses the implementation of the training program, including the number and type of farmers trained and technical areas of training.



## Farmer uplift programs conducted

The project's approach to improving resilience involved promoting knowledge transfer on four key areas topics (mentioned above) through group-based training, which was then reinforced by better access to services or products through the project's partnerships, as discussed in Chapter 2. Farmer group trainings were combined with practical field demonstrations and were conducted using two approaches - through local partner NGOs and through individual field extension workers who were embedded in the local communities. All trainings were conducted using a flexible approach; the timing of training was agreed upon by groups beforehand, taking into consideration community events and periods where participants were busy on their own farms. The training program integrated GAPs, FaaB, CSA, income diversification, and gender into the same curriculum, which was split into several modules involving a contact session every week for eight to ten weeks. This ensured more continuity in attendance, as farmers appreciated the linkage between the topics through the entire farming calendar rather than as standalone training components. One additional component of the training program was included on financial literacy and business skills. Given its specialist nature, this component was rolled out through business service providers in the two regions.

The training program components were as follows:



**FaaB** is a technical approach involving capacity building of low-income small-scale farmers with the aim to sustainably increase profits from their farming enterprises, while contributing to an enabling environment, allowing them greater market engagement. REACH-Uganda FaaB trainings involved several training subjects and topics, including goal setting, habits of a successful market-oriented farmer, development of a projected income statement, crop variety selection, profit maximization, and joint decision making.



**GAP** trainings focused on improving knowledge on good agronomic practices in rice, potato, and ancillary crop production. (This is further explained in the training manual Annex 10.)



**CSA.** In the face of a changing climate, farmers need to be able to better adapt in their farming and manage these changes where possible. REACH-Uganda designed this component of the training program around the three pillars of climate-smart agriculture: productivity improvement, adaptation, and mitigation. The key productivity approaches were conducted in conjunction with the GAP training, with emphasis on soil and water conservation, making use of weather data, use of quality/clean seed, and balanced fertilizer use, while the adaptation techniques comprised crop and enterprise diversification and access to finance, as previously discussed. Under mitigation, the project emphasized techniques that reduce greenhouse gas emissions, such as smart fertilizer usage and good soil management.



**Income diversification.** In addition to the many ways to diversify income sources, a crop diversification approach beyond the main crops of rice and potato was also promoted. For potato, the secondary crops promoted were climbing beans, cabbage, and onions; for rice, the crops were beans (soy and common).



**Access to finance.** To promote better access to finance for farmers, the project established and trained members of VSLAs on financial literacy and business skills. The business skills component was included in recognition of the

need to plan and optimize use of the resources available through the groups, and focused on leadership and governance, business planning, marketing and networking, and budgeting for a farm business.



### Gender/joint household decision making.

Enhancing joint household decision making was a key component of the resilience strategy. The approach aimed at addressing key constraints and tackling root causes that drive the social gaps.

39,121 individual farmers. In total, 36,398 farmers were trained in GAPs for rice and potato, 35,913 in FaaB, and 35,536 in CSA. Of the farmers trained in these three subjects, 62% were female and 37% were youth. Farmers were expected to attend at least 75% of the modules to be considered trained.

Under the resilience components, 33,935 farmers were trained in income diversification. In financial literacy, business skills, and VSLA, over 23,000 farmers were trained, although the target of 36,000 was not reached because of travel and meeting restrictions imposed by the nationwide lockdown due to the pandemic. A total of 31,478 farmers were trained on gender dynamics. This was enhanced by the change agent approach, in which key change agents or influencers were identified in the communities to promote behavior change on gender dynamics at the household level.

Table 7 provides an overview of the uplift programs conducted by REACH-Uganda. The training program was rolled out to over 1,943 farmer groups consisting of

**Table 7:** Training programs conducted by REACH-Uganda.

	2017			2018			2019			Cumulative		
	Rice	Potato	Total	Rice	Potato	Total	Rice	Potato	Total	Total	Male	Female
FaaB	12,565	5,913	18,478	5,920	3,059	8,979	6,116	2,825	8,941	<b>36,398</b>	<b>13,896</b>	<b>22,502</b>
GAP	10,310	4,857	15,167	8,175	3,630	11,805	6,116	2,825	8,941	<b>35,913</b>	<b>13,707</b>	<b>22,206</b>
Income Diversification	5,613	3,297	8,910	9,490	6,594	16,084	6,116	2,825	8,941	<b>33,935</b>	<b>13,845</b>	<b>20,090</b>
Access to Finance	0	0	0	9,929	6,619	16,548	4,506	2,762	7,268	<b>23,816</b>	<b>11,598</b>	<b>12,218</b>
Joint Decision Making	2,240	2,526	4,766	7,089	8,665	15,754	5,917	5,041	10,958	<b>31,478</b>	<b>12,220</b>	<b>19,258</b>
CSA	5740	3826	9566	10388	6641	17029	6,116	2,825	8,941	35,536	13,588	21,948
Ancillary Crops	0	0	0	10,217	3,406	13,623	13,691	6,743	20,435	34,058	13,160	20,898

Finally, 34,058 farmers were trained on GAPs and CSA practices for five ancillary crops that are of economic and nutritional importance to potato and rice farmers within their wider farming systems.



## Profile of farmers trained by REACH-Uganda

Farmers reached by the REACH-Uganda project can be classified as follows:

- **Commercially oriented farmers** with more than 3 acres of cultivated land (farmers who always produce a surplus, hire labor to cultivate land).
- **Smallholder farmers** cultivating between 1 and 3 acres of land (farmers who produce some surplus, use mainly family labour).
- **Resource-constrained farmers** with less than 1 acre (farmers who are barely able, if at all, to support a household).

As Table 8 shows, most potato farmers reached (59%) were smallholders. This was expected since average land holdings in potato-cultivating areas, especially the southwest, are small. On the other hand, most rice farmers (73%) were commercially oriented. This is because rice farmers are inclined to rent additional land (in low lying areas, estates, or schemes) for rice production. The project did not have an in-built targeting strategy for resource constrained farmers which only made up 4% of potato and 1% of rice farmers. What it did seek to do was uplift smallholder farmers who were aspiring to transition towards a more business centric approach in rice and potato.

**Table 8:** Categories of farmers trained by REACH-Uganda.

	Potato farmers	Rice farmers
Average acreage farmed (all crops)	3.5	6
Percentage of farmers cultivating more than 3 acres (all crops)	37	73
Percentage farmers cultivating 1-3 acres (all crops)	59	26
Percentage of farmers cultivating less than 1 acre (all crops)	4	1
	<b>100%</b>	<b>100%</b>
Percentage of farmers cultivating more than 3 acres of potato/rice	6	18
Percentage of farmers cultivating 1-3 acres of potato/rice	38	70
Percentage of farmers cultivating less than 1 acre of potato/rice	55	12
	<b>100%</b>	<b>100%</b>

## 3.2

# Smallholders adopt good practices, become more resilient

This section discusses how the training program has influenced farmer adoption of good agronomic practices and how farmers are becoming more resilient. The outcomes of the training program are discussed below.



### FaaB

Through the training farmers reported been able establish their cost of production for a season (expenditures) and estimate the amount of profit or loss they will make at the end. This is critical to ensure that farming is taken on as a business and investments are made based on economic principles, among other factors.



### Good Agricultural Practices

By the end of the project, 85% of farmers practiced at least four out of nine recommended GAPs, which no farmers did before the training; 88% of farmers practiced three out of nine GAPs, compared to the baseline of 52%. This demonstrates a clear improvement. Rice farmers adopted several key GAPs, including line planting, increased use of fertilizers, field preparation, weed management, pest and disease management, and post-harvest handling. Potato farmers adopted planting improved early-maturing varieties, using water catchments, increased use of fertilizers, and proper management of pests and diseases.





## Climate-Smart Agriculture

By the end of the project, over 61% of farmers had adopted five out of 10 CSA practices; at the start of the training, the figure was 48%. This demonstrates that farmers have absorbed the knowledge from the training and technical support provided.

Considering this more closely in terms of resilience, however, farmers still face difficulties in the event of a climatic shock or setback. Both rice- and potato-growing areas are increasingly subject to uncertain rainfall, increased droughts, and flooding, and changing rainy seasons. Rainfall patterns were irregular throughout the project period, with drought conditions occurring in consecutive agricultural seasons (2016B and 2017A) and above normal rainfall in 2018A, both seasons of 2019, and 2020A. These fluctuations - too much or too little rain - impacted farmer yields, given that over 90% of production is still rainfed.

Over 59% of potato farmers and 76% of rice farmers still perceive their yields did not meet their expectations, primarily due to harsh weather conditions, excess

sunlight, droughts, and less rainfall. This suggests that, although more techniques are being used by farmers, these do not fully reduce the impact of weather events. Therefore, although yield improvements have been made overall, farmers expect better performance from rice and potato. Going forward, this will require the adoption of more key practices, coupled with promotion of access to the services/goods through the project partnerships as they become available to more households, to build resilience to weather events.

In rice, the key practice for lessening impact from changing climate is proper water conservation and management practices. In drought conditions, farmers who constructed bunds and were able to save water from early rains had no significant impact on their yields.

In potato, more farmers suffered from yield losses due to weather events, although adoption of some climate-smart practices, such as improved terracing (larger mounds), water catchments, and timely planting, reportedly improved.



## Income diversification

By the end of the project, 97% of farmers were practicing some elements of income diversification, compared to the baseline of 50%. Two of the most relevant approaches adopted by farmers were crop diversification and engagement in off-farm income generation.

Through this training, farmers gained an understanding of the benefits of crop diversification. By the end of the project, 98% of the trained farmers were engaged in crop diversification activities, compared to 74% at baseline, and 20% more of the trained farmers were growing other crops than their non-trained counterparts. Furthermore, trained farmers purposely diversify crops to improve food security, the quality of their soils through crop rotation, and as a backup source of income in case of crop failure. By putting this into practice, farmers have a fallback position to resist or absorb shocks in case of poor harvest from their main crops and can change their situation through crop rotation within their wider farming system.

Almost half (46%) of farmers were also engaged in off-farm small-scale business, compared to the baseline of 28%. This approach reduces a farming households' reliance on agriculture as a sole income source. Off-farm small-scale businesses farmers engaged in included retail shops, trading foodstuffs, salons, and fish sales.





## Access to finance

By the end of the project, 87% of the 39,000-plus farmer group members were part of VSLAs. These VSLAs provide the foundation for farmers to understand the basics of financial literacy, promote a savings culture, and offer farmers the opportunity to access small loans (a maximum of approximately €100).

The small loans provided through VSLAs are used mainly for household needs, especially health and education, but are insufficient to fully support farm activities. The financial literacy and business skills training has enabled farmers to plan and budget for their farm activities at the beginning of the agricultural season; farmers are able to determine their costs and their sales and therefore their profitability at the end of the season.

### Box 5

#### Overview of VSLAs



Interest rates are typically **5-10%** per month.



Loans range in size from **€2 to €100** and are used primarily to cover school fees and health expenses or as working capital for off-farm activities.



Savings in VSLA groups range from **€50 to €2,700**.



**Two loan cycles** in a year with end-of-year sharing.



**25%** of VSLAs have opened savings accounts with savings and credit cooperatives (SACCOs) or microfinance institutions (MFIs).



At the same time, VSLAs offer a sound entry point for financial institutions looking to reduce risk by targeting farmers who are already knowledgeable on the basics of savings and loans with higher value credit options. Through the course of the project, an average of 31% (compared to target of 30%) of farmers per year were able to access loans from formal financial institutions, an increase from 16% at baseline.

Access to loans from financial institutions is advantageous to farmers, as the average size of loans from financial institutions is larger and can cover farm productions costs. The average loan size for rice farmers was approximately €330 and for potato farmers was €370. In both rice and potato, the loans were primarily used by farmers to rent land for agriculture or to purchase agricultural inputs, such as fertilizers, pesticides, and herbicides.

The savings culture generated within VSLAs is also transferred to the area of formal finance. At the end of the project, through linkages made with financial institutions that were integrated into the trainings and more direct partnerships, such as that with MSC, 55% of project farmers had access to bank accounts, compared to 27% at baseline.

When a shock or setback occurs, farmers' coping mechanism is to access loans from financial institutions

rather than VSLAs. By establishing a savings account with a financial institution, farmers are able to absorb a shock or setback, such as that with COVID-19, more effectively. This is mainly due to the larger loans offered by financial institutions, whereas funds are limited within a VSLA. When a shock or setback occurs, VSLA funds are in high demand, as most group members are affected at the same time. With a personal account with a financial institution, farmers can more readily access funds at any time.



## Gender dynamics

Over the course of the project, an average of 68% of households practiced joint household decision making, compared to the baseline of 45%. Some of the positive signs of change have involved planning/budgeting, which has increased to support agricultural production; better access by women farmers to output markets and price information of produce; sharing roles and responsibilities, such as female labor in production or male involvement in post-harvest handling activities; and sharing financial proceeds from agriculture among the entire household.

Although some of these practices have contributed to improving the decision making around agricultural production and marketing, women report their agency around decision making is more restricted during periods of economic hardship. As a result of lockdowns, the economic situation, and increased financial constraints imposed at household level in 2020 and 2021, women reported a reduction their involvement in decision making.



### 3.3

## REACH-Uganda combined impact on smallholders

This section discusses the combined number and overlap between farmers the project has reached with its interventions. Following this, the impact on yields, income, and food security is analyzed further.



### Combined outreach

Both the uplift programs presented above and the investment portfolio described in Chapter 2 influenced smallholder farmer performance in the REACH-Uganda working areas in southwestern and eastern Uganda. The impact of individual investments – for instance, the yield impact of access to good seed – was traced, thus

enabling the program to make a specific statement on impact attributed to the investment portfolio, as presented in Chapter 2. Table 9 shows how the partnerships combine with changes in practices from the uplift programs to augment the overall impact.

**Table 9:** Combined outreach.

	Rice	Potato	
Farmers benefiting from partnerships but not trained	-	1,544	<b>1,544</b>
Farmers benefiting from partnerships and trained	8,027	2,192	<b>10,219</b>
Farmers trained but not reached through partnerships	19,491	9,605	<b>29,096</b>
<b>Total farmers reached</b>	<b>27,518</b>	<b>13,341</b>	<b>40,859</b>

The total project beneficiary farmers cover two categories: (1) farmers benefiting from trainings (36,398) and (2) farmers benefiting from partnership interventions (11,763). To further explain the overlap, these include farmers benefiting from partnerships but not trained

(including those farmers outside REACH-Uganda trained areas) – 1,544; farmers benefiting from both training and partnerships – 10,219; and farmers trained but not yet benefiting from partnerships – 29,096. Therefore, in total 40,859 total farmers were reached.



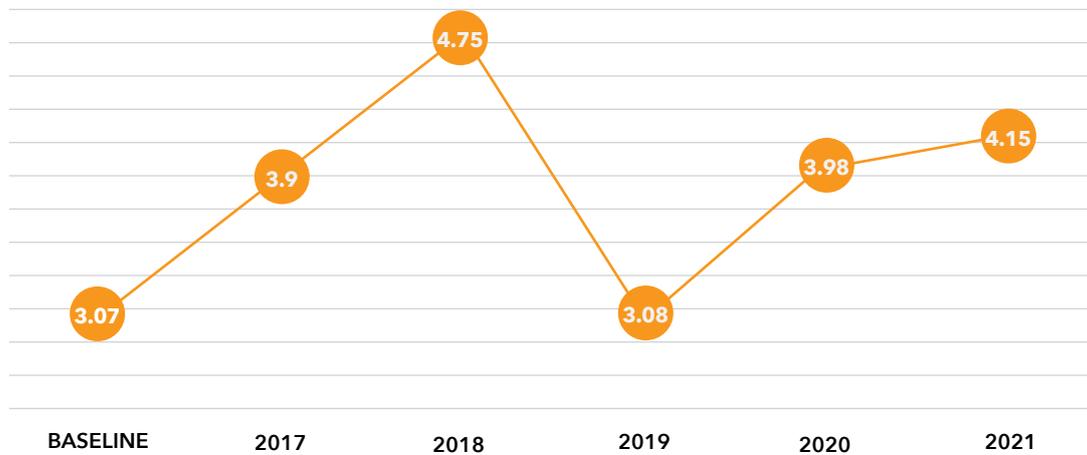
## Smallholder farmer productivity - improved yields

Figure 5 shows that both potato and rice farmers saw yields improve significantly over the course of the project. Potato yields trended upward (influenced by fluctuations in annual weather patterns), resulting in 2021 yields being 35% higher than the baseline figure

(4.15 mt/acre versus 3.07 mt/acre). In the first two years, potato yield may have been affected by climatic conditions. There was drought in 2016 (baseline) then the situation normalized in 2017, hence the large increase.

**Figure 5** Potato yields by year.

### Farmers' potato yields (MT/acre)



Rice yields showed a steadier upward trend (less influenced by fluctuations in rainfall due to irrigation), from 0.6 mt/acre at baseline level to 1.36 mt/acre in

2021. There was no change in rice between 2016 and 2017, which can be attributed the fact that the training program had just started in late 2017.

**Figure 6** Rice yields by year.

### Farmers' rice yields (MT/acre)



The increase in potato yields was primarily due to farmers receiving training. Most of the farmers who contributed to the 4.15 mt yield/acre in 2021 had been trained, while only some of these farmers were using clean seed. This shows the value of the training on GAP which clearly influences yield. Yields would increase further if more farmers would start to access clean seed.

The improvements can only be partly attributed to the use of clean seed, as only a limited amount of clean seed (attributed to the project) had entered the market at this point.<sup>17</sup> The average yield of clean seed, however, is much higher than recycled or home-saved seed. In 2021, the average potato yield of farmers using clean seed was 4.35 mt/acre, compared to 3.13 mt/acre for farmers using home-saved seed. Potato yields from QDS have shown similar results for the last two years (4.5 mt/acre in 2020 and 4.35 mt/acre in 2021). The yield potential is almost double, with up to 8.32 mt/acre recorded.

Another important factor for improved potato yields is the correct use of pesticides and fungicides to control pests and disease, particularly late blight. Farmers who were trained by the project on GAPs experienced fewer issues with pests and diseases on their crop than their untrained counterparts, who spent twice as much on pesticides but did not use the correct pesticide or application rate.

The use of fertilizer for growing potato is critical to promoting tuber growth, particularly in areas where some nutrients are deficient, such as the Elgon highlands where phosphorus content is low.<sup>18</sup> Fertilizer usage in potato increased from 80-95% of project farmers, compared with 65% for farmers who were not trained. This can be attributed to increased knowledge on the benefits of fertilizer usage for improving soil health using an integrated soil fertility management approach.<sup>19</sup> Although this is an encouraging sign and a clear indication that the farmers are understanding the benefits of fertilizer, the actual proper use of fertilizer is less standardized. At present, just over half of trained potato farmers use the correct application rate for NPK. This means their yields may not be as high as possible, as the applied fertilizer rate is not as effective as it would be at optimal rates.

Rice yields from QDS have shown a similar trend results for the last two years (1.4 mt/acre in 2020 and 1.48 mt/acre in 2021). At the same time, clean seed is just reaching farmers in several districts in eastern Uganda and is therefore only a contributing factor to yield improvements. The market for clean lowland rice seed is just emerging, although these are the main outreach areas for Pearl Seeds and Kibimba Ltd.

In terms of pests and diseases, rice farmers using recycled seed spend twice as much on herbicides as their counterparts who use clean seed, which may be due to the increased occurrence of weeds from poor-quality degenerated seed.

Although these yields are a significant improvement from the baseline, they are still below the project target of 2 mt/acre for rice and 5 mt/acre for potato. There are three reasons for this:

### **1 Smallholder farmers in Uganda, like elsewhere, are not likely to apply a complete GAP package.**

They will continue some practices important to them while economizing on others. This is a risk mitigation strategy that farmers adopt. Smallholders do not aim to maximize yields in the same way commercial farmers do. Increase in application of GAPs will be a gradual, ongoing process.

### **2 Availability of clean seed, albeit improving, is still limited.** For the whole of Uganda, currently only 10% of the seed potato demand is met that can be attributed to REACH-Uganda interventions. Due to REACH-Uganda's work, this is comparatively better in the Kigezi and Elgon regions at 16%. When the installed capacity of all ISBs and LSBs is fully utilized, this will be expected to increase to 26% for local varieties and up to 28% in the regions. In rice, approximately 3% of the potential demand in eastern Uganda has been met, which will rise to 20% at maximum capacity of the two partners.

<sup>17</sup> There are other sources of clean seed accessible to farmers that are not attributable to the project. Clean seed is still developed through the NARO system in both regions and is a contributor, as is the seed developed through the Uganda National Seed Potato Producers Association.

<sup>18</sup> Current research conducted by Mohammed VI Polytechnic University (UM6P) and IFDC in Elgon indicates that the soils are generally healthy with a textural class range of clay to sandy clay, optimum bulk density, and adequate to luxury amounts of organic matter, potassium, calcium, magnesium, sulfur, and total nitrogen. However, the region has low available phosphorus in the soils. This calls for increased use of phosphate fertilizer to meet the crop demands. The region has higher soil acidity (<5.5) than the recommended levels.

<sup>19</sup> ISFM has three main principles: (i) practices based solely on mineral fertilizers or solely on organic matter management are insufficient for sustainable agricultural production; (ii) well-adapted disease- and pest-resistant germplasm is necessary to make efficient use of available nutrients; and (iii) good agronomic practices are essential for ensuring the efficient use of scarce nutrient resources.

**3** For both potato and rice, there is still a strong correlation with adverse weather conditions and below optimal yields. Farmers will continue to have challenges planning and responding to climatic shocks and setbacks.

Not surprisingly, a low percentage of farmers are able to achieve optimal levels in potato and rice (18% of rice farmers and 29% of potato farmers are achieving optimal yields, compared to the project target of 50%). However, **an important consideration for future strategies is that clean seed is the key to achieving optimal yields; 44% of all farmers achieving optimal yield use clean seed potato material.**

The first step in farmer uplift was largely achieved with farmer training programs, but the next step needs to come from industries, as described in Chapter 2, to further advance this uplift.



## Smallholder farmer income

Table 9 underscores the increasing importance of access to seeds (and agrochemicals) once the initial uplift is in place. Table 10 compares potato farmers who were untrained and utilized home-saved seed material, farmers who used the same home-saved seed but were trained, and farmers who were trained and used QDS.

Trained farmers attain higher yields from the same home-saved seed compared to untrained farmers (this demonstrates the adopted good practices at work). **Trained farmers who use QDS are able to achieve higher yields; in addition to this, they receive a better price for a better product, resulting in much higher returns.**

**Table 10<sup>20</sup>:** Comparison of potato yields, and income by training and seed type.

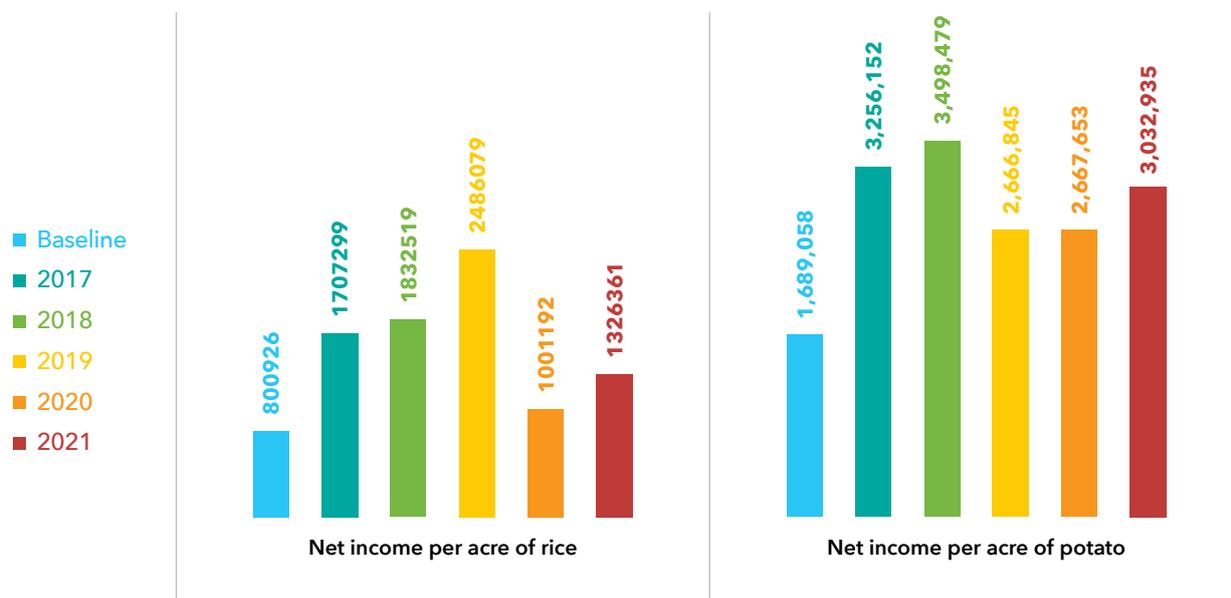
Category of farmer	Total land used for potato cultivation (acre)	Average selling price (UGX)	Yield/ acre (mt)	Cost of production/ acre (UGX)	Revenue/ acre based on yields <sup>21</sup>	Expected net income/ acre
1. Potato farmers trained and using home-saved seed	0.98	1,054	4.20	1,993,484	4,424,260	2,430,776
2. Potato farmers with no training and using home-saved seed	1.10	1,026	3.13	1,196,302	3,206,554	2,010,253
3. Potato farmers trained and using QDS	1.12	1,575	4.35	2,489,229	6,854,618	4,365,388

<sup>20</sup> Due to a lack of data, a comparable table for rice could not be developed.

<sup>21</sup> Clean seed = €992. Farmers just raised = €552. Home saved seed = €456 per acre per season.

Overall, net smallholder income improved throughout the project (Figure 7).

**Figure 7** Farmers' net income (UGX) from potato and rice.



In rice, net income has improved by 65% from baseline, from €182 to €301 per acre per season. This is mainly the result of yield improvements and increased access to more efficient multi-stage mills, which gives farmers more and better-quality rice to be sold in the market (see Chapter 2).

This is quite an achievement since the market price for rice dropped considerably in the last two years. In 2019, at the high point of the market, the price was UGX 2,400/kg; however, by 2021 this had fallen to UGX 1,800/kg and as low as UGX 1,500/kg for season B. This was due to the relaxation of taxes on importation of rice from Tanzania, which undercut the local market. Despite this, REACH-Uganda multi-stage mill partners were able to maintain a price above the prevailing market price (by UGX 200/kg) to ensure farmers were still able to obtain an economic benefit from rice production.

Overall, in an adverse, fluctuating market, increased efficiency (better production, better milling) is keeping rice cultivation profitable.

Net income from potato has improved more, from €383 to €689 per acre per season, or 80%. This considerable increase of almost twofold can be attributed to the higher yield discussed above. There has been an improvement in price, but this is related to market dynamics where the QDS is produced, in the southwest only at present, which is higher value than other markets in the country.





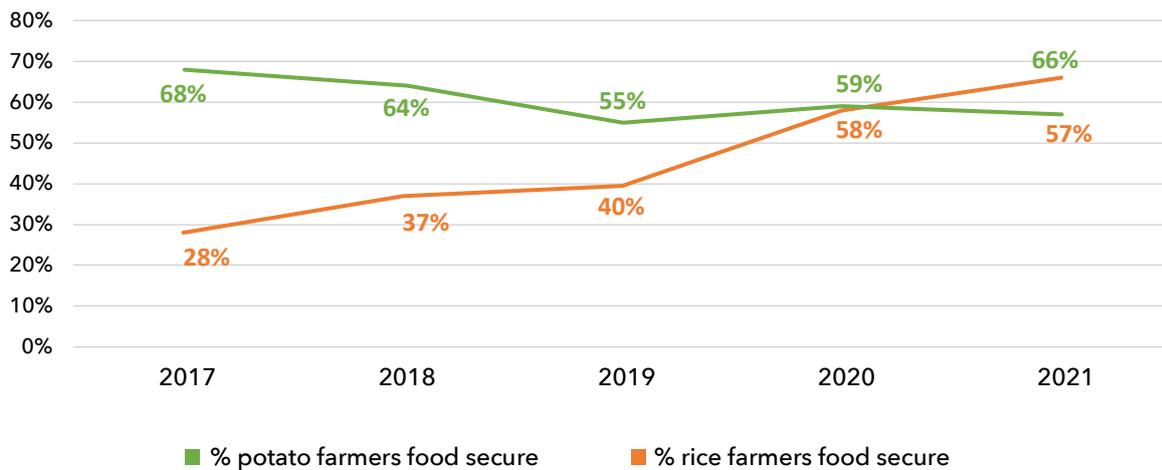
## Food security

Food security improved from 55% to 62% as measured by the Household Food Insecurity Access Scale (HFIAS).<sup>22</sup> While still just below the target of 65%, this gradual

improvement has been due to the increase in yield and income for smallholder farmers and the increased practice of crop diversification.

**Figure 8** Household food security trends by year.

### Food security trends



It is interesting to note that rice farmers are more food-secure than their potato counterparts. By the end of project, 66% of rice farmers were food-secure, compared to 57% of potato farmers. This is despite the fact that 90% of rice is sold, compared to 69% of potato. Almost one-third of potato yield is retained for home consumption, with some smaller tubers saved as seed for the next agricultural season. Almost all rice farmers (96%) practice

crop and income diversification, from which they are able to keep enough for home consumption as well as buy the extra foodstuffs they do not grow. The 89% of rice farmers who practice crop diversification do so purely for household food security. On the other hand, potato farmers who practice crop diversification do so mainly to improve the quality of their soil and to provide a backup source of income in case of a crop failure.

<sup>22</sup> This measures the severity of household food insecurity, focusing on the “access” aspect of food insecurity based on household food vulnerability and on the behavioral responses to food insecurity.





04

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# REACH-Uganda lessons learned





This chapter summarizes the results and lessons learned from REACH-Uganda in 10 key takeaways. It highlights what worked, the synergies generated by the hybrid approach, and the next steps needed to further systemic smallholder inclusion, productivity, and resilience.

## **Potato and rice are relevant crops for food security, farmer resilience, and business expansion in Uganda; potato is also relevant for nutrition.**

Potato and rice are crops farmers invest in to improve their livelihoods. A sign of this is that rice farmers rent land to cultivate rice and potato farmers invest in clean seed when available.

Supporting smallholders to grow such cash crops in a productive manner is an effective poverty-reduction strategy – few crops have the yield and revenue potential to do this. The key driver is (national) demand. Rice and potato are increasingly the “new” staple crops in Uganda; finding buyers (the market) is not a problem. Supporting smallholders to cultivate these crops also supports the development of national food industries and is important to food security.

Both rice and potato are complex crops to cultivate, for different reasons, and this can hamper smallholder entry into or sustained productivity from these crops (which in turns slows down the closing of a national demand-supply gap). Wetland rice demands a degree of control over water levels and a degree of coordination among neighboring farmers (to manage water levels and disease prevention). Potato demands access to clean potato seed and sufficient investment in agrochemicals to prevent diseases. Both crops benefit from smallholders with a solid understanding of good agricultural practices. Both crops can only thrive and reach their yield potential if that skill is matched with access to land, seeds, agrochemicals, and finance to put that smallholder skill to work. This is the fundamental logic underlying REACH-Uganda’s hybrid approach, commencing with farmer uplift, but increasingly focusing on access to inputs and services to progress this uplift, make it sustainable, make it systemic.

Access to efficient multi-stage mills for rice further enhances smallholder gains. Supplier arrangements can also help them access formal financial services (charging lower interest rates). Economical “good enough” local rice free from stones and impurities will be important for Uganda’s competitiveness versus imports. The ability to grow premium potato varieties for a burgeoning food industry will offer additional earning potential for farmers and support import substitution.

Rice imports suppress the growth potential of the local industry, but the figures in this report suggest that efficiency gains in the industry (supported by REACH-Uganda) have still helped smallholders improve their returns in the face of rice imports.



## 2 Farmer uplift can only be sustained with access to inputs and services from specialized providers; farmer group contributions have been modest.

Farmer uplift cannot be sustained without access to supporting inputs and services. Information on sustainable and resilient cropping patterns, how to plant and manage crops, and what kind of inputs to use must be matched by access to these inputs and services. Farmer groups can perform useful functions, such as forming VSLAs or organizing cost-effective bulk potato and rice pickups from the village. But their ability to step into more sophisticated (business) functions that demand more technical skill, management, time, and capital is limited.

REACH-Uganda represents good examples of farmer groups and associations indeed stepping up, but also of many groups that did not. Many service functions critical to smallholders are performed by individual businesses. This should be considered normal (not a problem) and should caution against too high expectations from farmer groups or associations.

## 3 Expansion of potato and rice cultivation in Uganda can be led by commercially sustainable, private sector-led investment.

REACH-Uganda leveraged significant investment from partners, both big and small, at a ratio of more than 3 to 1 (partners/REACH-Uganda).<sup>23</sup> These partners remained in business during COVID-19 and turnover attributed to the investments has improved year over year. This is a sign of commitment. Careful hybrid facilitation remains important to make all the investments in potato and rice work (see point 4) – but REACH-Uganda has identified motivated partners to work with, which are likely to be relevant for the systemic uplift REACH-Uganda has been working toward.

## 4 In thin markets, an adaptive, hybrid approach allows the project to support diverse actors informed by evidence on what works and what works less.

In thin markets producers may need to learn many practices to become productive. The farmer uplift component has demonstrated it is a key stepping stone for farmers and there is a clear linkage between better practice and improvements, such as those in yields. At the same time, the system actors that should provide access to inputs and services, as well as exposure to good practices, may be absent or struggling to manage their own business, leaving them too weak to drive inclusive change at smallholder level. This is the scenario for potato and rice in Uganda. A seed industry is emerging (with support from REACH-Uganda). Distribution and services for the application of agrochemicals need to be finely meshed (as REACH-Uganda has supported). Access to formal finance requires better organized banks and MFIs, better organized farmers, and benefits from formal contracts/supplier relations. In these circumstances, farmer uplift only goes that far, but neither can systemic solutions cover all.

A project should never take on functions that either a system actor or farmer (group) should perform. It should not get in the way of them forming a direct relationship or make either side dependent on its presence (or select unsuitable actors to perform a function in the first place). This increases risks and slows down implementation but is essential so that actors learn and develop sustainable practices. What a project can do is nudge both sides along and facilitate them to overcome obstacles. This is the careful balancing act that REACH-Uganda performed: getting ISBs established, introducing them to plantlet suppliers, introducing farmers to their clean seed; and helping millers to invest in multi-stage mills, working out their value-adding services for farmers, and helping farmers understand and benefit from these.

<sup>23</sup> Total investment made through partnerships was €7,023,324: €5,437,134 from partners and €1,586,190 from REACH-Uganda.



### Key areas of REACH-Uganda support have been:



Developing comprehensive business models/business plans that help partners competently manage different aspects of the business.



Introducing partners, helping facilitate linkages between partners and farmers/groups, and building networks.



Monitoring, providing advice against underperformance, helping iron out misunderstandings.

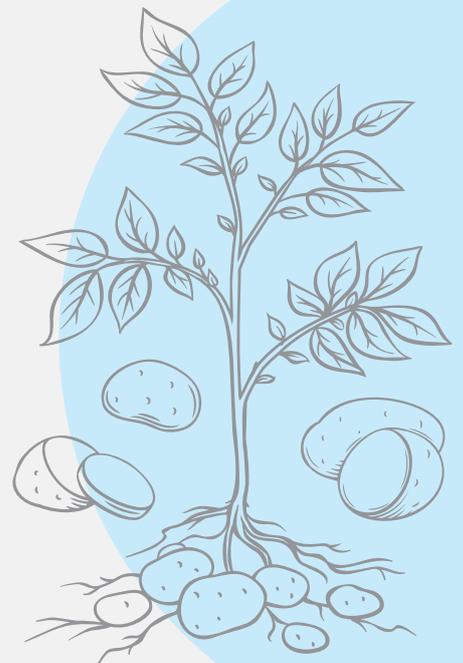
This careful, calibrated way of working depends on near real-time insight into what works, what works less, and why. As it is assumed that partners need to go through several cycles of learning and expansion, it is acceptable to step away from partners and then step back in if useful to address an issue not caused by a lack of effort.

## 5 A local seed potato industry is needed for potato to live up to its potential; lowland rice could benefit from this but demand is just emerging.

Potato seed quickly degrades as it is affected by pathogens; it is bulky to transport; and it requires a trusted relationship between buyer and seller. All three are arguments in favor of potato seed multiplication near potato farmers. When working with plantlets, this can be achieved by establishing regional networks of ISBs and LSBs, which at their current capacity when fully operational can reach an additional 26% of the market. With a concerted push from donors, projects, and the private sector, this subsidized model is needed to attract farmers who are potential ISBs, to further bridge the demand gap.

For importation of Dutch basic seed, the multiplying party must be a commercial farmer or larger cooperatives, given the prerequisite resources required. Their last-mile multiplication makes the seed available to smallholders at an affordable price.

Rice loses its vigor over more generations. Yield increases in lowland rice are highly dependent on water control and management but also depend on good-quality seed. In estates, farmers growing the same variety helps with the coordination of water levels and disease management (all plants follow the same cycle) although the expected investments in these areas have been slowed down by the tumultuous business environment. The outgrower model supported by Pearl Seeds is a promising approach, and as a registered seed company, it overcame a number of technical hurdles efficiently. Whether more rice mills such as Kibimba have an interest in providing farmers with seed to be able to source a uniform paddy crop for processing remains to be seen given difficulties encountered in registration.



## 6 Access to finance to support investment in agriculture remains a challenge - for farmers and agribusinesses.

While the technical pathway to enhanced smallholder productivity in potato and rice is clear (uplift combined with access to inputs and services provided by system actors), the financing of this pathway remains a challenge. It is not a stretch to conclude that the more investment can be financed from retained earnings, i.e., not dependent on external sources, the better. REACH-Uganda worked on access to finance at different levels. This is the picture that has emerged:



VSLAs are useful instruments to institutionalize a habit of savings. This certainly contributes to a household's well-being, as it means financial reserves can be accessed when needed. However, a key financial need of smallholders is prefinancing of the agricultural cycle. VSLAs can offer minimal support to this, as a stepping stone, but the amounts saved may not be sufficient nor can every household withdraw funds at the same time.



The financial track record that comes with a functional VSLA, for instance combined formal supply contracts, can help toward opening up a bank or MFI account and formal credit - another stepping stone. However, the number of farmers reached in this manner through project partner MSC have been modest, as outreach is limited. There is also a need for bank or MFI procedures to be better tuned into agricultural cycles. A loan disbursed too late may be of little use and may be spent on other household needs, not the agricultural cycle.



Banks are hesitant to lend even to more established agribusinesses, making it highly unlikely that a new ISB in the region would be considered. It is not uncommon for banks in and beyond Uganda to consider agriculture "risky" and, for this reason, prefer the smallest possible exposure to the sector. This can only change when a bank develops the expertise to read agricultural risks more accurately.

Altogether this creates a mixed picture. The percentage of smallholders in potato and rice with a bank account is higher than expected (55%). At the same time, this financial inclusion may not yet translate to a significant increase in the ability to do productive investment.

Smart subsidies will continue to be useful to fund agricultural innovation. Joint approaches in which banks lend money to companies that also receive support can be useful to build up expertise. What would not be useful is for donor funds to be used to buy down credit risks to such an extent that banks do not have to change their practices (i.e., they do not learn to read risk better, stop lending the moment the credit guarantee ends).

## Despite more erratic weather patterns and a difficult business enabling environment, smallholders were able to increase productivity and returns.

The yield figures presented in Chapter 3 reflect the fluctuations in rainfall between seasons and years, but overall show an upward trajectory. The potato dataset, which allowed for a comparison between three categories of farmers (no training and no good seed, training only, and training and good seed) show the compound effect of pairing skilled farmers with the inputs to make the most of these. This ultimately justifies using a hybrid approach. More data analysis (and data collection not hampered by COVID-19 restrictions) would allow a better understanding of which constraint to focus on to further increase yields: skill gaps that remain, a shift toward seed and agrochemicals, access to finance, or water.

Encouragingly, better potatoes translated into price gains, rewarding farmers for their efforts.

## Smallholder farming households and the systems with which they interact are becoming more resilient; infrastructure improvement underpins this.

Generally, smallholders have adopted practices that support climate-smart agriculture, income diversification, better joint household decision making and, ultimately, resilience. Income diversification and CSA practices were found to be strong contributors to resilience as reported by farmers. It should be noted that household-level resilience is compounded by system-level resilience, i.e., better access to more appropriate inputs and services for productive farming. Investment in infrastructure supports this. For instance, it supports control over water, which can help secure yields. Investment in roads also supports better linkages to input and output markets so that farmers ultimately have more options available to them.

## The practice of crop diversification resulted in farmers being more resilient than their non-trained counterparts

Within income diversification, the project promoted crop diversification as a key resilience strategy and trained farmers on ancillary crops. Over 95% of farmers who were trained practiced crop diversification, which was over 20% higher than their untrained counterparts. The reasons for this were to improve soil health and income rather than food security purposes alone. A more diversified crop base formed an important safety net in case of a shock or setback. This could be strengthened further by looking at this approach through a farming systems lens - which considers all crops within the highland system, livestock, labor and risk reduction. This was not in the design REACH-Uganda, but looking at this in a more holistic may enhance farmer resilience further in future.



**I**n thin markets (and probably elsewhere) a realistic and nuanced approach to systemic development, based on an accurate understanding of what various actors (private, public, civic) can do to allow smallholders to adopt good practices and access critical services is essential - sustainable development emerges from a balanced, context-informed approach, not dogmatic (and sometimes simplistic) choices.

An overly conventional MSD approach may not be effective in thin markets where systematic pathways are weak. In REACH-Uganda, for the first two years of implementation an orthodox approach was used which only engaged in very light touch interventions, however, private sector partner uptake was slow, and outputs were limited. After the mid-term review the project took a more pragmatic approach and considered more direct engagement with business models which included some co-funded capital equipment for technology and innovation promotion, while still sticking to the fundamental principles of an MSD program. This resulted in better partner engagement, more meaningful partnerships and ultimately the development of pathways to more systemic change.

In its outreach, the project targeted mainly smallholder and commercial farmers through market-based actors, but less so the inclusion of vulnerable farmers that cannot or will not engage with markets. This group of extremely poor farmers can still benefit from market activities but may also require other specific support that the REACH-Uganda project was not designed to provide. This needs a more nuanced approach which looks at the risks inherent to their livelihoods and the different coping mechanisms needed by vulnerable groups.







## Annex 1: Results Against Indicator Framework (Log Frame Indicators)

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>Goal</b> To strengthen the efficiency, and inclusiveness of the agricultural market system while contributing to improved household resilience and productivity in selected value chains in Uganda	Employment created in the chain (total additional FTE)	0	125	0	2	44	244	62	<b>352</b>	SWT: 266 FTE, PSALMS: 15 FTE, LH: 2 FTE, CKB: 27 FTE, KFRC: 2 FTE, DGL :8 FTE, RGC 6 FTE, MSC 3 FTE, Muyambi: 2 FTE, Maziba: 8 FTE. MIFA:4 FTE  17 interns got employment after the internship program, 9 of these were retained by the companies and 8 got new employment elsewhere.
	% of farmers classified as food secure	55%	65%	47%	52%	47%	59%	62%	<b>62%</b>	66% of rice farmers and 57% of potato farmers. Food security has improved over time attributed to yield increments, crop and income diversification, farmers are able to sell and yet keep enough for home consumption as well as buy extra food stuffs they do not grow.
	% increase in net income of farmers attributable to potato (per acre of potato)	1,689,058	2,026,87 (20%)	3,256,15 (92%)	3,498,47 (7%)	2,666,84 (-24%)	2,667,65 (0.03%)	3,032,93 (14%)	<b>80%</b>	Net income for potato farmers increased for 2021, this is mostly due to utilization of clean seed by the farmers which in turn increases yield and better-quality potatoes that fetch a higher price on the market.

Indicator	Performance								Narrative on Performance
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
% increase in net income of farmers attributable to rice (per acre of rice)	800,926	961,111	1,707,29 (113%)	1,832,51 (7%)	2,486,07 (36%)	1,001,19 (-60%)	1,326,36 (32%)	<b>66%</b>	Farmers benefit from better milling efficiency and better prices from using multi-stage mills. This has contributed to the 66% increase in net income per acre from that at baseline.
<b>At the business level</b> Higher turnover and improved efficiencies	0	10%		27%	65%	20%	47%	<b>40%</b>	<p>PFIL turnover increased by 55% from UGX 542,286,000 or EUR 129,495 in 2020 to UGX 839,232,000 or EUR 200,404 in 2021 which is attributed to the increase in the number of retail points.</p> <p>RGC turnover was increased by 44% from UGX 3,112,500,000 or EUR 743,248 in 2020 when using a single stage mill to UGX 4,357,500,000 or EUR 1,040,547 in 2021.</p> <p>SWT turnover was increased by 83% from UGX 2,591,144,343 or EUR 618,751 in 2020 to UGX 4,730,440,000 or EUR 1,129,603 in 2021 due to sourcing from the farmers from Eastern Uganda in areas of Bugiri, Busembatya, Sironko and Bulambuli.</p> <p>DGL's turnover remained constant at 6% from UGX 1,182,975,326 or EUR 282,488 in 2020 to UGX 1,258,218,427 or EUR 300,456 in 2021. The low percentage increment was due to the high competition in the rice markets which caused a fall in prices.</p>

Indicator	Performance								Narrative on Performance	
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative		
Revenue per acre (Potato) UGX/acre	2,417,849	3,143,203	1,844,393	5,265,769	3,051,434	4,250,494	5,115,113	<b>5,115,113</b>	Revenue per acre varies per year, this is due to fluctuating climatic conditions that alter yields in different years. 2018 was generally a good year for potato in terms of weather conditions, even in bad years like 2019, overall revenue has gone up compared to baseline by 112% and surpassed the target by 63%.	
Revenue per acre (Rice) UGX/acre	1,281,018	1,665,323	1,254,188	2,056,496	3,122,359	2,754,282	2,259,635	<b>2,259,635</b>	<p>Much as prices for rice were relatively the same for 2021A compared to 2020, yield per acre reduced in 2021A leading to a reduction in overall revenue per acre.</p> <p>Overall, revenue per acre of rice has improved by 76% in comparison to baseline and surpassed the target by 36%.</p>	
<b>At the farm level</b> Increased income	% Agricultural production sold (HH level)	73%	95%	89%	89%	90%	92%	92%	<b>90%</b>	Rice farmers have been selling on average 90% of their total milled rice across different years. This when compared to baseline is 17% increment. Farmers previously sold less of their milled rice due to poorer quality whereby a big proportion of their milled rice could not be sold/was wastage and hence used for home consumption. Because of improvements in the quality of milled rice, farmers are now able to make more money out of their rice businesses and plant other crops for home consumption.
	% Agricultural production sold (HH level)- Potato	63%	80%	63%	62%	66%	68%	69%	<b>66%</b>	By June 2021, potato farmers were selling on average 69% of their produce. Cumulatively, across different years, this has been an average of 66% which is a slight increment from that of baseline and an achievement of 83% of the project target. The 34% remaining is mainly for household consumption with a small amount retained as seed.

Indicator	Performance								Narrative on Performance
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
% Agricultural production sold to miller/value added (Rice)	66%	76%			79%	90%	90%	<b>90%</b>	63% of all rice farmers are now selling to multi-stage mills compared to 20% at baseline, on average, farmers who supply to multi-stage mills, now sell 90% of their produce to millers. This is because farmers are now aware of the many benefits of using a multi-stage mill compared to single stage mills.
<b>Outcome 1.1</b> Farmers achieve increased profitability and efficiency through access to improved market functions.	% of produce sold by FG & FBGs to Agribusiness/MSMEs (Rice)	0	50%			0%		90%	Since almost all FGs are not aggregating produce, farmers sell their rice individually. Farmers are now selling 90% of their produce to millers.
	% of produce sold by FG & FBGs to Agribusiness/MSMEs (Potato)	0	25%			32%	32%	24%	<b>29%</b>
% FGs supplying a MSME	0	25	N/A	N/A	49 %	58%	51%	<b>53%</b>	Rice (DGL 65%, LH 73% and RGC 16%) of FGs supplying to MSMEs.

Indicator	Performance								Narrative on Performance
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
% farmers selling via FG/FBG (by gender) - Rice	10%	40%	0%	0%	0%	11%	0	<b>11%</b>	Although 53% of targeted farmer groups supply MSMEs, only a few farmers reported supplying their rice by aggregating together with their fellow group members. Much as these farmers are paid individually, they believe costs of transportation and storage are reduced when they sell via their farmer groups. Farmers usually identify one member within their FG who has a storage facility where they store their paddy before transporting it for milling and selling, over 1,500 farmers have benefited from this practice.
% farmers selling via FG/FBG (by gender) - Potato	0%	35%	0%	0%	5%	0%	0%	<b>5%</b>	Potato farmers sold their produce individually either to surrounding community or traders. Farmers mostly sell to traders as they provide ready market, their produce is picked from gardens, so no transport costs are incurred, and fairly good prices are offered.
Rice production cost per unit (KG)	656	558	881	760	823	411	679	<b>679</b>	<p>Although the costs are increasing, to increase profitability, farmers need to invest more in better practices, better inputs including good seed, so we generally expect costs of production to increase, although in turn all these will improve productivity.</p> <p>On average farmers spend UGX 876,640 per acre for growing rice. The cost for farmers using clean seed is relatively higher due to relatively higher expenditures for procuring seed. Farmers using home saved seed spend relatively more on herbicides as compared to farmers using clean seed, which suggests that home saved seeds are more susceptible to weeds.</p>

Indicator	Performance								Narrative on Performance	
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative		
Potato production cost per unit (KG)	343	292	450	376	392	433	499.5	<b>499.5</b>	<p>Although the costs are increasing, to increase profitability, farmers need to invest more in better practices, better inputs including good seed, so we generally expect costs of production to increase, although in turn all these will improve productivity.</p> <p>Trained potato farmers use significantly more fertilizer than non-trained which could account for the increased cost of production. At the same time less than 50% of farmer use the correct application rates.</p>	
% farmers using at least 2 identified support services	0	30%	8%	14%	39%	27%		<b>27%</b>	REACH-Uganda project promoted specific support services which included extension services, financial services, spray services, and agro-input services.	
<b>Outcome 1.2</b> Agribusinesses and service providers are able to achieve higher sales and expand clientele by offering better input services and transactions.	% increase in volumes purchased from FGs/FBGs	0	20%	N/A	N/A	42%	10%	24%	<b>25%</b>	Rice: 24% increase in the volume of paddy sourced from farmer groups from 973.5 MT in 2020 to 1,208 MT in 2021. This is attributed to the premium prices offered to farmers by MSMEs as well as reduced transport costs resulting from use of trucks that makes it easy for farmers to supply paddy to MSMEs.
	% increase in volumes sold	0	15%			53%	14%	54%	<b>54%</b>	<p>PSALMS volumes increased by 54% (52.5MT in 2021 compared to 34.1 MT at the baseline till June) due to the establishment of retail shops.</p> <p>The volume of rice sold by DGL increased from by 19% from 293 MT between January and June 2020 to 349 MT in 2021. This is credited to increased volumes sourced from farmers with improved quality of rice.</p> <p>SWT reported increased volumes of sales by 90% from 960MT in 2020 to 1819MT in 2021.</p>

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>Output 1.1</b> Agribusinesses, service providers screened and selected.	# lead firm/ MSMEs screened	0	50	13	22	23	11	0	<b>69</b>	A cumulative total of 69 MSMEs were identified and screened for potential engagement by IFDC through the course of the project.
	# lead firms/ MSMEs selected	0	25	5	14	11	9	0	<b>26</b>	Cumulatively, REACH-Uganda project has selected and implemented 26 partnerships i.e., 6 in rice, 18 in potato value chains and 2 cross-cutting.
<b>Output 1.2</b> Develop, formalize and implement partnership agreements with business plans	# action plans implemented with FBGs	0	50	1	1	24	5	0	<b>31</b>	DGL (4), Kibimba (2), RGC (3), PSALMS (2), MIFA (2), KGCF (5), SUKUT (4), GPL (1) and MSC (2) LH (2), NBC (2)  These are the actions implemented to directly benefit farmers with in each DCA including sourcing, trainings, drying, access to finance, access to inputs etc.
	# business plans implemented with MSMEs	0	25	5	12	17	26	26	<b>26</b>	26 signed partnerships implemented plans in line with the Detailed Collaboration Agreements signed. At the end line 95% of partners were actively continuing with the business models that had been developed under the partnerships in terms of investment, staffing, sales etc.
<b>Output 1.3</b> Public facilitation leverages private investment and introduction of innovative businesses practices.	Amount (Euros) invested by private sector through partnerships	0	€1.0m	€0.42m	€1.08m	€2.31m	€1.44m	€0.19	<b>€5.44<sup>1</sup></b>	Through an MSD approach, the private sector takes more ownership of the action plans, almost 50% of the investment comes from private sector. With bigger partnerships like SWT, KL and PFIL comes bigger investments by private sector and hence the big achievement on this target.

<sup>1</sup> These are the official audited figures which have been adjusted from 2020 report.

Indicator	Performance								Narrative on Performance
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
# innovative business practices introduced	0	50			12	3	0	23	<ol style="list-style-type: none"> <li>1. Commercial production of new Dutch varieties</li> <li>2. Taurus for crisps processing and Markies for chipping</li> <li>3. Cost effective and practical screen houses for farmers in the Southwest</li> <li>4. Cost effective and practical screen houses for farmers in the East</li> <li>5. Production of apical cuttings from plantlets</li> <li>6. Training on screen house management</li> <li>7. Training farmers on how to grow QDS in the East</li> <li>8. More pre-basic and basic seed availed in the East,</li> <li>9. Created market for clean seed in new areas</li> <li>10. Farm ponds to collect and reserve water for seed potato multiplication</li> <li>11. Development of rice scheme with SWT to produce locally grown rice</li> <li>12. Automated crisps processing equipment and machinery</li> <li>13. New flavors of crisps to the Ugandan market</li> <li>14. Lowland rice seed production</li> <li>15. 2 gravity flow drip irrigation systems</li> <li>16. Sourcing plan for in-vitro plantlets with Agromax</li> <li>17. Introduction of multi-stage to replace single mills</li> <li>18. Village agent model for sourcing paddy</li> <li>19. Use of moisture meters before milling at RGC</li> <li>20. Establishment of cold rooms</li> <li>21. Establishment of the ambient stores,</li> <li>22. Introducing seed potato production in Eastern</li> <li>23. Business digitalization for marketing and service delivery</li> </ol>

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>Output 1.4</b> FBGs, FG and Farmers are able to access financial products for productive investments.	% FGs accessing loans	17.43%	30%	9%	7%	13%	33%	0	<b>33%</b>	No additional farmer groups have received loans through MSC in 2021. Currently 88,000,000 UGX has been approved for 5 farmer groups in the Rice growing areas and yet to be disbursed.
	% farmers accessing loans	16%	30%	39%	37%	37%	26%	22%	<b>31%</b>	22% of all farmers (23% and 21% of rice and potato farmers respectively), accessed loans in monetary terms in 2021, although 31% did this on average throughout the project. Most of these farmers (53%) got loans from VSLAs, 37% from FIs and 10% from other sources like fellow farmers, money lenders etc.  In addition, 55% of all farmers have access to bank accounts, from where they can access credit if needed, this is especially so for farmers that require bigger loan amounts for production which they cannot get from VSLAs.
<b>Output 1.5</b> Work placements created at FBGs and MSMEs	# work placements created	0	100	0	31	42	0	0	<b>73</b>	Activity completed in 2019. The 73 placements were for youth graduates who were able to attain vital work experience at MSMEs. 17 of these 79 went on the full-time jobs
<b>Output 1.6</b> Youth entrepreneurs supported to be Spray Service Providers (SSPs).	# youth spray service providers trained	0	100	27	83	137	0	0	<b>137</b>	Activity completed in 2019.

Indicator	Performance								Narrative on Performance	
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative		
# youth spray service providers operating a functioning business	0	50	0	28	113					<p>8 SSP associations were formed and registered, on average each association comprises of 15 members. SSPs belonging to associations have gone ahead with business operations beyond receiving knowledge from trainings.</p> <p>On average, each SSP association can serve between 120-200 farmers in one season. 60% of the farmers served are small scale farmers with less than 5 acres of cultivated land. The promotion activities conducted by IFDC increased visibility of SSP work with in the communities attracting more customers, even though some farmers still need sensitization about the importance of SSPs.</p>
<b>Output 1.7</b> Dutch developed potato varieties registered and/or promoted through National Varietal Performance Trials and commercial linkages.										
# of new Dutch potato varieties registered	0	15	0	7	16 under trials					8 varieties were evaluated and have been put forward to Varietal Release Committee (VRC) which will meet in quarter three of 2021.
# businesses introducing and or using Dutch potato varieties in the Ugandan market	0	2	1	5	5	11	0	<b>11</b>		<p>5 businesses including Namakwaland, Clarke farm, Kakie, FICA and New Bukumbi coffee processors are producing Dutch potato varieties for the Ugandan market.</p> <p>Previously, 5 Dutch seed companies participated in supplying seed potato for evaluation under NVPTs) in 2018. These include HZPC, AGRICO, Den Hartigh B.V, Europlant and Meijer B.V.</p>
# seed multipliers linked to Dutch businesses	0	10	0	0	1	2	1	<b>4</b>		Namakwaland farm, Clarke farm, Kakie and FICA have been linked to Dutch seed potato breeders to multiply Dutch seed.

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>Output 1.8</b> Additional local businesses and greenhouse owner (associations) are supported to make bacteria and virus free seed potato planting material on the Ugandan market.	MT of clean seed potato produced and supplied per year	0	1000	163	668	1,999.7	1,263.6	594.8	<b>4,689</b>	REACH-Uganda signed partnerships started giving seed in 2019, compared to the annual target of 1,000MT per year, this is an achievement of 200% of 2019, 126% in 2020 and 59% in 2021 which for one season of 2021. Overall seed produced throughout the project is over 4,000 MT, this includes seed that may have reached LSBs through the NARO system but was included as groups part of ISB-LSB linkage meetings. In 2021A, a total of 594.8 MT of clean seed was produced so far(53.22 MT of pre-basic, 115.42 MT of Basic seed, 426.4 MT of QDS).
	# new screenhouses established and operational (related to additional funds)	0	6	-	-	5	4	0	<b>9</b>	8 partnerships with screen house installation were signed, 5 of these are in the southwest and 3 in the East; including CKB, KFRC, MIFA, MUYAMBI, Maziba, Bitamba, Welishe and Chemonges.
<b>Output 1.9</b> Up to EUR 1.0 million earmarked for joint investment in public infrastructure through match funding with District Local Government.	Amount invested in public infrastructure (roads, irrigation, storage)	0	€1.5 m	0	€0.34m	€1.28m	€0.14m	0	<b>1.76m</b>	
	# km of roads constructed and rehabilitated between farmers and markets	0	25	0	44.13	23.3			<b>67.43</b>	Completed.
	# farmers within road catchments	0	19,000	-	76,988	149,083	156,848		<b>156,848</b>	

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>At the farmer level</b> Improved productivity and resilience	% of farmers are practicing 3 (of 4) resilience measures	0	50%	23%	71%	89%	94%	93%	<b>93%</b>	97% and 88% of the potato and rice farmers respectively practiced 3 out of 4 resilience measures.
	% farmers increase their yields to 2 MT/acre for rice and 5.5 MT/acre for potato (disaggregated by gender and age category)	10%	50%	16%	39%	20%	26%	24%	<b>26%</b>	18% for rice 29% for potatoes farmers had increased yields of 5.5 MT/acre versus the baseline of 10%. The targets of 50% of farmers increasing their yields to 2 mt/acre in rice and 5.5 mt / acre were not met. In both crops it appears that there is still a strong correlation with adverse weather conditions and below optimal yields - farmers still have challenges planning and responding to climatic shocks setbacks. Secondly, clean seed availability albeit improving is still limited. It is however important to note that 44% of all farmers with high yields are using clean seed.
<b>Outcome 2.1</b> As a result of training farmers increase their yields (potato and rice) to at least 65% optimal level	Average yields for rice (MT, disaggregated by gender)	0.6	2.0	0.6	0.97	0.99	1.44	1.36	<b>1.36</b>	Overall yield, 1.36MT/acre Home-saved seed; 1.19MT/acre Clean seed; 1.48MT/acre F: 1.27MT/acre M: 1.39MT/acre
	Average yields for potato (MT, disaggregated by gender)	3.07	5.0	3.9	4.75	3.08	3.98	4.15	<b>4.15</b>	For all farmers average in 2021 Season A; 4.15 MT/acre F: 4.07 MT/acre M: 4.18 MT/acre  While for farmers using QDS average in season A; 4.35 MT F: 4.28MT/acre M: 4.41 MT/acre  Farmers trained; 4.20 MT/acre and Farmers using Home saved seed; 3.13MT/acre

	Indicator	Performance								Narrative on Performance
		Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
<b>Outcome 2.2</b> Farmers adopt and use resilience strategies	% farmers have diversified their income (disaggregated by gender and age category)	50%	70%	99%	99%	99%	99%	88%	<b>97%</b>	In 2021, 90% of the potato farmers and 87% of rice farmers had other sources of incomes besides rice and potato production. These include livestock, owning small businesses and crop diversification. 46% of these farmers diversify their incomes through off farm business activities. 97% of trained farmers purposely diversify crops, to improve food security, quality of soils, and back up source of income in case of crop failure. This is 20% higher than their non-trained counterparts.
	% of farmers have access to finance (disaggregated by gender and age category)	27%	50%	28%	29%	33%	39%	55%	<b>37%</b>	In 2021, 48% of all potato farmers have access to finance through formal financial institutions whereas 89% of these farmers have access to finance through VSLAs.  Rice: 61% have access to finance through formal institutions and 84% through VSLAs.  There has been a steady increase in the percentage of farmers with access to credit which is a 10% increment compared to baseline and 74% achievement of the target across different years.
	% of female farmers with input into decision making at household level	45%	60%	67%	60%	87%	66%	58%	<b>68%</b>	67% and 50% of rice and potato female farmers reported to have input in most or all decisions at HH level in 2021

Indicator	Performance								Narrative on Performance
	Baseline	Target	2017	2018	2019	2020	2021	Cumulative	
% of farmers use climate smart approaches in agriculture (disaggregated by gender and age category)	0%	70%	99%	99%	99%	100%	100%	<b>99%</b>	In 2021, 96% had used 4 out of the 10 approaches 76% had used up to 5 of the 10 approaches in rice and potato production.
% farmers using at least 4 good agricultural practices in rice and potato production	0%	70%	84%	79%	77%	92%	93%	<b>85%</b>	Farmers have improved their farming practices with 91% and 94% of all trained potato and rice farmers practicing at least 4 GAPs in their farming.
# VSLAs established and trained	0	1500	705	904	449			<b>1,353</b>	87% of all farmers belong to a VSLA at a farmer group level.

## Annex 2: Summary of Business Partnerships

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>Psalms Food Industries Limited (PFIL)</b>	Potato	Local potato value addition through processing crisps	<ul style="list-style-type: none"> <li>◦ Engaged consultant to review process flow and plant layout</li> <li>◦ Factory space expanded from 179M<sup>2</sup> to 392M<sup>2</sup>cl</li> <li>◦ Purchased and installed processing machineries and equipment (fryer, packaging, peeler, slicer).</li> <li>◦ Developed a sourcing plan from farmers</li> <li>◦ Developed a brand and new packing materials</li> <li>◦ Launched a new brand on market and brand promotion activities conducted.</li> <li>◦ Developed new product flavours</li> <li>◦ Developed a strategic plan and business plan</li> <li>◦ Trained staff in sales and marketing, operation of machines and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>◦ The production process flow and plant layout were reviewed by a consultant, it was recommended that the factory space be expanded from the existing 179M<sup>2</sup> to 392M<sup>2</sup> to create space for the installation of crisp processing machinery and equipment to increase on the production capacity and quality of the final products.</li> <li>◦ As a result, the production of the potato crisp has increased from 25kgs/hour to the current 94 kgs/ hour.</li> <li>◦ PFIL procured and installed fryer, peeler, slicer, blancher and packaging equipment on its factory floor and hired staff to operate the machinery, however PFIL has not been able to operate at optimal capacity of 125 kgs/hour, that is mainly attributed to the inconsistencies in the quality of potatoes procured.</li> <li>◦ PFIL is currently producing on average 109 MT of potato crisps per annum from 439 MT of potatoes sourced annually over the entire partnership from Namakwaland Farm and New Bukumbi Farmers for Dutch potato variety (Taurus) and traders for local varieties of Rwagume and Kinigi.</li> <li>◦ In 2021, PFIL sourced a total of 223 MT by June; 134.2 MT of local varieties of Rwagume and Kinigi from traders and 88.4 MT of Dutch varieties from Namakwaland. From January to June 2021, PFIL produced, 52.5 MT potato crisps.</li> <li>◦ PFIL has not continued to source from farmers as farmers were unable to meet their quality standards consistently, however, on average 5% of what is sourced is directly from small scale farmers. An overall total of 1,522MT has been sourced by PFIL from the beginning of the partnership to date, 17% of this are Dutch varieties and the rest local varieties.</li> <li>◦ PFIL has been offering prices basing on the prevailing market price ranging from UGX 1,000 - 1400/kg for local varieties and UGX 1,300/kg for Dutch potato varieties.</li> <li>◦ In the short to medium term PFIL will continue to source for Dutch potato varieties from farmers working with New Bukumbi and farms like Namakwaland, in addition to working with traders for local varieties.</li> <li>◦ In the long term, PFIL will work with farmers of Kisoro Potato Growers Cooperative Union after evaluating their performance on 5MT of Taurus that he gave to the cooperative a pilot. A detailed plan of how Psalms will engage the farmers will depend on the performance of the pilot</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ PFIL rebranded its crisps as "SUMZ" and created new packs with new look, while also continuing with its existing design for its smaller packages. The new brand and packaging has been more popular in city markets and larger retail stores will the exiting packaging continues to be more popular in schools, and smaller retail points. PFIL conducted brand promotional activities, as a result, over 638 sales retail points have been established as of June 2021, this has increased the overall sales and customer base.</li> <li>◦ PFIL added 5 flavours on the potato crisps product line, these include tangy lemon, fruity chutney, chill, salt and vinegar and tomato.</li> <li>◦ PFIL annual potato crisps sales turnover increased from EUR 176,000 to EUR 620,000</li> <li>◦ PFIL potato crisps turnover for the first half of 2021 was EUR 200,404 (UGX 839,232,000) with additional revenue of EUR 78,225 (UGX 327,582,000) for 2021.</li> <li>◦ Cumulatively, PFIL has earned an additional revenue of EUR 576,902 from the partnership with REACH-Uganda.</li> <li>◦ PFIL hired staff for specialized position such as maintaining sales and sourcing records. This has helped PFIL in planning ahead for their sourcing plans for the upcoming seasons based on their annual sales revenue and investment potential.</li> <li>◦ 9 Additional FTEs created and trained in 2021 with an additional income of EURO 5,158 (UGX 21,600,000). 4 staff recruited in the production department and 4 sales staff were recruited to support the promotion and sale of PSALMS products. This brings the cumulative number of FTEs created to 15 FTEs by June 2021.</li> </ul>
<b>Kibimba Limited (KL)</b>	Rice	Certified seed production for small farmers and paddy sourcing from farmers	<ul style="list-style-type: none"> <li>◦ Acquire a license and foundation seed to produce certified seed.</li> <li>◦ Seed multiplication, processing, packaging, and branding.</li> <li>◦ Set up demonstration plots and marketing of seed.</li> <li>◦ Recruited four field extension workers</li> <li>◦ Procure motorcycles</li> <li>◦ Develop a sensitization and sourcing plan for paddy</li> </ul>	<ul style="list-style-type: none"> <li>◦ KL dedicated land for the production of certified seed. Meetings were held with MAAIF, documents to proceed with seed production issued, however, the process of certification was not complete due to prevailing regulations under the revised seed certification policy which mandates Kibimba to meet a turnover of 75% from seed production, as well as dual registration for Kibimba as a separate seed company and a production company which Kibimba global management did not agree on.</li> <li>◦ Seed processing unit of 2 MT per hour capacity, complete with cleaner, grader and packaging unit were procured and installed. However, the branding was not finalized since the certified seed process could not be completed.</li> <li>◦ 20 demo plots were established, farmer field days conducted, and seed meetings conducted with farmers. Over 150 farmers participated and are aware of the benefits of using good quality seed.</li> <li>◦ KL has been selling seed as "quality declared seed". In 2021, KL sold 1 MT of seed: 0.6 MT of clean seed sold to NaCCRI seed company and 0.40 MT to farmers at a price of UGX 5,000 per kg, this benefited 80 farmers. Additionally, KL has sold an overall total of 5.9MT of clean seed benefiting 631 farmers.</li> <li>◦ KL's additional turnover for business from sale of clean seed EUR 7,740 (UGX 32,412,000).</li> <li>◦ In future, KL plans to continue with its original plan of production/processing of certified seed, pricing, supplying to farmers and buy-back agreements for paddy with the local farmers once the seed production approval from MAAIF is attained.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ 4 FTEs created earning an additional income of EUR 16,258.71 (field extension agents recruited), and 4 motorcycles purchased to facilitate sourcing of paddy as well as marketing of Quality Declared seed.</li> <li>◦ Sourcing plan developed however sourcing from farmers did not happen as most farmers were not selling paddy, KL offered an extra UGX 100 but the sampled quality of paddy from farmers was of poor quality leading to 35% loss. Furthermore, government's support on imported rice reduced the price of paddy from UGX 1,500 to 700 per kilogram so farmers preferred selling milled rice.</li> </ul>
<b>Diner's Group Limited (DGL)</b>	Rice	Farmers make more use of more efficient milling services, producing rice that is of higher value and more in demand in the market	<ul style="list-style-type: none"> <li>◦ Recruited 2 field agents and purchase of two motorcycles</li> <li>◦ Assessed DGL's working capital requirement.</li> <li>◦ Developed a sourcing plan for paddy</li> <li>◦ Purchased 12 MT truck to transport paddy from farmer communities.</li> <li>◦ Conducted sensitization and seasonal review meetings with farmers and DGL.</li> <li>◦ Purchased and distributed tarpaulins to farmer groups.</li> <li>◦ Develop and designed a new logo and packaging materials.</li> <li>◦ Engaged a financial service provider</li> <li>◦ Expansion of Kampala outlet</li> </ul>	<ul style="list-style-type: none"> <li>◦ 2 field extension workers (FEWs) recruited, and two motorcycles purchased, these FEWs supported sourcing and transfer knowledge on post-harvest handling practices to the farmers, this improved the quality of rice delivered to DGL premises for milling.</li> <li>◦ DGL developed a sourcing plan for the potential volume of paddy it could source per annum from nearby regions, and increased its sourcing of paddy from 55 farmer groups with an average increase of 11% for paddy sourced annually over the period of the partnership, DGL sourced up to 725 MT in 2021 bringing the overall additional paddy sourced from farmers to 1,999MT. This has been mainly enhanced by the truck which is used to source paddy from farmers at a lower cost and the use of the village agents that mobilize paddy from the different areas of REACH-Uganda by DGL. Additionally, farmers sensitization and mobilization by the extension workers also boosted awareness about DGL's milling services.</li> <li>◦ 828 farmers have benefited with additional income of EUR 172,326 or UGX 721,648,630.</li> <li>◦ 8 additional FTEs have been created earning an additional income of UGX 70,800,000 or € 16,907.</li> <li>◦ DGL distributed 215 tarpaulins to 42 farmers groups which has improved the quality of paddy sourced from farmers, by improved drying practices.</li> <li>◦ New logo developed and packaging material designed, this has promoted marketing of DGL's rice to better markets including new off-takers from further Districts outside the business region, as well as distribution center in the capital city.</li> <li>◦ A microfinance institute (MSC) was connected with DGL. 6 FGs received loans through DGL's engagement with MSC by providing recommendation letters for the FGs supplying to DGL.</li> <li>◦ DGL's turnover increased by 6% from UGX 1,182,975,326 or €282,488 in 2020 to €300,456 in 2021. The low percentage increment was due to the high competition in the rice market from imported Tanzanian rice which has caused a decline in demand plus a fall in prices. However, DGL has earned an additional turnover for business of EUR 850,088 or UGX 3,559,578,239 from the REACH-Uganda intervention partnership</li> <li>◦ In future, DGL plans to set up a warehouse in Kampala (city market) to increase on its production volume as well as storage facility for the increased volume of rice.</li> <li>◦ DGL is also in plans to perform value addition of rice to increase the nutritional value targeting the school feeding program.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>Mengya Integrated Farmers' Association (MIFA)</b>	Potato	Establishing commercially viable seed potato business	<ul style="list-style-type: none"> <li>Installed gravity irrigation system with drip demonstration.</li> <li>Installed two 120 M<sup>2</sup> screen houses</li> <li>Developed a sourcing plan for plantlets</li> <li>Trained MIFA members and workers in screen house operation and management</li> <li>Constructed 240M<sup>2</sup> diffused light stores</li> <li>Developed a brand for MIFA seed potato</li> </ul>	<ul style="list-style-type: none"> <li>Through the gravity-fed irrigation systems at MIFA, 74 farmers (50 MIFA members and 20 other farmers) are now earning a 68% increase in profits using irrigation in the off-season as compared to the rainfed season.</li> <li>MIFA installed two screen houses and procured 4,000 plantlets from NARO KAZARDI in 2021 for planting in the screen houses. MIFA expects to harvest 32,300 mini tubers from the 4000 plantlets. Going forward MIFA plans to source plantlets from Agromax (Private tissue culture lab) or KAZARDI depending on availability.</li> <li>The 32,300 mini tubers will be planted on approx. one and half acres to produce approx. 8 MT of pre-basic seed. The 8MT of pre-basic seed will be planted on approx. 10 acres and will produce approx. 52MT of basic seed.</li> <li>The 52MT of basic seed will be planted on approx. 65 acres by MIFA members to produce approx. 364MT of Quality Declared Seed (QDS) that will benefit 455 potato farmers by 2023.</li> <li>MIFA members will earn an additional income of UGX 360,360,000 or EUR 85,800 from sale of Quality Declared Seed (QDS).</li> <li>In addition to the mini tuber production, MIFA also procured 4.64MT of basic seed from NARO KAZARDI, planted on approx. 5.8 acres and produced 37.5MT of QDS that benefited 47 farmers.</li> <li>MIFA also received 1.875MT Sagiita, 1.875MT Panamera and 1.25 MT Voyager that was planted by two farmers on approx. 6 acres to popularize Dutch potato varieties among farmers and will be sold as ware potato.</li> <li>15 MIFA farmers were trained on clean seed production while 4 were trained on screenhouse management. These MIFA farmers are now going to be managing seed production moving forward.</li> <li>2 FTEs established in the screen house management, 1 in the Diffused Light store management, 1 for the irrigation system management earning UGX 7,200,000 or EUR 1,719</li> <li>The 240M<sup>2</sup> Diffused Light Store with storage capacity of approx. 60MT was constructed to facilitate the storage and post-harvest handling of seed potato before sprouting and sale to farmers.</li> <li>The brand for MIFA seed potato was developed as a way of distinguishing MIFA seed potato from other seed potato producers and building relationship with customers (Farmers).</li> </ul>
<b>SWT Tanners Ltd.</b>	Rice	Increase sourcing of Local paddy for milling by facilitating investment in scheme development and relevant agricultural services	<ul style="list-style-type: none"> <li>Identified land, tested, and acquired it for cultivation.</li> <li>Developed a master plan and a business plan.</li> <li>Carried out general and topographic surveys to develop the land.</li> <li>Developed access roads.</li> <li>Developed water infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>5,000 acres of land procured by SWT, general and topographic surveys were done,</li> <li>A full plan for utilized procured land for paddy production and milling rice was made based on projections for the next 3 years. The plan consisted of a detail of personnel required to manage SWT's land for rice cultivation.</li> <li>Developed a 5.4 km access road which has improved access to market by communities and facilitated movement of equipment and machinery to the farm. This road has benefited a minimum of 8,391 people living in the road catchment area.</li> <li>Established farm structures such as farm buildings, water infrastructure, procured equipment and machinery to facilitate farm operations leading to efficiency and increased yields</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
			<ul style="list-style-type: none"> <li>Procured equipment and machinery to facilitate farm operations.</li> <li>Opened land for cultivation</li> <li>Sourced paddy from farmers.</li> <li>Provide transport services to farmers while sourcing paddy.</li> <li>Developed SWT Ugandan brand.</li> </ul>	<ul style="list-style-type: none"> <li>A total of 500 acres have been opened and cultivated.</li> <li>Using the nucleus farm, SWT produced 328 MT of paddy in 2021 from 230 acres, this brings the cumulative total produced from the SWT to 665MT.</li> <li>Additional 44 FTEs created at SWT earning EUR 21,897 in 2021 with a total of 266 FTEs created.</li> <li>SWT has plans of moving towards more local production and have reduced importation as more land for cultivation is to be opened with more 1000 acres to be opened by the end of 2021.</li> <li>Sourced 2,758 MT of paddy from 5,070 farmers in Eastern Uganda earning them an additional income of UGX 1,048,040,000 or EUR 250,266. SWT reimbursed farmers for their transportation cost of supplying paddy, and then incorporated it into their sourcing price.</li> <li>Additional turnover for SWT from selling milled rice is EUR 1,748,355</li> <li>The SWT rice products are a popular brand available in the city markets of Uganda.</li> <li>In future, SWT plans to import hybrid seed by end of 2021 which will first be used on SWT farm, once it is registered, they plan to distribute out to farmers from whom they will source paddy.</li> <li>To construct a drying yard for paddy of 300 square meters as well as create more storage facilities at the farm for paddy with the capacity of 30 to 50MT of paddy.</li> <li>Plan to use more mechanization for land preparation and harvesting as the area is increasing significantly.</li> </ul>
<b>St. Richards Group of Companies (RGC)</b>	Rice	Farmers make use of efficient milling services and produce higher valued rice	<ul style="list-style-type: none"> <li>Drying yard expanded, constructed a 2300sqm drying yard with a capacity to dry 4.4MT of paddy</li> <li>Renovation of the building to install the new multi-stage milling machine.</li> <li>Purchased the multi-stage milling machine with capacity of 30MT per day.</li> <li>Purchased 3 moisture meters and trained 3 RGC employees on their operation.</li> <li>Trained 57 village agents in post-harvest handling</li> </ul>	<ul style="list-style-type: none"> <li>The drying yard is being used by community farmers as well as other farmers who dry and then mill their paddy with RGC. It has worked as an incentive for farmers to mill with RGC. As such 515 MT of paddy was sourced and milled at RGC using the Multi-stage mill by June 2021.</li> <li>RGC's facility was renovated to make space for installing a multi-stage milling machine. 396 farmers milled using the multi-stage mill procured and installed because of the partnership, out of the 1,292 farmers milling from RGC as of June 2021. The paddy mobilized by village agents is milled using the multi-stage mill, while most farmers who bring directly opt to use the single stage mill. 6 (3 Males and 3 females) additional staff employed at RGC and involved in the operation of the multi-stage mill with additional income UGX 6,280,000 or EUR 1,500.</li> <li>Additional turnover for UGX 834,758,769 or €199,336 from selling better quality milled rice as of June 2021.</li> <li>Most farmers had issues with transporting their paddy to RGC which has been solved as RGC procured 2 trucks of 5MT to support sourcing from farmers in the areas of Tororo, Soroti, Mbale and Northern Uganda. The number of farmers is expected to increase due to the transport incentive that is to be offered by RGC to the farmers, this will enable the RGC to increase its sourcing hence increase their milling capacity from 15MT a day in 2020 to 20MT.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>Charles K. Byarugaba (CKB)</b>	Potato	Establishing commercially viable seed potato business	<ul style="list-style-type: none"> <li>◦ Installed 240 M<sup>2</sup> screen house</li> <li>◦ Developed sourcing plan for plantlets</li> <li>◦ Constructed farm ponds &amp; installation of 3.2-acre pressure compensating drip irrigation system</li> <li>◦ Constructed of diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>◦ Staff trained are now able to assess moisture content of paddy at the time of buying and milling using the moisture meters, this helped to improve the quality of rice milled as previously over drying of paddy was an issue at RGC.</li> <li>◦ Village agents were trained in post-harvest handling including water management, threshing rice, drying paddy, transportation and packaging, these Village agents transferred knowledge to farmers through training farmer groups. Each VA reached out and trained 4 FGs each consisting of 10 farmers, as a result, quality of paddy from farmers improved, due to better drying and post-harvest handling practices.</li> <li>◦ Much as the farmers still somewhat have perception issues with using the RGC multi-stage mill, through the radio talk shows there has been an increase in the customer base hence farmers milling using the multi-stage has increased.</li> </ul> <ul style="list-style-type: none"> <li>◦ CKB installed a 240 M<sup>2</sup> screen house with a planting capacity of 3,900 plantlets. CKB plans to source plantlets from Agromax or KAZARDI, depending on the availability.</li> <li>◦ 2,251 farmers have so far been reached with 1,801 MT of clean seed through Operation Wealth Creation (OWC) program and LSBs that procure from CKB. These farmers are benefiting from increased yield of ware as a result of using clean seed earning them an additional income per year of EURO 543 per farmer using clean seed instead of home saved seed.</li> <li>◦ It is projected that CKB will produce a total of 70.37MT of pre-basic seed and 464MT of basic seed by end of 2023 reaching a total of 2,320 farmers in Kabale, Bukwo, Bulambuli, Sironko Kween, Kabarole and Mityana Districts</li> <li>◦ Currently, CKB plants 8,073 plantlets in screen house with each plantlet producing an average of 15 mini-tubers generating a total of 121,095 mini-tubers annually.</li> <li>◦ The 121,095 mini-tubers produces 30MT of pre-basic seed and 30MT will translate into 200 MT basic seed annually.</li> <li>◦ 27 FTEs have created with additional income of 26,160,000 UGX or EUR 6,247 by June 2021.</li> <li>◦ CKB short to medium term plan is to invest in land to increase on the land available for seed potato production due to the increased number of mini-tubers, pre-basic and basic seed that require more land in line with the proper rotation regime for seed potato production.</li> <li>◦ In the long term, CKB plans to promote the farm into an agrotourism center, where farmers from different parts of the country can come and learn about potato production.</li> <li>◦ Installing the 3 acres pressure compensating sprinkler irrigation system has enabled CKB to produce pre-basic seed from mini-tubers during off season production of pre-basic seed. A total of 18MT has been produced using the irrigation system.</li> <li>◦ Constructed 200 M<sup>2</sup> diffused light store with a storage capacity of 60MT of seed potato. This will address the challenge of seed potato storage and post-harvest handling.</li> <li>◦ CKB also plan to invest in a small Diffused Light Store (DLS) specifically for storage of mini-tubers.</li> <li>◦ In the medium term, CKB plans to invest in the 12MT truck to facilitate the transportation of seed potato from the production area to the store and later distribution the farmers.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>Kigezi Farmer's Resource Center (KFRC)</b>	Potato		<ul style="list-style-type: none"> <li>◦ Constructed screen house</li> <li>◦ Developed sourcing plan for plantlets</li> <li>◦ Constructed of diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>◦ KFRC Installed 120 M<sup>2</sup> screen house with plant capacity of 1,600 plantlets.</li> <li>◦ Currently, KFRC plants 3,200 plantlets in screen house with each plantlet producing an average of 13 mini-tubers generating a total of 41,600 mini-tubers annually. KFRC plans to procure plantlets from Agromax or KAZARDI, depending on availability.</li> <li>◦ The 41,600 mini-tubers produces approx. 10MT of pre-basic seed which will translate into 66MT of basic seed annually.</li> <li>◦ In 2021A KFRC purchased 500 Plantlets from NARO KAZARDI that it propagated to produce 1,622 apical cuttings planted in the screen house and yielded 21,682 mini-tubers</li> <li>◦ In 2021, KFRC sold 39.36 MT of clean seed benefiting 345 farmers through OWC and QDS multiplication through LSBs, these farmers are earning additional income of EUR 743 per farmer from the increased yield and volumes of ware potatoes for sale.</li> <li>◦ Overall, KFRC has produced and sold 148.1MT of basic seed 1,256 farmers using LSBs who multiply the basic seed into over 1,000MT of QDS.</li> <li>◦ It is projected that, by end of 2023, KFRC will produce 283.53 MT of basic seed. 50% of this will be used to produce QDS and the rest will be sold to farmers through OWC. The seed produced is expected to reach a total of 874 farmers in Rubanda, Kanungu, Kisoro, Kabarole, Bunyangabu districts.</li> <li>◦ KFRC sales kilogram of seed is sold at UGX 3,000 (EUR 716 per MT of clean seed) and an additional income from sale of basic seed is EUR 28,197 for 2021 A</li> <li>◦ KFRC short to medium term plan is to invest in land to increase on the land available for seed potato production due to the increased number of mini-tubers, pre-basic and basic seed that require more land in line with the proper rotation regime for seed potato production</li> <li>◦ In future, KFRC plans to acquire more land to manage the increasing number of mini-tubers, and pre-basic seed that require considerable land if the rotational protocol for seed potato production is to be followed as required by MAAIF.</li> <li>◦ Constructed 200 M<sup>2</sup> diffused light store with a storage capacity of 60MT of seed potato. The store will address the challenge of seed potato storage, post-harvest handling and proper seed potato marketing.</li> </ul>
<b>Kapchosombe Green Change Farmers' Cooperative (KGCF)</b>	Potato	Establishing commercially viable seed potato business (from basic seed to QDS)	<ul style="list-style-type: none"> <li>◦ Improved and expanded irrigation system</li> <li>◦ Established of water user committee</li> <li>◦ Sourced clean basic seed for planting</li> <li>◦ Trained in QDS seed production</li> <li>◦ Establish a diffused light store</li> <li>◦ Supported marketing for QDS produced</li> </ul>	<ul style="list-style-type: none"> <li>◦ Installed irrigation system serving 30 farmers with an average of 2 acres, farmers are now earning a 68% increase in profits using irrigation in the off-season as compared to the rainfed season. The irrigation system is utilized for potatoes (seed) and other crops such as cabbages, onions, and tomatoes. This has encouraged crop rotation and farmers are earning an extra income from crop diversification. They have plans to increase on land for production under irrigation and to encourage other farmers to purchase equipment needed for drip irrigation.</li> <li>◦ A water user committee of 5 members was established for managing water usage and maintenance of the irrigation system.</li> <li>◦ Purchased 0.9 MT of basic seed planted to produce 6.48 MT Quality Declared seed which was sold to 8 group members at UGX 900 per kilogram, earning KGCF an additional income of EUR 1,393 from sale of QDS.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>Received 1.875 MT of Panamera, 1.875MT of sagitta and 1.25 MT of voyage Dutch varieties as to popularize Dutch potato varieties among the farmers. This was planted by 3 farmers who will produce ware potatoes that will be sold in both local and Kampala markets.</li> <li>In the short term KGCFRC plans to purchase basic seed from ISBs in Kabale to produce quality declared seed.</li> <li>In the medium to long term, KGCFRC will work closely with MIFA to source Basic seed to produce 25 MT of quality declared seed per season reaching 125 farmers by end of 2023 in Kapchorwa District.</li> <li>Capacity building and training was conducted of 30 (16F &amp; 14M) KGCFRC farmers on clean seed production and a learning visit for 6 KGCFRC members by on farm visits to MIFA</li> <li>Constructed a 134 M<sup>2</sup> diffused light store with storage capacity of 60MT of quality declared seed</li> <li>KGCFRC plans to market their seed in future through radio talk shows and farmer field days.</li> </ul>
<b>Grain Pulse Limited (GPL)</b>	Cross-cutting	Farmers have access to crop specific fertilizers and information on how to use them	<ul style="list-style-type: none"> <li>Selection &amp; assessment of stockists</li> <li>Training of selected stockists and lead farmers /agents/CATS</li> <li>Establishment of demonstration plots</li> <li>Increased market activation of crop specific fertilizer blends through radio talk shows.</li> <li>Increased market activation through pocket guides/booklets, leaflets, and banners</li> </ul>	<ul style="list-style-type: none"> <li>18 District level, 36 Subcounty level stockists and 108 lead farmers were selected.</li> <li>Increased product knowledge about crop specific fertilizers through selection and training of 42 district and sub county level stockists in the Eastern and Southwestern districts.</li> <li>There has been an additional 15 -25 agro input stockists established in the areas of Namutumba, Sironko, Bugiri, Kabale and Rubanda for easy access of the inputs for the farmers. These stockists have purchased and stocked over 349MT of potato and rice blends. However, very few have stocked rice blends due to it being hygroscopic (rice blends have a tendency to absorb moisture from air) so it is only stocked when it is demanded.</li> <li>42 potato and 30 rice demonstration plots were set up with the crop specific fertilizers. The demos are expected to attract almost 50 farmers per plot at the time of harvest.</li> <li>Increased awareness of crop specific fertilizers among farmers by conducting 20 radio talk shows in the Southwest and Eastern Uganda.</li> <li>There has been an increased demand for GPL products as well as the customer base, this is evidenced by the repeat purchases and increased purchases of the blends by agro dealers from GrainPulse.</li> </ul>
<b>Microfinance support center (MSC)</b>	Cross-cutting	Farmers and service providers have better access to financial products and services.	<ul style="list-style-type: none"> <li>Recruitment of agriculture loan officers</li> <li>Procured motorcycles and desktop computers for the credit assistants.</li> <li>Conduct sensitization meetings to popularize MSC products to farmers</li> <li>Identify and select potential farmer groups eligible for lending</li> <li>Review the current MSC financial products.</li> </ul>	<ul style="list-style-type: none"> <li>Recruited 3 credit assistants to support with the sensitization of farmers on the MSC loan products. These earn an additional income of EURO 5,986.</li> <li>The credit assistant officers are able to scope for potential FG's interested in acquiring loans and quickly process their loaning application through their computers.</li> <li>62 Farmer groups were sensitized on the MSC products.</li> <li>Through this partnership, MSC disbursed loans to 14 farmer groups amounting to UGX 336,000,000 or EUR 80,235 creating financial access to 210 farmers.</li> <li>Currently, EUR 21,014 or UGX 88,000,000 has been approved for 5 farmer groups in the Rice growing areas and yet to be disbursed at a low interest rate of 1% per month.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ Inadequate preparations of farmer groups receiving financing has been the main challenge, farmer groups need a lot of sensitizations and preparing on proper utilization of funds received, however with the big catchment area for MSC, this has not been handled adequately because of limitations in staffing levels. In the end, fewer FGs are ably prepared for receiving loans. MSC financial products are suitable for potato and rice farmer groups of Uganda, however the initial screening and approval process takes time.</li> </ul>
<b>Lwoba Holdings (LH)</b>	Rice	Farmers make use of efficient milling services and produce higher valued rice	<ul style="list-style-type: none"> <li>◦ Construction of a one-acre concrete drying yard</li> <li>◦ Recruitment of field agents</li> <li>◦ Training in post-harvest handling of paddy</li> <li>◦ LH to operate as a distributor of inputs like fertilizers, pesticides, and certified rice seed from Grain Pulse and Kibimba Ltd</li> <li>◦ Training staff on agro-inputs handling.</li> <li>◦ Linkage to MSC for loans to LH and farmers of Manafa river basin cooperative.</li> </ul>	<ul style="list-style-type: none"> <li>◦ 894 MT of rice has been milled at LWOBA by June 2021, farmers have realized benefits of using the drying yard as such more community farmers mill from LH with the drying yard as an incentive.</li> <li>◦ 2 FTEs were created earning an additional income of EUR 2,966.</li> <li>◦ Field agents sensitized and trained community farmers in post-harvest handling, 1,376 MT of paddy was sourced from 570 farmers of which 360 farmers were from the Manafa Basin and the rest from Kumi District as well as other farmers from Butaleja District.</li> <li>◦ LH offers between UGX 1,800 -2,000 for milled rice compared to UGX 1,500 at single stage mills. Super aromatic rice is bought between UGX 3,000- 3,100 from farmers and accounts for only 10% of the total rice milled at LH.</li> <li>◦ Farmers milling with Lwoba earn an additional income of EUR 524 per farmer compared to those milling with single stage mills.</li> <li>◦ LH's turnover EUR 512,499 as at June 2021. This has been as a result of full production under the Manafa River Basin scheme which was under rehabilitation from previous years.</li> <li>◦ With the establishment of Wita 9 seed from KL, farmers have reported more yields and higher incomes as a result of selling the Wita 9. Wita 9 is usually sold at UGX 2,100/Kg when processed at the LWOBA multi-stage mill.</li> <li>◦ LWOBA intends to purchase more certified seed although there is a need to create more awareness to the farmers on the varieties. Once, LWOBA perfects its distribution and management of seed, it will incorporate other inputs into its distribution model.</li> <li>◦ LWOBA has plans of obtaining a Q mark from UNBS and access credit from Stanbic bank to be able to buy all milled rice from the farmers who mill from the Multi-stage mill.</li> </ul>
<b>Agromax</b>	Potato	Supporting the development of seed potato market	<ul style="list-style-type: none"> <li>◦ Identification of farmers &amp; farmer groups with capacity and skills to operate screen houses</li> <li>◦ Develop a sourcing plan for plantlets</li> <li>◦ Execution of technical assistance</li> <li>◦ Purchase and installation of screen houses based on specification.</li> <li>◦ Seed potato quality assurance, certification, and promotion</li> </ul>	<ul style="list-style-type: none"> <li>◦ Agromax was connected with REACH-Uganda supported partners that were interested in procuring plantlets for producing seed.</li> <li>◦ However, Agromax were only able to supply 1,900 to 3 screen houses in Elgon after which they suspended production of plantlets until the technical challenges were resolved. - the lab required decontamination.</li> <li>◦ In the medium to long term Agromax will embark on production of plantlets to supply all screen houses in Elgon areas in the districts of Mbale, Kapchorwa and Kween. They anticipate producing 30,000 tissue culture plantlets for supply by end of 2022. Agromax will coordinate with screen house owners and make a sourcing plan for plantlets.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ Agromax will connect with potential farmer groups interested in starting a seed production business by providing them with the relevant material for establishing a screen house, DLS and also the technical guidance for running the business.</li> <li>◦ The adjustment in their model given the issues with transport is to use of 2mt refrigerated truck to transport plantlets to BugizARDI who will act as a central point where the screenhouse owners can collect the plantlets from.</li> </ul>
<b>Sukutu Multipurpose Women Group (SMWG)</b>	Potato	Establishing commercially viable seed potato business (from basic seed to QDS)	<ul style="list-style-type: none"> <li>◦ Training in seed production</li> <li>◦ Exposure learning visit to MIFA</li> <li>◦ Sourcing of clean basic seed for planting</li> <li>◦ Establish a diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>◦ Capacity building and training of 20 (12F &amp; 8M) SMWG farmers on clean seed production, learning visit to MIFA for the 3 farmer members. This enabled SMWG to start the seed potato business.</li> <li>◦ Planted 1.6 MT of basic seed sourced from CKB for production of Quality Declared Seed. Produced 1.1MT of clean seed with technical guidance from REACH-Uganda.</li> <li>◦ A diffused light store was established for storing potato. This will be in use once, a larger volume of seed is produced in the coming years.</li> </ul>
<b>Byampa Enterprise</b>	Potato	Women benefit from access to information, skills, and opportunities	<ul style="list-style-type: none"> <li>◦ Procurement of semi-automated processing equipment.</li> <li>◦ Training in operation of machinery and equipment</li> <li>◦ Purchase of digital weighing scale and sealing machine</li> <li>◦ Develop annual sourcing plan for raw materials</li> <li>◦ Develop new packs for crisps</li> </ul>	<ul style="list-style-type: none"> <li>◦ Byampa upgraded the processing equipment from manual to semi-automated with output capacity of 2.8kgs/hour up from 0.6kgs/hour of potato crisps.</li> <li>◦ By June 2021, BYAMPA was able to sell 0.9MT of crisps earning her a turnover of EUR 2,686.</li> <li>◦ By using the weighing scale and the sealing machinery, Byampa can prepare crisps in standardized packages for sale.</li> <li>◦ Byampa is projected to process 6MT of potato crisps per annum from 24MT of ware potatoes sourced from 4 farmers.</li> <li>◦ EUR 860, additional income 4 farmers supplying 3.6 MT of potatoes to BYAMPA</li> <li>◦ Branded and developed new attractive packs for crisps which have increased her visibility in the market.</li> </ul>
<b>Highgrow Agri (Namakwaland farm)</b>	Potato	Establish a value chain for new (Dutch) potato varieties.	<ul style="list-style-type: none"> <li>◦ Imported seed potato from HZPC and AGRICO in Netherlands to Namakwaland Farm in Masaka Uganda.</li> <li>◦ Produced potatoes of Dutch potato varieties in Uganda.</li> <li>◦ Popularized Dutch potato varieties among the farmers.</li> <li>◦ Connected Namakwaland Farm to the national electricity grid.</li> <li>◦ Installed 80MT potato cold chain storage unit</li> </ul>	<ul style="list-style-type: none"> <li>◦ In 2021, produced 201.2MT of ware potato of Taurus variety from the 25 MT imported from Kenya by Namakwaland in October 2020. The Taurus was sold to PFIL and Markies to Chicken Express. Overall, Highgrow Agro has produced total of 449.1MT (165.8 Markies and 283.3 of Taurus varieties)</li> <li>◦ Additional turnover from sales of ware potato 198.94 MT is EUR 61,448 or UGX 257,323,950 by June 2021</li> <li>◦ 50 MT of potatoes for planting have been produced, 40% sold to farmers from Kisoro District and Rakai District and retained 60% for ware potato production to maintain a consistent supply to PFIL for processing. Namakwaland currently has seed orders of 79 MT from Fort Portal (individual seed multipliers)4.5 MT for a Zombo District Farmers Association.</li> <li>◦ Received 25 MT of elite material for multiplication into seed potato, that will be planted on approx. 28 acres with expected yield of 157.5 MT. 75% of this seed will be sold to benefit 148 farmers in 2022.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ Namakwaland acquired a seed production license from MAAIF to enable the farm to produce and sell seed potato.</li> <li>◦ The Farm will shift from production of ware potato to seed potato production with an annual production target of 360MT reaching a total of 450 farmers.</li> <li>◦ Namakwaland also plan to establish an out-grower scheme to produce ware potato to feed the establish a small processing factory to process French fries to supply to fast food restaurants in Uganda</li> <li>◦ Namakwaland farm connected to the national electric grid, that did not only save the farm fuel cost of running the generator but also power the 80MT cold chain storage use to store seed potato to reduce post-harvest handling and marketing of the seed potato.</li> </ul>
<b>Muyambi William</b>	Potato	Establishing commercially viable seed potato value chain from plantlets to basic seed to producing Quality Declared Seed (QDS) at affordable prices.	<ul style="list-style-type: none"> <li>◦ Installed 240 M<sup>2</sup> screen house.</li> <li>◦ Linkage of Muyambi to agromax to source plantlets</li> <li>◦ Promoting clean quality seed potato</li> <li>◦ Construction of a diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>◦ Muyambi installed a 240 M<sup>2</sup> screenhouse with a planting capacity of 3,400 plantlets.</li> <li>◦ In 2021A Muyambi purchased 1,500 plantlets which he propagated into 3,822 apical cuttings that he planted in the new screenhouse. From these cuttings Muyambi yielded 62,747 Mini-tubers, this is to be planted on 2.95 acres of land in season 2021B and is projected yield of 15.6MT of pre-basic seed. 15.6MT of pre-basic will produce 102.96MT of basic seed in 2022, once this basic is multiplied into QDS, it will benefit over 900 farmers.</li> <li>◦ Currently, Muyambi plants 7,644 plantlets in screen house with each plantlet producing an average of 15 mini-tubers generating a total of 114,660 mini-tubers annually.</li> <li>◦ 2 FTEs were created earning an additional income of UGX 4,032,000 or EUR 963</li> <li>◦ Constructed 134 M<sup>2</sup> diffused light store with a storage capacity of 40MT of seed potato. The store will address the challenge of seed potato storage, post-harvest handling and proper seed potato marketing.</li> </ul>
<b>Welishe</b>	Potato	Establishing commercially viable seed potato business from plantlets to Basic seed.	<ul style="list-style-type: none"> <li>◦ Construction of a screen house</li> <li>◦ Develop sourcing plan for plantlets</li> </ul>	<ul style="list-style-type: none"> <li>◦ Welishe installed 120 M<sup>2</sup> screen house with a plant capacity 1,700 plantlets.</li> <li>◦ Annually, Welishe will plant 3,000 plantlets in its screen house, producing approx. 45,000 mini-tubers.</li> <li>◦ The 45,000 mini-tubers will produce approx. 11MT of pre-basic seed that will translate into 73MT of basic seed.</li> <li>◦ Welishe has purchased 700 plantlets from Agromax, propagate into 1,000 apical cuttings and planted in screen house. While, procuring 300 plantlets from KAZARDI</li> <li>◦ From the 1,000 plantlets, Welishe harvested 30,000 mini-tubers, stored for 3 months, and planted on 1.5 acres, this was harvested producing 6.5 MT of pre-basic seed. He will remultiply the 6.5MT of pre-basic seed to produce 42.9MT of basic seed. Welishe plans to sale his basic seed within the potato growing areas of Wanale, Sironko, Bulambuli and Mbale</li> <li>◦ By the end of 2023, Welishe is projected to produce 19.5MT of pre-basic seed and 85.8MT of basic seed. This once multiplied in QDS will be reaching 358 farmers.</li> <li>◦ Welishe plans to source plantlets from NARO KAZARDI since the previous source of plantlets which was Agromax advised him to identify another source, because Agromax was still sorting out the technical issues with their TC lab.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>Chemonges</b>	Potato	Establishing commercially viable seed potato business from plantlets to basic seed	<ul style="list-style-type: none"> <li>Construction of a screen house</li> <li>Develop sourcing plan for plantlets</li> <li>Construction of diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>Chemonges installed a 240 M<sup>2</sup> screen with a planting capacity of 3,400 plantlets.</li> <li>Chemonges will be planting 6,800 plantlets in screen house with each plantlet expected to produce an average of 15 mini-tubers generating a total of 102,000 mini-tubers annually.</li> <li>The 102,000 mini-tubers will produce approx. 25MT of pre-basic seed and 25MT will translate into 168MT basic seed annually.</li> <li>In 2021 season A, Chemonges purchased 2,200 plantlets from NARO-KAZARDI to plant in screen house.</li> <li>He is expected to harvest 17,600 mini-tubers in October 2021. From the 17,600 mini-tubers, Chemonges is expected to 4.4MT of pre-basic seed in 2022A.</li> <li>It is projected that Chemonges will produce 13.2MT of pre-basic seed and 87.12MT of basic seed by 2023 reaching 108 farmers in Kapchorwa and Kween Districts</li> <li>He plans to continue sourcing plantlets from NARO KAZARDI as the only reliable source of plantlets plus the fact that they also provide technical support on crop management in screen house.</li> <li>Constructed 134 M<sup>2</sup> diffused light store with a storage capacity of 40MT of seed potato. The store will address the challenge of seed potato storage, post-harvest handling and proper seed potato marketing.</li> </ul>
<b>Bitamba</b>	Potato	Establishing commercially viable seed potato business from plantlets to Basic seed	<ul style="list-style-type: none"> <li>Construction of a screen house</li> <li>Develop sourcing plan for plantlets</li> <li>Promoting clean quality seed</li> <li>Construction of diffused light store</li> </ul>	<ul style="list-style-type: none"> <li>Bitamba installed a 240 M<sup>2</sup> screenhouse with a planting capacity of 3,400 plantlets.</li> <li>Bitamba will be planting 6,800 plantlets in screen house with each plantlet producing an average of 13 mini-tubers generating a total of 88,400 mini-tubers annually.</li> <li>The 88,400 mini-tubers produces approx. 22MT of pre-basic seed and MT will translate into 145MT basic seed annually.</li> <li>Bitamba procured 1,000 plantlets from NARO KAZARDI which was propagated into 3,696 apical cuttings. Bitamba plans to continue sourcing from KAZARDI.</li> <li>From the 3,696 plantlets, He has harvested 31,345 mini-tubers which will be planted on approximately one and half acres to produce approx. 7.6MT of pre-basic seed in season 2022A.</li> <li>The 7.6MT of pre-basic seed will be replanted on approx. 9.75 Acres and is projected to produce approx. 50.16 MT of basic seed by end of 2023. The 50.16 MT once multiplied into QDS is projected to reach over 400 farmers in Buhara Sub County in Kabale District and across the border in Rwanda. Bitamba has a network of farmers through which they are planning to promote and sell its seed.</li> <li>Constructed 134M<sup>2</sup> diffused light store with a storage capacity of 40MT of seed potato. The store will address the challenge of seed potato storage, post-harvest handling and proper seed potato marketing.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
<b>New Bukumbi Coffee (NBC)</b>	Potato	Establish a value chain for new (Dutch) potato varieties.	<ul style="list-style-type: none"> <li>Produce ware potato of Dutch potato varieties in Uganda</li> <li>Popularize Dutch potato varieties among the farmers.</li> <li>Secure market for Dutch potato varieties.</li> <li>Improved storage and marketing of ware potato (Construction of the ambient store)</li> </ul>	<ul style="list-style-type: none"> <li>Through the New Bukumbi engagement, a total of 120 farmers received 87.5MT of Dutch potato varieties 50MT of Taurus, 25MT of Markies and 12.2MT of Panamera for production of ware potatoes.</li> <li>The seed potato was distributed to 120 farmers planting on average 1 acre and were able to yield an average of 6.5MT/acre with some farmers yielding up to 10MT per acre. The average was affected by adverse weather conditions like heavy rains and drought. Farmers expected to sell at a price of Ugx.750/kg, and since were given free inputs including seed, the UGX 750/kg is profit earned by these farmers.</li> <li>NBC farmers are earning an additional income of UGX 108,020,250 or EUR 25,795 (UGX 2,455,006 or EUR 586 per farmer using Dutch seed compared to UGX 1,964,005 or EUR 469 per farmer using local varieties) this yield is a representation of 75% increment when compared to when these farmers were growing local varieties with an average yield of 2MT per acre, average price is UGX 600/Kg in the local market for both Dutch and local varieties.</li> <li>NBC signed a supply contract with Psalms Food Industries Limited a crisps processor for Taurus variety and the other two varieties are supplied on open markets in the Kampala Metropolitan area.</li> <li>Due to the success that has been registered, NBC plans to scale up and increase to 200 farmers that require 180 MT of seed potato.</li> <li>New Bukumbi also plans to hire a project manager who will be responsible for the coordination of the potato activities.</li> <li>Constructed 134M<sup>2</sup> potato ambient store with a storage capacity of 40MT of ware potato. The store will address the challenge of ware potato storage, post-harvest handling and proper ware potato marketing. The store can keep the potatoes for up to 30 days without the potatoes losing quality the quality attributes.</li> </ul>
<b>Clarke farm</b>	Potato	Establish a value chain for new (Dutch) potato varieties.	<ul style="list-style-type: none"> <li>Secure market for Dutch potato varieties.</li> <li>Produce seed potato of Dutch potato varieties in Uganda</li> <li>Popularize Dutch potato varieties among the farmers.</li> <li>Installation of the appropriate irrigation system</li> <li>Construct and install a cold chain storage unit.</li> </ul>	<ul style="list-style-type: none"> <li>In 2020B Clarke Farm received 25MT Dutch Potato varieties, 25MT of Panamera for production of ware potato to activate the market for the Dutch potatoes in Uganda, the 25MT of Panamera yielded 159MT, with average yield of 5.5MT per acre.</li> <li>In 2021A 25MT of elite material, 12.5 Markies and 12.5 Taurus of elite material for multiplication into seed potato.</li> <li>From the 25MT of Markies and Taurus elite materials, Clarke farm produced 56MT of certified seed potato I, 12MT will be replanted to produce certified seed potato II and the remaining 50MT will be sold as seed reaching a total of 62 farmers in Kyenjojo, Mubende, and Kabarole Districts in 2022A.</li> <li>Clarke Farm will establish an out-grower scheme for coffee and potatoes. The farmers will receive seed potatoes and other inputs like fertilizer, crop protection products, and provide extension services to farmers at a cost. They anticipate between 700-1,000 farmers will be part of this scheme in the next two years.</li> <li>Clarke farm plans to establish input distribution and potato collection centres within the out growers' scheme to facilitate distribution and collection of potatoes to and from farmers.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ Clarke Farm will then buy the potatoes from farmers in consideration of the costs for seed and other inputs.</li> <li>◦ Clarke Farm installed irrigation system with irrigation capacity of 6 hectares to allow sustained production of seed potato to feed into the seed potato system.</li> <li>◦ Installed cold storage room with a storage capacity of approx. 80MT of seed potato. Dutch potato varieties have a long dormancy period of up to 4 months. The cold room will keep the seed potato in good condition for that time during dormancy before sprouting and allow proper post-harvest handling and marketing. Currently the store is holding 37 MT of Taurus and Markies harvested in 2021A season as 7MT have been sold out to Kyenjojo. The 37MT will be ready for sale to farmers in 2022A season. Currently the store is holding 37 MT of Taurus and Markies harvested in 2021A season as 7MT have been sold out to Kyenjojo community. The remaining 37MT will be ready for sale to farmers in 2022A season.</li> </ul>
Pearl Seeds	Rice	Farmers have access to more appropriate cost-saving and yield increasing production inputs (seed) and have access to more information on how to use these and other Good Agricultural Practices (GAP).	<ul style="list-style-type: none"> <li>◦ Foundation seed procured, and seed crop produced.</li> <li>◦ Required infrastructure for seed processing developed.</li> <li>◦ Witta-9 and the newly released seed varieties tested on farms</li> <li>◦ Popularization of the certified seed.</li> </ul>	<ul style="list-style-type: none"> <li>◦ 9 MT of seed crop was harvested and cleaned, 6.5 MT was sold to farmers in northern and eastern Uganda at a price of UGX 4,000 per kg benefiting 542 farmers.</li> <li>◦ Additional income from the sales of certified seed UGX 26,000,000 or EUR 6,209 as at June 2021</li> <li>◦ Installed a seed processing unit of 2MT capacity for cleaning of the seed crop produced by PEARL SEED LTD. The seed cleaner has so far been used to clean and package 20MT of clean rice seed and 70MT of all other seed crops. It is able to clean 4 to 5MT of rice seed per day and 8 to 10MT of other seed crops.</li> <li>◦ PSL plans to continue with rice seed production as they anticipate bigger demand for rice seed between 500 to 1000MT per year to supply farmers in both northern and Eastern Uganda by 2023.</li> <li>◦ On marketing, PSL plans to engage print media, talk shows for advertisement, they also plan to get in touch with the district coordinators to ensure more recognition as seed producers in the districts they work in</li> </ul>
FICA	Potato	Establish a value chain for new (Dutch) potato varieties.	<ul style="list-style-type: none"> <li>◦ Produce seed potato of Dutch potato varieties in Uganda</li> <li>◦ Popularize Dutch potato varieties among the farmers.</li> <li>◦ Installation of the appropriate irrigation system</li> <li>◦ Construct and install a cold chain storage unit.</li> </ul>	<ul style="list-style-type: none"> <li>◦ Received 25 MT of Dutch potato varieties 12.5MT of Markies and 12.5MT of Taurus elite material for multiplication into seed potato. This seed was planted on 30 acres and produced a total of 168.9MT of seed potato. This seed will be ready for sale in in 2022A reaching a total of 211 farmers in the areas of Kabarole, Kyenjojo, Zombo and Bunyangabu Districts. Overall, FICA seed produced will benefit 281 farmers per year.</li> <li>◦ In the short-term FICA plans to directly engage Dutch potato breeders (HZPC and AGRICO) to discuss the formal arrangements on how they can continue to access basic seed for multiplication into certified seed for sale to the local farmers. This is because they anticipate that there is substantial demand for Dutch varieties on Uganda market.</li> <li>◦ In the long term, FICA plans to further engage the Dutch potato breeder to explore possibilities of using their existing Tissue Culture lab infrastructure to generate seed potato of Dutch varieties locally in Uganda, because importation of materials from Netherlands is not sustainable.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
				<ul style="list-style-type: none"> <li>◦ Installed a 20-acre irrigation system, to facilitate all year-round production of seed potatoes and to mitigate the risk of drought.</li> <li>◦ FICA plan to extend the irrigation system to cover additional 20 acres to allow rotational planting of seed potato.</li> <li>◦ Installed cold storage for seed potatoes, with a storage capacity of approx. 80MT, to ensure that seed is kept in good condition before sprouting and selling to the farmers for production of ware potato</li> </ul>
<b>Maziba Progressive Farmers Resource Centre Ltd (MPFRC)</b>	Potato	Establishing commercially viable seed potato business from plantlets to Basic seed	<ul style="list-style-type: none"> <li>◦ Purchase and installation of a screen house.</li> <li>◦ Sourcing of approximately 3,200 plantlets</li> <li>◦ Promoting clean quality seed potato</li> <li>◦ Constructed 134M<sup>2</sup> diffused light store with a storage capacity of 40MT</li> </ul>	<ul style="list-style-type: none"> <li>◦ Installed 240M<sup>2</sup> screen house with a plant capacity of 3,400 plantlets per planting.</li> <li>◦ Maziba sourced 400 plantlets which he propagated into 4,435 apical cuttings. From the apical cuttings, a total of 49,508 mini-tubers were produced, 21,400 mini-tubers were replanted on approx. 1 acre to producer 5.35MT of pre-basic seed in 2021A and the balance of 28,108 mini-tubers will be planted on approx. 1.3 acres in 2021B to produce 7.03MT of pre-basic.</li> <li>◦ It is projected that by the end of 2023, Maziba will be able to produce 34.2 MT of pre-basic seed and 191.92 MT of basic seed, reaching a total of 239 farmers in Maziba Sub County in Kabale and Zombo District.</li> <li>◦ With technical support from REACH-Uganda, Maziba earned a turnover of EUR 3,194 or UGX 13,375,000 from the sale of 2.8MT pre-basic seed to three individual seed multipliers and 2.57MT to Uganda National Seed Potato Producers Association at UGX. 2,500/Kg for further multiplication into basic seed</li> <li>◦ Maziba's medium to long term plans is to produce and stop at pre-basic seed, this is mainly because of shortage of land to multiply pre-basic seed to produce basic seed, as well as the emerging market of pre-basic seed from farmers in Maziba Sub County and in Zombo District.</li> <li>◦ With additional work from seed production, 6 FTEs were created earning an additional income of EUR. 1,941.</li> <li>◦ Constructed a diffused light store with storage capacity of 40MT of pre-basic and basic seed.</li> </ul>

Partner	Value chain	Intervention area	Main activities	Key achievements as at December 2020
KAKIE Farm	Potato	Establish a value chain for new (Dutch) potato varieties.	<ul style="list-style-type: none"> <li>◦ Imported 25 MT certified seed for ware potato production and market activation.</li> <li>◦ Installed appropriate irrigation system</li> <li>◦ Construct and install a cold chain storage.</li> <li>◦ Import of farm equipment and machinery unit.</li> </ul>	<ul style="list-style-type: none"> <li>◦ Received 25MT of Dutch potato varieties, 12.5 MT of Panamera and 12.5 MT of Taurus. With the average yield projected at 7MT per acre, KAKIE will produce approx. 109.38MT of ware potato to be sold to Crisps processors in Kampala Metropolitan area.</li> <li>◦ In the short term KAKIE plans to purchase 10MT of certified I seed in 2022A from Namakwaland to produce certified II seed to sale to farmers in Kabarole, Bundibugyo, and Bunyangabu Districts.</li> <li>◦ Installed irrigation system with irrigation capacity of 3 hectares to facilitate all year-round seed potato production and to reduce the risk of drought during production.</li> <li>◦ Installed cold room for storage of seed potato with storage capacity of approx. 80MT.</li> <li>◦ In the long term KAKIE also plans to install solar powered energy to supplement electricity in the running of the cold room.</li> </ul>

## Annex 3: EKN Indicators

Outcome	Indicator	Cummulative achievement	Comment
Peoples' nutrition improved	# people with improved food intake	25,333	24,255 farmers out of the total number 39,121 diversified their food intake
	# people with improved access to healthy diverse food	N/A	
Economic performance and resilience of farmer systems increased	# farmers with increased productivity	10,623	10,171 farmers increased productivity through good agricultural practices including use of good clean seed.
	# farmers with increased income (net)	13,831	13,831 farmers achieved increased net income from higher yields through CSA and GAP (30% of potato and 46% of rice farmers, 38% overall average).
	# farmers with improved access to services	16,752	Through trainings and linkages with private sector, farmers were able to access support services such as; extension services, financial services, spray services, and agro-input services.
	# farmers more resilient to shocks	37,999	Adopted 3 or 4 resilience measures which include: CSA, access to formal finance, income diversification and joint decision making in the household. This an improvement from 4,167 in 2017 which was the first year of impact.
	# hectares of farmland that become more resilient	4,890	61% of the trained farmers practiced 5 out of 9 CSA practices. Average acreage is 0.5 acres equals 0.22 hectares.
Quality of private sector development of FNS increased	# jobs created in agro food sector	352	The 352 full-time equivalent jobs were created for on farm production and factory operation management
	# value chains/sectors that perform better		
	# businesses co-investing in FNS activities	24	Of the 26 partners, 24 business co-invested in FNS activities

# Annex 4: Promoting Uganda’s Food and Nutrition Security, One Potato Greenhouse at a Time

*Building a commercially sustainable seed potato industry in Uganda*



## The Relevance of Investing in Potato for Food Security, Nutrition, and Farmer Resilience

### Rapid population growth and stagnating agricultural yields in Uganda

Uganda is an independent nation located in East Africa, neighbored by Kenya, Tanzania, Rwanda, South Sudan, and the Democratic Republic of Congo. Presently, it has a population exceeding 44 million persons and a population growth rate of 3.6% per annum. Uganda is one of Africa’s 33 least developed countries.<sup>1</sup> Gross domestic product (GDP) per capita is estimated to be approximately €761 per annum. Analysis of GDP by sector reveals that agriculture contributes 21.9%, followed by services at 43.0% and industry at 27%.<sup>2</sup> Analysis of the distribution of the labor force by occupation shows 41.2% work in agriculture, 16.4% in industries, and 42.4% in services.<sup>3</sup> These figures are indicative of an agricultural sector that is not presently working efficiently. A chronic lack of investment in the sector by the Government of Uganda (GoU), as noted by the World Bank, is responsible for the sluggish growth.<sup>4</sup> Underinvestment, however, is not solely the domain of the GoU. Private sector investment is also lagging, with the formal financial sector reluctant to offer lending and often only doing so at unattractive terms to borrowers. This is resultant from agricultural lending being twice as risky for the lender as other sectors and on average offering a 4-5% lower return.<sup>5</sup> When the rate of agricultural growth is considered in relation to the population growth rate, Uganda’s future food security is at risk.

The REACH-Uganda project, which ran from 2016 to 2021, was funded by the Embassy of the Kingdom of

Netherlands in Uganda. Work to establish a sustainable seed potato industry during the lifecycle of the project aimed at closing the yield gap for what is becoming a very important food crop for Uganda. Recognizing the broadening footprint of potato, activities took place in the eastern and southwestern regions of the country.<sup>6</sup>

### Potato “gold”: Food security and economic opportunities

While potato has been grown locally in Uganda for many years, the crop’s potential economic importance for farmers is only now being realized. Likely introduced by Belgian Missionary Fathers working in neighboring Rwanda, potato initially was grown almost exclusively in Uganda’s southwestern highlands, known as the Kigezi sub-region. This region with higher altitudes (reaching over 2,400 meters above sea level in places) and cooler temperatures provided ideal growing conditions for the crop.

Since the 1980s, however, several factors have driven the spread of potato cultivation to other regions of Uganda. Migrant workers from Kigezi moved to other areas in Uganda (particularly the Rwenzori region), bringing with them their own cultural beliefs and practices, including diet, which was already heavily dependent on potato as a ready source of energy. This coincided with a breakthrough in local potato breeding, which led to the release of the Victoria variety. This blight-tolerant variety could be grown successfully at a wide variety of altitudes, effectively transforming potato from a niche crop to one that could be grown nationwide.

<sup>1</sup> [https://en.wikipedia.org/wiki/Least\\_developed\\_countries](https://en.wikipedia.org/wiki/Least_developed_countries)

<sup>2</sup> [www.statista.com/statistics/447716/uganda-gdp-distribution-across-economic-sectors/](http://www.statista.com/statistics/447716/uganda-gdp-distribution-across-economic-sectors/)

<sup>3</sup> [www.ubos.org/wp-content/uploads/publications/10\\_2018Report\\_national\\_labour\\_force\\_survey\\_2016\\_17.pdf](http://www.ubos.org/wp-content/uploads/publications/10_2018Report_national_labour_force_survey_2016_17.pdf)

<sup>4</sup> <https://www.worldbank.org/en/country/uganda/brief/uganda-poverty-assessment-2016-fact-sheet>

<sup>5</sup> Aceli Africa. 2020. Bridging the Financing Gap: Unlocking the Impact Potential of Agricultural SMEs in Africa.

<sup>6</sup> The REACH-Uganda project was an innovative market systems project targeting both farmer uplift (farmer training) and market outreach (market systems development). The project was active in the potato and lowland rice sectors and covered a number of geographical areas. During the lifecycle of the project, REACH-Uganda worked with 36,398 farmers and 26 private sector firms across its two target crops.

Potato's nutritional value is often overlooked and its role in development misunderstood. While offering a ready form of carbohydrate, potatoes also contain important micronutrients and amino acids.<sup>7</sup> Potatoes have been cultivated in the Andes in South America for thousands of years and were introduced to Europe during the 16th century. With notable exceptions, historians credit potato for providing food stability throughout much of northern Europe from the 18th century onward, feeding the industrial revolution.<sup>8</sup> As a tuber or root crop, potato can keep growing larger and larger rather than falling over, as is the case with grains, once they become

too heavy. Therefore, under optimal conditions when produced by large-scale professional growers, potato yields can reach 40-50 metric tons per hectare (mt/ha).<sup>9</sup>

According to interviews conducted by IFDC with industry stakeholders as well as secondary GoU data sources, the total market demand for potato is estimated to be 219,370 mt annually (please see Table 1 Potato Demand for Uganda by Market Segment for more details). Accurate demand growth projections can be hard to come by; however, projected annual demand growth of 3% would be in line with figures developed for other sub-Saharan nations.<sup>10</sup>

**Table 1:** Potato Demand for Uganda by Market Segment.

Market segment	Name	Variety(ies) required	Demand current and project per year (MT)	Notes
<b>Crisps Sector</b>				
<b>Processors</b>	SNACK ATTACK	Taurus, Rwangume & Kinigi	960	based on the product visibility on the mkt, demand is estimated @ 80mt/month
	SUMZ		1,040	machine capacity (output) 125kgs/h, input/h 500kgs of potato, working 5 days a week, 52 weeks a year
	NEWMANS		480	based on the product visibility on the mkt, it is estimated @ 40mt/month
	VERIS INVESTMENT		2,500	projected demand @ 208mt/month based upon interviews held with Veris staff
	HOLLAND FAIR FOOD/Winers		400 rising to 1,500	commencing operations February 2022, demand based upon interviews with HFF management
	TROPICAL HEAT		1,500	based on the product visibility on the mkt, demand is estimated @ 125 mt/month, currently processing from Kenya, but have purchased a factory site outside Kampala for crisp manufacturing.
	KATIBA TRADERS		104	machine capacity (output) 12.5kgs/h, input/h 50kgs of potato, working 5 days a week, 52 weeks a year. Facility mainly used for business incubation purpose
<b>Sub-total MT</b>			<b>7,230</b>	

<sup>7</sup> <https://www.eufic.org/en/healthy-living/article/the-goodness-in-potatoes>

<sup>8</sup> <https://www.smithsonianmag.com/history/how-the-potato-changed-the-world-108470605/>

<sup>9</sup> <https://www.hse.gov.uk/pesticides/resources/G/crop-guide.pdf>

<sup>10</sup> Scott, G.J., M.W. Rosegrant, C. and Ringler. 2000. "Global Projections for Root and Tuber Crops to the Year 2020," Food Policy, 25(5):561-597.

Market segment	Name	Variety(ies) required	Demand current and project per year (MT)	Notes
<b>French Fries Sector</b>				
<b>Processors</b>	KPPL	Markies, Kinigi, Panamera & Rwangume	1,500 rising to 6,000	sale of precooked frozen french fries from February 2022, demand based upon interviews with Delphy and KPIL team
	KFC		504	current demand @ 42mt/month, for cut fries. Based upon data supplied by Ministry of Finance, Planning and Economic Development
	CHICKEN EXPRESS		360	current demand @ 30mt/month, locally sourced based upon interview with Purchasing Manager
	CAFÉ JAVAS		1,296	current demand @ 108mt/month based on data collected from interview with Procurement Manager in 2020
	JAVA HOUSE		624	current demand @ 52mt/month interview with Procurement Manager in 2020
	SUPERMARKET (Shoprite & Caerefour)		3,650	Frozen chips, mainly imported
	Informal Resturants, Road Side Venders		32,662	we considered a total of 10,887 road side vendors and resturants in the country with each consuming 10 kgs/day for 300 days
	HOTELS/ RESTURANT		1,095	15 big hotels in kampala
	Medium size resturant (Kampala)		3,979	109 gazzated eating places in Kampala using on average 11kg/ per day for a full calendar year
13 other major population centers	783	15 estimated gazzated eating places, demand estimated @ 11kgs/day, 365 days		
<b>Sub-total MT</b>			<b>47,953</b>	
<b>Fresh Potato Sector</b>				
Super Markets	SHOPRITE	Rwangume, Kinigi, Victoria, Markies, Panamera and other local varieties	180	estimated current demand @15mt/month
	OTHERS (7 super mkt)		151	demand for @ hotel estimated at 1,800kgs/ month
Local Distributors	KPIL		1,500 rising to 6,000	supplying, cleaned and bagged potatoes for the retail sector from February 2022
Open Markets	Open market		135,456	Based on analysis of ASSP 2020/21-2024/25 for potato
	Farmers		25,400	Potatoes kept by farmers to be used as seed
<b>Sub-total MT</b>			<b>164,187</b>	
<b>Total demand MT</b>			<b>219,370</b>	
Total current and projected demand NL varieties		<b>MT</b>	<b>16,724</b>	
% of NL potato for processing sector excluding Informal resturants		<b>22,521 MT</b>	<b>74%</b>	

The physical appearance of potatoes can vary by variety in terms of color of the outer skin and inner flesh, as well as shape. In addition, cooking characteristics can vary as a result of physical properties of the potato, including shape, dry matter content (or starch), and sugar content. Some potatoes are suitable for roasting or making crisps and chips, while some potato varieties are excellent for boiling and mashing at home. Present consumption of potato in Uganda stands at 15 kg per capita, which is lower than Rwanda at 125 kg but higher than Kenya at 12 kg<sup>11</sup> (the global per capita average was 32.3 kg in 2018<sup>12</sup>), which suggests that there is room for future growth in the sector.

Market segmentation or differentiation at present is poor for potatoes. Households tend to purchase potatoes based more on appearance (red-skinned potatoes are preferred over paler colored potatoes) than defined cooking characteristics. In the local wholesale markets, potatoes are often identified by region of origin rather than variety. Therefore, they are commonly referred to as Kisoro, Kabale, Mbale, Mubende, and Masaka. However, households and fast-food outlets prefer the following varieties: Victoria, Rwangume, Kinigi (especially for French fries), and Kachpot. Therefore, the price differentiation between potatoes is narrow, with those from Kisoro and Kabale receiving a slight premium over those grown elsewhere.<sup>13</sup>



## A Potentially Vibrant Sector Underperforming

When profiling a Ugandan potato farmer (representative of 90,000+ active in the sector), similarities to other Ugandan smallholder farmers quickly emerge. They all typically grow a range of crops across 3-5 acres, make limited but strategic investments in critical agrochemicals and crop protection products, and predominantly market their produce on an individual basis. Like other smallholders, they frequently face challenges when attempting to access finance for crop production. What differentiates potato farmers is their involvement in a highly profitable and lucrative value chain.

At present, Ugandan smallholder potato farmer yields translate into a net income of approximately €454 annually. Although low, this still compares favorably with a number of other crops grown by smallholder farmers, such as climbing bean, sorghum, and sweet potato, which incur losses of €44, €43, and €23, respectively, when labor cost is included. Data collected by IFDC since 2016 suggests that Ugandan farmers achieve

productivity of 7.49 mt/ha. Assuming optimal yield is approximately 15 mt/ha, farmers in Uganda are experiencing a yield gap of 7.51 mt/ha, or 50%. More tellingly, Ugandan farmers are achieving only 25% of their European counterparts' 40-50 mt/ha yield. Lower yields experienced by Ugandan potato growers creates ripple effects, often limiting the grower's ability to reinvest in subsequent seasons. This perpetuates a cycle of low invest, low out-put production.

### Yields are low...

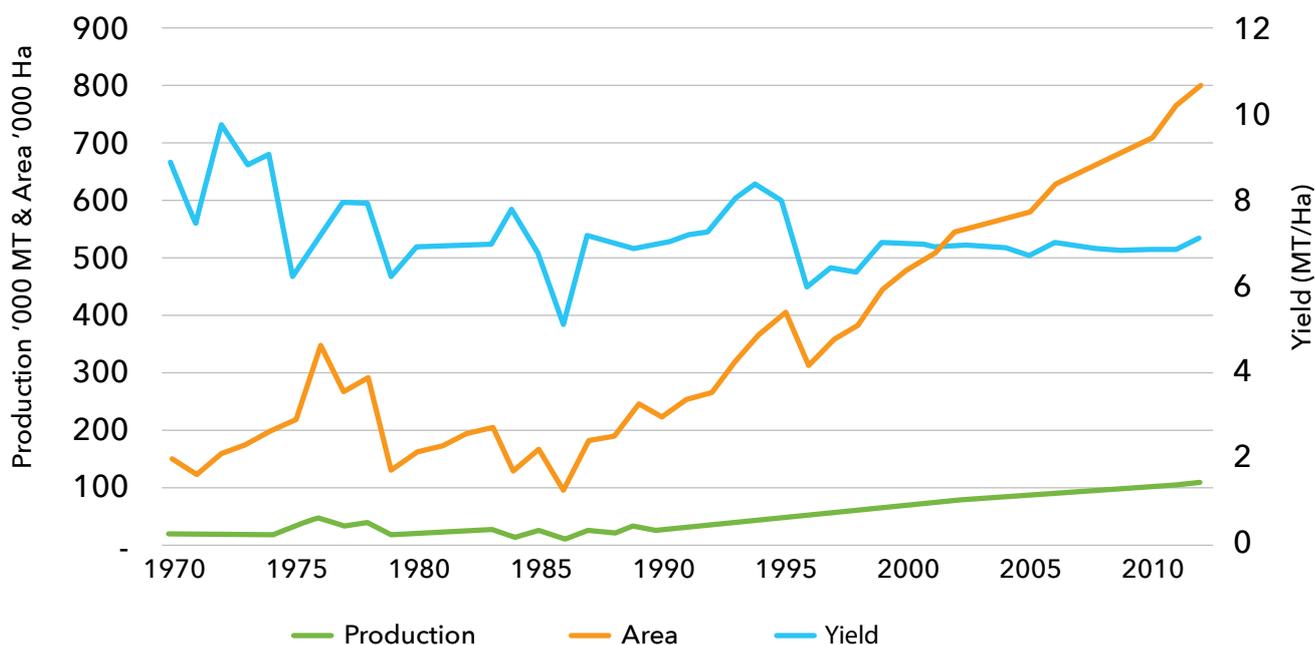
Clearly, room exists for potato farmers to double or triple their income, so what is holding potato back? Examination of statistics generated by Uganda Bureau of Statistics (UBOS), National Agricultural Research Organization (NARO), and Ministry of Agriculture, Animal Industries and Fisheries suggests that increases in the national harvest have come from expansion of the area cultivated rather than productivity gains.

<sup>11</sup> FAOSTAT

<sup>12</sup> <https://www.helgilibrary.com/indicators/potato-consumption-per-capita/>

<sup>13</sup> Tadeo, Ajuna, and Steve Hodges. 2019. Market Mapping Report on Irish Potato Trade Activity in Kampala.

Figure 1 Irish potato production, area and yield trends in Uganda (1970 - 2010).



### ...Due to a lack of quality seed

A review of the literature regarding constraints in potato production reveals a common theme, which is succinctly stated in the following quote: "Good quality seed is almost universally considered a requirement for high productivity in all potato production systems."<sup>14</sup> Uganda is estimated to need approximately 24,500 mt of genuine seed annually, but only 9.1% of potato farmers report that they can access quality seed.<sup>15</sup> Work conducted in 2014 by the International Institute for Tropical Agriculture (IITA), in conjunction with IFDC, established that the greatest determinant of potato yield in Uganda was access to and utilization of quality seed by farmers. "Using IITA agronomic survey data (2015), this study demonstrated that the use of quality seed with fertilizer increased potato yields from 6.4 mt/ha to 16.5 mt/ha."<sup>16</sup> This would raise farmer income from potato to €908 per year.

The shortage of seed in the market has a number of knock-on effects. Farmers often resort to recycling saved seed. With every production cycle in which the seed potato is reused, its productivity drops by a minimum of 5%. Alternatively, farmers will purchase tubers sold

in the market purporting to be seed but are often just tubers that are undersized due to the impacts of disease and genetic deterioration. This exacerbates production challenges by exposing farmers' land to soil-borne pests and pathogens, which further inhibits productivity.

### ...Due to a complex seed potato production cycle

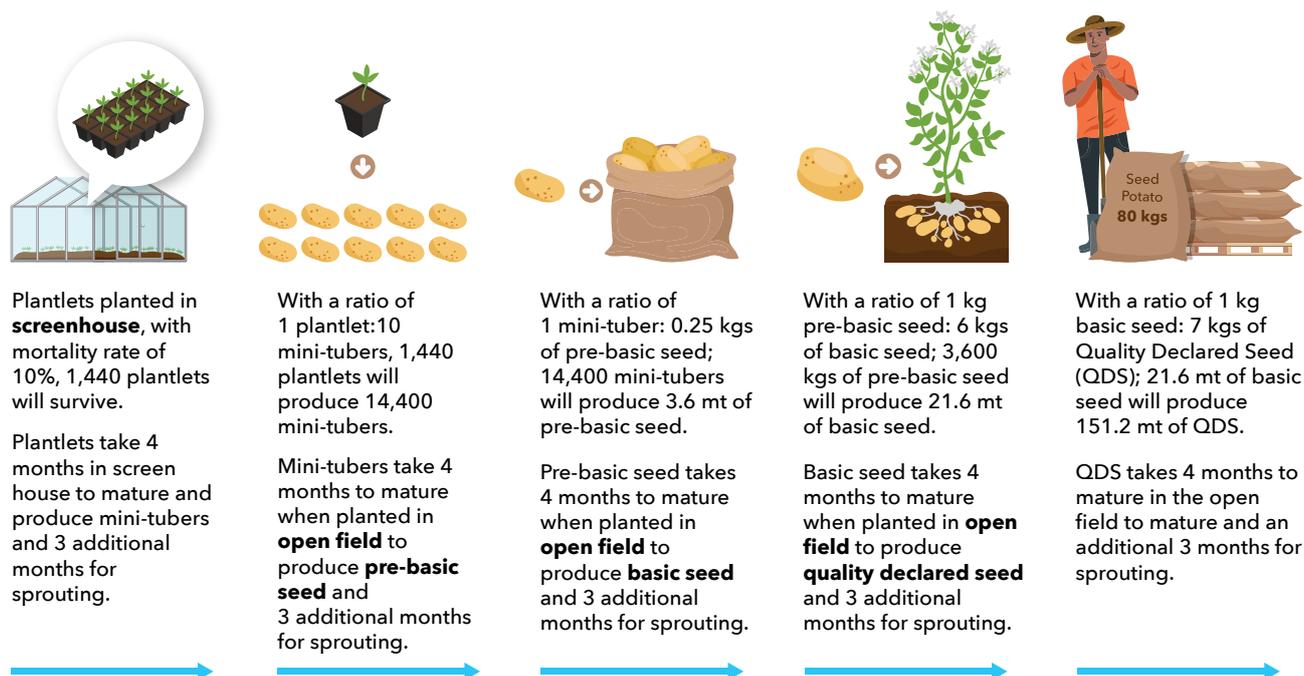
The complexity of the seed potato production cycle and relatively low multiplication factor are the primary reasons that seed potato availability in the market is poor and its costs are high. While the price varies by season, seed costs currently make up 42% of farmers total production cost. By the time a potato variety enters the market, it will have undergone a 12-year process of selection and testing, which is slow and expensive in terms of development. Seed potato itself is typically generated from tissue culture plantlets grown under laboratory conditions. Tissue culture refers to the process of growing plantlets (or micropropagation) in sterile conditions from cells harvested from a mother plant. This process helps generate disease-free plants with uniform physical characteristics.

<sup>14</sup> Campos, H., and O. Ortiz (eds.). The Potato Crop 2020. [https://doi.org/10.1007/978-3-030-28683-5\\_12](https://doi.org/10.1007/978-3-030-28683-5_12)

<sup>15</sup> UBOS, Annual Agricultural Survey 2018

<sup>16</sup> Research Report No. 14, Investment Opportunities and Challenges in the Irish Potato Value Chain in Uganda, PASIC Project Output 1: Evidence Generation-Activity # 1.2 Value Chain Studies.

Figure 2 Seed multiplication process.



Tissue culture plantlets are then grown in a variety of mediums to produce mini- or micro-tubers. Mini- or micro-tubers harvested from these tissue culture plantlets will then be multiplied in the soil in field conditions up to five more times before sufficient volumes of seed have been generated, which can be sold at a cost-effective price to growers. The multiplication factor for potato of 5-10x from generation to generation is low compared to that of grains, which

can number in the 100s. This further adds to difficulties of generating large volumes of seed potato for farmers rapidly. Multiplication through this process, under Ugandan conditions, takes approximately 24 -28 months before the seed potato can be sold to farmers at an economically viable price as Seed Class, "Certified 1." Table 2 explains the different seed classes and the best-case multiplication factor between generations.

Table 2: Seed potato classes and multiplication factors.

Type of Material	Seed Class	Generation	Maximum Multiplication Factor
<ul style="list-style-type: none"> <li>Healthy mother plants (clonal selection)</li> <li>In-vitro plants, mini-tubers</li> </ul>	Breeders' seed	G0	5x
Tubers	Pre-basic	G1	10x
Tubers	Basic	G2	10x
Tubers	Certified 1	G3	10x
Tubers	Certified 2	G4	10x
Tubers	Certified 3	G5	10x
Tubers	Certified 3	G5	10x



## How to Build a Commercially Sustainable Seed Potato Industry?

### Previous seed potato initiatives: Piecemeal positive changes

Through previous work in the potato sector under the Catalyze Accelerated Agricultural Intensification for Social and Environmental Stability (CATALIST) project (2012-2016), IFDC had experience the potato sector. With this experience came an understanding and appreciation of the initiatives previously undertaken in the potato sector targeting improved farmer access to seed potato and increased incomes. These had taken a variety of approaches focused on organizational capacity building and technology transfer:

- 3G Project, implemented by the International Potato Center (CIP), which was active in southwestern Uganda between 2008 and 2011, targeted rapid multiplication of seed through three generations (instead of five to seven) of seed multiplication in the field using mini-tubers initially produced from aeroponic systems. The project targeted meeting 5% of Uganda's national seed potato demand<sup>17</sup> and maintenance of seed quality.
- AT Uganda, working in Kapchorwa, eastern Uganda, from 2002, focused on improving seed availability through farmer-based systems, training 20 primary multipliers and introducing a localized seed traceability system.
- Integrated Seed Sector Development (ISSD) and ISSD+ projects, working nationally between 2012 and 2021, supported the development of local seed businesses for the multiplication and sale of quality declared seed (QDS). ISSD was also active in seed policy formulation, development, and enactment.
- The Uganda National Seed Potato Producer Association (UNSPPA), formed in 1995 and primarily active in southwestern Uganda, has been supported by various donor projects. These projects have focused on organizational capacity building for UNSPPA and technology transfer to its membership.
- CATALIST-Uganda, active in southwestern Uganda from 2012 to 2016, promoted positive seed selection by farmers. Farmers were trained to identify the strongest plants in their field and save their tubers to use as seed in the following season, thereby maintaining seed quality. Minimum tillage practices were also promoted through demonstration plots. Through its grant mechanism, the project also supported the development of increased production capacity for the Kachwekano Zonal Agriculture Research Development Institute (KaZARDI) tissue culture laboratory and mini-tuber production by outgrowers.

Agricultural production is an inherently technological activity, and interventions targeting boosting potato productivity through introduction of new technologies have also taken place. These include CIP's work on the introduction of rooted apical cuttings. This approach seeks to rapidly bulk planting materials generated from cuttings harvested from tissue culture plantlets for the production of pre-basic seed potatoes in nursery beds.

Other more novel technology has involved the introduction of true potato seed (botanical seed) by commercial firms, such as Bejo and Solynta. Farmers could potentially grow potatoes directly from botanical seed, or alternatively, the botanical seed could be used to produce potato tubers, which would then serve as the planting material for future production cycles. The potato varieties linked to this technology remain under testing and have yet to be released in Uganda for commercial production.

Throughout this period, the NARO has continued to contribute to the development of the sector. In interviews conducted by IFDC, NARO revealed that its role was not to be a commercial entity, but to focus on varietal development and production of early generation material. KaZARDI, which was mandated to work in the potato sector, led the way in this field. In particular, they championed the production of tissue culture plantlets to provide access to disease- and virus-free early generation planting material. These plantlets were essential for a number of different technological approaches, including rooted apical cuttings, aeroponics/hydroponics, and production of mini-tubers in sterile screenhouse conditions. The vacuum in the seed potato system created by an absence of multipliers often meant KaZARDI would act as the de facto national seed producer, producing all the early generation material for further multiplication by farmers and small-scale multipliers who frequently formed the membership of UNSPPA.

To date, all of these interventions have brought positive, but piecemeal, benefits to farmers and the sector. Stemming from misconceptions about the true national nature of potato as a crop, too often they have been localized in scope and scale. Further, they have not systematically addressed the seed potato system, focusing on production and conservation of final generation seed material and ignoring challenges presented in the development of early generation seed. Additionally, popularization of the concept of seed potato being a "community good" rather than a commercial enterprise inhibited the sector's development and willingness of entrepreneurs to invest. The ultimate outcome of this saw the development of a supply and demand imbalance. In the face of an

<sup>17</sup> <https://cgspace.cgiar.org/bitstream/handle/10568/73176/78254.pdf?sequence=3&isAllowed=y>

average annual seed demand of 24,500 mt, KaZARDI was delivering perhaps less than 30 mt<sup>18</sup> of basic or pre-basic seed to UNSPPA annually for multiplication, with no fresh seed potato material being generated from other sources.

The REACH-Uganda project's analysis of the potato sector conducted in 2017 and updated in 2019 confirmed that access to seed potato remained a critical

weak point in the chain. Not wishing to repeat or further entrench previous mistakes, the project sought to develop a wholly commercial strategy at scale, focused on specialized commercial actors working across multiple regions, capable of delivering sustainable systemic change. The ultimate outcome would be farmers having access to high-quality seed from recognized producers in their locality.

## Identifying a Business Model for Industry Players

Problem diagnosis in a situation like this with an abundance of evidence is easy; on the other hand, viable solutions are frequently harder to come by. Development of the seed potato industry as we know it in the European context is the outcome of decades of interaction between national governments and the private sector. While relevant lessons from this process can be identified and applied to the Ugandan context, it is not readily applicable as an actual template for development. Examination of the scholarly literature around the subject reveals a focus on the development of new technologies or the refinement of existing seed production techniques. Some offer a cost-benefit analysis of the approach, which they have tested, but evidence for action at scale is scant. With the focus on technological pilots prevailing at the expense of trialing commercial systems, a blind spot was created, which needed to be addressed.

While attempting to develop an approach capable of delivering systemic change, key considerations for the REACH-Uganda project team were "Productivity, price, and replicability - finding a balance between, technology, ambition, and cost." Using this design mantra, the project sought to identify an accessible open-source business model that future players could enter. This model would be designed to support the rollout of a seed potato production system, optimizing

the cost of investment with the volume of seed produced (and consequently financial revenues). This would be matched to a technological solution, using materials and technology available in Uganda. In this context, the concept of "ambition," meaning scale, was also a critical consideration. The size of the budget envelope would always dictate certain parameters. However, the project felt it necessary to achieve a scale of intervention that exceeded a pilot and could definitively generate impact as an industry, not just a standalone limited-scope intervention.

Other factors were also considered. A geographically dispersed seed supply system ensuring proximity to clients would be vital. Farmers need to be able to easily access seed potato, an inherently bulky commodity, to reduce transport costs. With limited ability to differentiate between good or bad seed, trust between farmer and seed supplier was of paramount importance. Localization of the seed potato supply system helps build this trust by deanonymizing the two actors in the supply chain.

When considering the options for change, IFDC assessed a number of different technology options including aeroponics, hydroponics, screenhouses, and rooted apical cuttings. All of these options offered pros and cons.



### Aeroponics

- Aeroponics is often considered the most effective and technologically challenging system for the production of early generation micro- and mini-tubers.
- Plantlets are held in foam cups, while their root systems are continually misted with a water and nutrient mix. Yields of 100+ tubers per plantlet have been reported under continual harvesting techniques (though reports from Ethiopia suggest 50 is more realistic).<sup>19</sup>

<sup>18</sup> Mbowa, Swaibu, and Francis Mwesigye. 2016. Investment Opportunities and Challenges in the Irish Potato Value Chain in Uganda, EPRC Research Paper No. 14.

<sup>19</sup> Chindi, Abebe, Gebremedhin W. Giorgis, Atsede Solomon, Lemma Tessama, and Kassaye Negash. 2014. "Rapid Multiplication Techniques (RMTs): A Tool for the Production of Quality Seed Potato (*Solanum tuberosum* L.) in Ethiopia," *Asian Journal of Crop Science*.

- Operation of the fertigation system requires the grower to have advanced technical skills to ensure that the plantlets receive the appropriate nutrients at the appropriate time, stimulating the plants to set tubers, and that the tubers grow to the appropriate size for seed production.
- For proper functionality of the fertigation system, a reliable electricity supply is required to operate the mister pumps; otherwise, the crop can die off in a matter of hours.
- The cost implications of adopting an aeroponics approach would be high. Mbiyu (2012) estimated that for Kenya a simple system capable of producing 80,000 mini-tubers annually would cost approximately €21,300 to set up.<sup>20</sup> This, in combination with the risks and challenges posed by unreliable electricity access and the high technical threshold needed for growers, counted against aeroponics.



## Screenhouses

- For screenhouse production systems, in-vitro tissue culture plantlets are placed in boxes or buckets filled with either sterilized soil or soil blended with other materials, such as coarse sand and sawdust, as a growth medium. While a variety of growth mediums can be used, coarse sand is recommended, as it can be chemically sterilized.
- When using sand as the growth medium, a simple gravity-fed drip irrigation system is recommended to ensure plantlets receive adequate watering. Drip irrigation can be supplemented with hand-watering if the need arises.
- The screenhouse itself is typically an aphid-proof poly-tunnel structure; a combination of materials can be used to build a more durable or permanent structure. The dimensions of the structure can be optimized to the size and shape of the site, but access to adequate sunlight for growth promotion is important, as is access to water.
- Based on 2019 costing, a poly-tunnel screenhouse with the capacity to produce 75,500 mini-tubers annually (based on three production cycles) would cost €6,660.



## Hydroponics

- Hydroponics is the term used to describe the production of plants without soil. Typically, this is achieved by placing the plants in an aerated liquid mineral nutrient solution (generally water-based).
- There are two main types of hydroponic systems relevant to seed potato production: deep flow technique (DFT) and nutrient film technique (NFT). DFT uses tanks of aerated nutrient solution, in which the plant roots are suspended. With NFT systems, plants roots are partially submerged in a horizontal pipe system and receive a constant flow of the liquid nutrient mix.
- The cost of establishing an NFT or DFT systems capable of producing 72,000 mini-tubers a year (based on three production cycles annually) would be approximately €8,930.
- Both systems are reliant on electrically operated pumps either to recirculate the liquid, as in the case of the NFT system, or for aeration, as in the case of the DFT system. This creates a risky scenario similar to an aeroponic system. In addition, the constant recycling of the liquid nutrient solution in an NFT system increases the risk of contamination and seed crop loss.

<sup>20</sup> Mbiyu, M.W., J. Muthoni, J. Kabira, G. Elmar, C. Muchira, P. Pwaipwai, J. Ngaruiya, S. Otieno, and J. Onditi. 2012. "Use of Aeroponics Technique for Potato (*Solanum tuberosum*) Mini-tubers Production in Kenya," *Journal of Horticulture and Forestry*, 4:172-177.

Offering the appropriate balance between initial development cost, operational cost, required technical expertise to operate, and production efficiency, screenhouses were chosen by the REACH-Uganda project to be promoted as the preferred means of production for mini-tubers. An advantage of this approach was that prior work undertaken by National Agricultural Research Organization of Uganda, supported by IFDC, in this field provided useful insights. These included: the need to identify a turnkey system

for the construction of the screenhouses, improved production efficiency through the incorporation of drip irrigation, use of sand as the preferred growth medium, and propagation of transplanted seedling in basins rather than planting boxes. Consideration for the post-harvest handling needs of seed potato was also given. As part of the technology package, participating growers would also be assisted in construction of low-tech diffused light stores for the storage and conditioning of the seed potatoes.



## Developing a Response to Market Demand for Good Quality Seed Potato

### A strategy to inform systemic change

To properly contextualize what systemic change looks like, the project needed to understand the size of the sector. To do this, the project developed some well-informed premises:

- Optimally, a potato farmer will replace his seed stock every three seasons on average.
- A screenhouse with the capacity to hold 1,500 plantlets per production cycle (two cycles annually),

when at full production either multiplying QDS or collaborating with a local seed business to conduct the final stage of multiplication, would contribute 270 mt of QDS annually to the system.

- Potato farmers plant an average of 0.4 ha per season twice a year.

Using these parameters and data from the UBOS survey,<sup>21</sup> the total seed demand by region and the corresponding screenhouse and tissue culture plantlet demand were calculated.

**Table 3:** Estimated Seed Demand and Corresponding Screenhouses by Region.

Region	Total Potato Planted Annually (ha)	Estimated No. of Farmers	Estimated Seed Demand (mt)	Estimated No. of Screenhouses to Meet Demand	Plantlet Volume for Screenhouses	No. of Local Seed Business Multiplication Partners Needed
N. Buganda	8,951	11,189	2,983.67	6	20,996	12
Elgon	12,097	15,121	4,032.33	7	28,376	14
Tooro	28,093	35,116	9,364.33	17	65,897	34
Kigezi	24,439	30,549	8,146.33	15	57,326	30
<b>Total</b>		<b>91,975</b>	<b>24,526.67</b>	<b>45</b>	<b>172,595</b>	<b>90</b>

<sup>21</sup> UBOS. 2018. Annual Agricultural Survey.

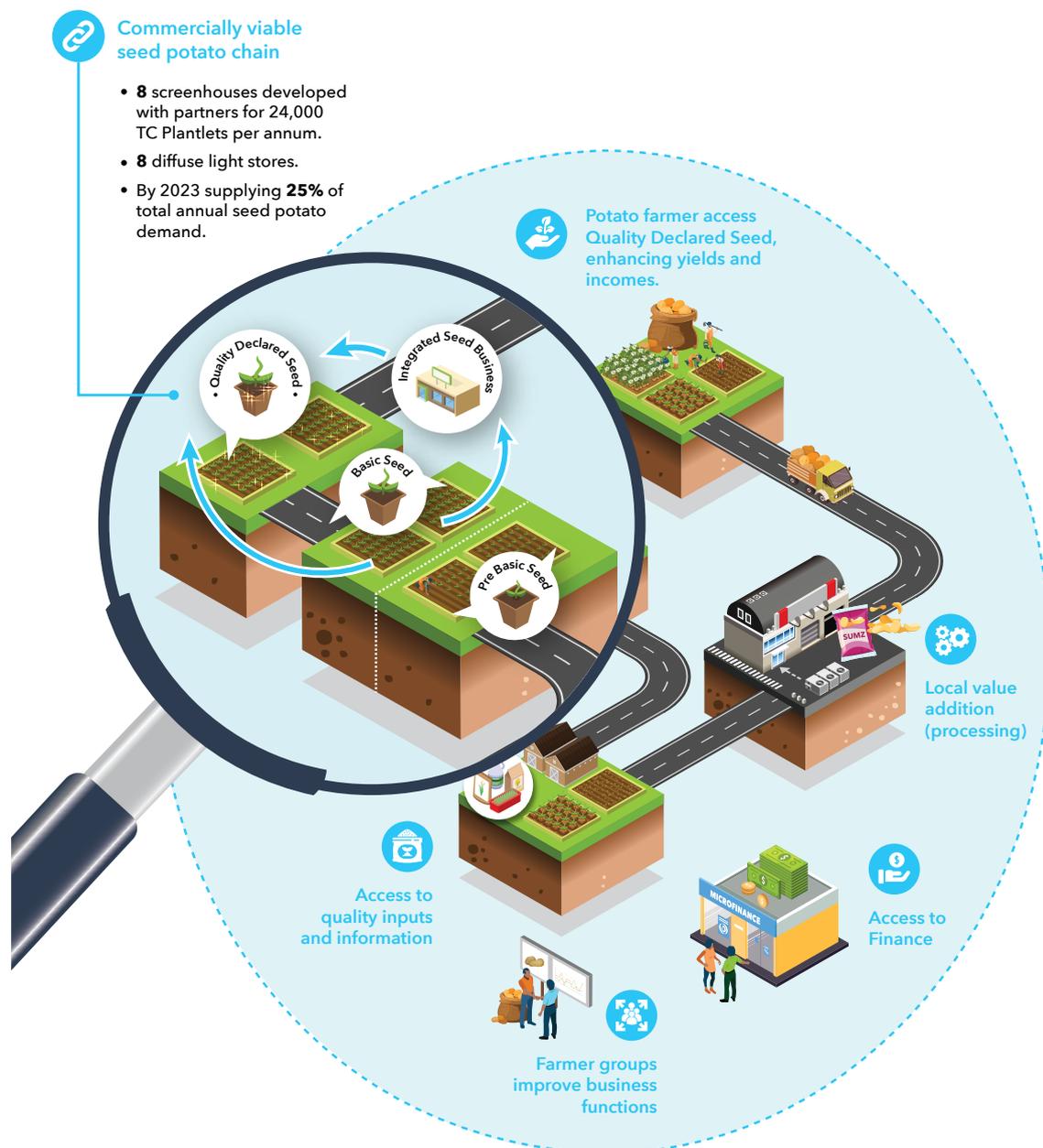
A total of 45 screenhouse units spread across four major potato-growing regions would be needed to meet the estimated demand of 24,500 mt of seed potato. To supporting this, a tissue culture plantlet supply chain capable of delivering 172,000+ plantlets per year and approximately 90 local seed businesses acting as multiplication agents for the generation of QDS would be required.

Fortunately for the project, some of this support infrastructure already existed. Two laboratories, Agromax and NARO-KaZARDI, were capable of producing tissue culture plantlets and were operational. In the short term, they could meet the initial tissue culture plantlet needs. However, for the long term, either their capacity would need to grow or additional entrants for the sector would need to be found. Work establishing and capacitating

local seed businesses carried out by the ISSD project nationwide ensured that there was a ready network of suitable multiplication partners for the screenhouse units.

Aside from the screenhouse units themselves, some other notable gaps existed, including sales and marketing of the QDS and access to finance. The relationship between seed suppliers and their clients within communities has always relied on trust. It was felt that the localized nature of the seed supply chain, which was to be created, would successfully harness this relationship dynamic. For access to finance from banks to be realistically achieved, a body of evidence generated from actual screenhouse businesses, rather than financial projections, would be required. This would be generated as the businesses came online.

Figure 3 Systems diagram.



## Not your average potato farmer

What has to be emphasized is that the REACH-Uganda project was trying to create a sustainable working business model that previously did not exist. The essential elements were known, but the project still had to identify where some of these would come from and who would supply them. Some of these would be easier to identify than others for the project team. Suppliers of tissue culture plantlets were already known, as were suppliers and installers of screenhouses and agrochemicals. Identifying and vetting potential screenhouse operators would be a much more complex process.

Informed by past experiences of the project team, a profile of what represented an ideal screenhouse operator/partner emerged. This would be an experienced potato grower who could access at least 8 ha of land and had working capital of around €2,500-4,000. Equally important, they needed to have credibility as a seed producer (as trust is a vital component of the system) with other farmers. Finally, the ideal partner would be able to convince the project they had the genuine drive and motivation to make sure that they could consistently actively participate in a long-term process through its conclusion. This meant that they could not be a passive or silent partner in the process but needed to be vocal, engaged, and energized. When combined, these characteristics are atypical for the sector, making our target screenhouse operator very different from the average potato farmer.

Unlocking farmer access to quality seed presented the opportunity to create a multiplier effect, from individual rural households right through to an increasing industrialized sector. To achieve this, a detailed strategy was created and an implementation methodology was identified. A balance between ambition and the resource base needed to be struck, with the project opting to cap support for the investment at approximately 70% (equivalent to €16,120) of the total cost of both the screenhouse and diffused light storage system. By taking this approach, the project estimated that it could meet 25% of the national seed demand through co-investment with eight partner businesses by 2023. The same resource envelope would support subsidies to aspects of the general enabling environment, including tissue culture seeding production and promotion of tailored fertilizer products.

Misconceptions about the role and level of investment support or subsidies in market systems activity abound. Various rules of thumb, such as seeking a 70:30 (partner vs. project) investment scenario or perhaps in some instances a 50:50 ratio, are often presented.<sup>22</sup> Nonetheless, no fixed rule exists and understanding

the operational context in which the intervention is taking place is critical. A thinly developed market, such as that in Uganda's seed potato system, would necessitate a "close engagement," as opposed to a "light touch," approach. This would require much more direct involvement by the project, with support frequently extending beyond technical assistance and business development services. Correspondingly, the risk level of an activity is an important consideration. Some business models are well established and understood. As previously discussed, this was a pioneering business model, with few, if any, well-documented precedents and many unknowns. Taking these factors into consideration, it was felt the categorization of this as a higher risk activity was legitimate, necessitating a 70% investment subsidy.



<sup>22</sup> Government of Australia. 2017. Operational Guidance Note: Market Systems Development.



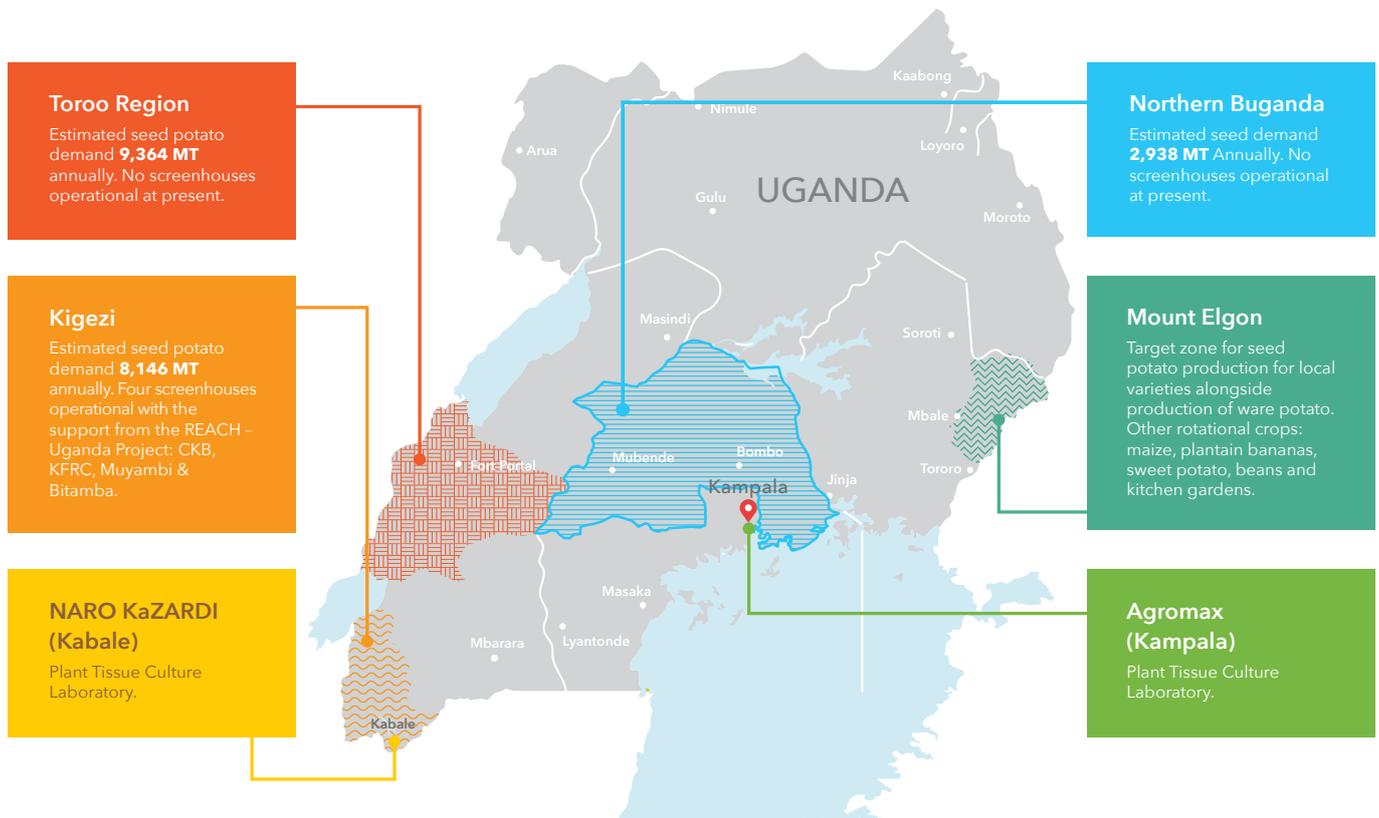
## A System Evolving

January 2019 marked the commencement of this phase of the IFDC’s intervention strategy. Sector mapping work conducted during the inception phase of the REACH-Uganda project, supplemented with research undertaken by other actors in the sector, including GIZ and CIP, helped generate an extensive list of potential partners. Entities identified as potential partners underwent a vetting process, which took place on a rolling basis. A lesson learned from the CATALIST project was that time must be invested with partners in developing realistic work plans and farmers happy to accept a subsidized screenhouse with no actual commitment to the process or shared vision for the sector should be avoided.

The project’s agribusiness team narrowed the initial list down to eight potential partners. Partnership

agreements were signed between April 2019 and March 2020 covering a wide geographical spread across both the eastern (three) and southwestern highlands (five). At this point the agribusiness team decided to christen these integrated seed businesses (ISBs), reflecting their integrated approach to seed potato production. The first four agreements were signed in April, May, June, and September 2019 and the final four in March 2020. To hedge against potential risks, maximize impact, and accelerate change, a strategic decision was made to blend new entrants with more established enterprises. This was of relevance in the southwest, as both Kigezi Farmer Resource Centre and Charles K. Byarugaba (CKB) Clean and Quality Seed Potato Production Enterprise had previously been supported financially through a sub-grant, which IFDC had provided to KaZARDI.

Figure 4 Map showing present distribution of seed potato demand and seed production centers.



Each partnership was based on a negotiated Detailed Collaboration Agreement (DCA). These delineated the roles of the project and the partner, clearly setting out the development steps and progress check points. Furthermore, the DCA outlined the total budget for the partnership and clearly established “who does,

who pays.” Details from the DCA played an important role in the project’s monitoring, evaluation, learning, and sharing (MELS) system by assisting in populating the intervention guide and the project’s results measurement plan.

## Delivering Results in a Time of COVID-19

Table 4. Seed Production Actual and Projected 2019 -2023 shows the continuum of change happening presently across the seed potato sector in Uganda, as the project's vision starts to come to fruition. Across the country, eight ISBs are now operational. All have produced their first cycle of mini-tubers, while some have produced their first cycles of QDS. By the end of 2021, these ISBs will be meeting 10% of the national

seed demand. This represents a doubling of the previous volume of recognized seed potato available to farmers in the system. End line research conducted by the project has shown that farmers growing QDS initiated at ISBs enjoyed 29% higher yields. Projections show that by 2023 the ISBs will be meeting around 25% of the national seed demand. Their production, combined with seed entering the system through other channels, means approximately 35% of market demand will be satisfied.

**Table 4:** Seed Production Actual and Projected 2019 -2023.

	2019	2020	2021	2022	2023	Sub totals mt
Partner	Basic Seed mt					
CKB	122.42	58.75	76.06	77.09	77.09	411.41
KFRC	92.84	15.89	39.36	67.72	67.72	283.53
MAZIBA	0	0	0	95.96	95.96	191.92
MUYAMBI	0	0	0	102.96	89.23	192.19
BITAMBA	0	0	0	50.16	102.2	152.36
WELISHE	0	0	0	42.9	42.9	85.8
MIFA	0	0	0	52.8	52.8	105.6
CHEMONGES	0	0	0	29.04	58.08	87.12
<b>Annual Total Basic</b>	<b>215.26</b>	<b>74.64</b>	<b>115.42</b>	<b>518.63</b>	<b>585.98</b>	<b>1,509.93</b>
<b>QDS Volumes</b>	<b>1506.82</b>	<b>522.48</b>	<b>807.94</b>	<b>3630.41</b>	<b>4101.86</b>	<b>10,569.51</b>
<b># farmers seed demand served</b>	<b>1,884</b>	<b>653</b>	<b>1,010</b>	<b>4,538</b>	<b>5,127</b>	<b>13,211.89</b>

The partnerships with CKB, KFRC, MIFA, and Muyambi, which commenced in 2019, have reached a greater level of maturity and are responsible for generating much of the results to date. The partnerships signed in 2020 with Bitamba, Chemonges, Maziba, and Welishe have had less time to mature and have not advanced as far. Disruptions have been wide ranging and have impacted the system at different levels within the partnerships. For example, shortages of shade cloth materials held back the completion of screenhouses. This was exacerbated by national travel restrictions implemented by GoU as part of their national lockdown measures, which limited the installation technician's ability to travel to sites.

Regardless of maturity, however, all have been negatively impacted by the COVID-19 pandemic. The partnerships signed earlier were not immune to the effects caused by the pandemic and saw their tissue culture plantlet supply chain severely disrupted. Consequently, they experienced several outages in supply, compromising their ability to produce mini-tubers. Loss of synchronization with seasonal rains resulting from this disruption was highly significant, causing farmers to be unable to plant seed potato, even when it was ready. One missed season of mini-tuber production by an ISB equates to a loss of 135 mt of QDS after 24 months (further analysis is contained in the Lessons Learned section).





## Exiting the Stage - Lessons Learned

With support from the REACH-Uganda project, eight independent ISBs are now operational in Uganda. Importantly, through the efforts of the ISB owners supported by the project, these businesses are embedded into the seed potato production system and are generating an ecosystem that spans tissue culture plantlet supply, agro-inputs, physical screenhouse infrastructure, final stage multiplication of basic seed into QDS and seed marketing. The ISBs that reached an operational stage earliest are already demonstrating strong performance. As expected, local

farmers are providing a ready market for their material. Unexpectedly, however, large institutional buyers from the GoU have demonstrated a willingness and desire to purchase from the ISBs. The upward growth trajectory for these businesses matches that of the sector as a whole.

Arising from the 30 months of work undertaken by the project toward the development of a seed potato system, important lessons have emerged, relevant both for IFDC and for others entering the sector.

☞ The supply chain for tissue culture plantlets remains weak, and actors currently active in the sector would benefit from additional support, from both a financial and technical perspective. Further, the sector needs to see more competition. With the current duopoly, there is little incentive for development or improvement. The entrance of new actors would change this dynamic, forcing innovation and change through competition. Given the geographic spread of ISBs across Uganda, a tissue culture laboratory facility situated in the eastern side of the country would benefit growers there.

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☞ Technology substitutions can offer opportunities for overcoming some of the supply chain challenges experienced to date. Of note is the introduction of rooted apical cuttings. Rooted apical cuttings are plantlets generated by harvesting cuttings from healthy tissue culture plantlets, which are then rooted and planted in growing boxes like conventional tissue culture plantlets. Typically, three to four rooted apical cuttings can be harvested from a tissue culture plantlet, a process that can be done with minimal training of the screenhouse operator. This is an approach that has been utilized by several of the ISBs to overcome shortfalls in tissue culture plantlet supply. Yield data indicates that rooted apical cuttings produce approximately 30% fewer mini-tubers than tissue culture plantlets but are economically viable as a solution. However, for rooted apical cuttings to be produced, the need for laboratories to produce tissue culture plantlets remains.

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☞ As the project has endeavored to refine the business model that it promoted, financial savings have been sought to reduce the cost as a barrier to entry. After examining the various technical components of the current design, the project identified savings of between €4,000-9,000 that could be made in the specifications of the diffused light stores, depending on the size. The model promoted by the project was a permanent brick and mortar structure. Evidence from other work carried out in the sector suggests that a simple wood-framed clapboard-sided structure would offer adequate protection for the seed potatoes. This structure would have an anticipated lifespan of seven to 10 years, depending on the location and maintenance. While this clearly is not a permanent storage solution, it would reduce the initial investment cost.

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☞ Potato production in Uganda is not limited to just eastern and southwestern Uganda. Table 3. shows that 50% of potato growers are located in western and central Uganda. The REACH-Uganda project worked in the geographically discrete areas of Elgon and Kigezi, and therefore its interventions have been focused there. In keeping with the localized approach promoted under the system developed by the project, future interventions in the sector should seek to expand the ISB network to cover Tooro and northern Buganda, thereby ensuring that potato farmers in these regions can enjoy similar access to quality seed. As local seed businesses, essential for the final stage of the seed potato multiplication, are already active in these areas, expansion should be possible with relative ease. Additional demand created for tissue culture plantlets by growth in the ISB network would need to be managed but could offer an important stimulus to the sector.

👉 Creating a system is possible. Ambition and time/patience are required, but above all, good partners are needed. Time invested in the project to identify potential ISB investors/operators proved critical to the overall success of the activity. After an initial flurry of four early partnership signings with established actors, the project adopted a more patient approach. Consequently, the project took almost 15 months to identify the other four partners, familiarize both parties with each other, and then design and negotiate the partnership agreements. Though this period of time appears to be a long, it proved to be time well spent. Despite the impacts of the COVID-19 pandemic, all of the partnerships continued to meet their milestones and eventually began delivering results. Had the project taken shortcuts in the identification process, many of the partnerships likely would not have survived the effects of the pandemic.

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👉 An unexpected marketing outlet for seed generated from the ISBs and local seed businesses has been large institutional buyers, such as Government of Uganda. This represents a very strong, clear signal of demand in the sector. Further, it provides vindication that the system the project was trying to create has taken root and is delivering tangible results, which have been noticed by and successfully exploited by the government to drive its development agenda. By placing large demands on the system in terms of volume needed, institutional buyers can be disruptive and divert seed from the geographical region for which it was intended. For the ISBs, institutional buyers offer important opportunities and cannot be ignored. Rebalancing in the long term is possible with the expansion of the ISB network to other geographic regions not presently covered, offering an opportunity to meet seed demand.

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👉 As noted earlier, the business model attached to the ISBs had yet to be established and was considered experimental. Examination of detailed financial data collected from the ISBs has revealed a number of important points regarding the overall viability of the greenhouse business model developed and promoted by the project. First and most important, the ISBs are financially viable and can generate sufficient profits for long-term reinvestment by their owners. By year three, they are profitable and after five years they have a positive net present value (NPV). This holds true whether the ISB owner finances the investment with their own money or uses a combination of their own money and a financial subsidy from the project. The picture changes, however, if the investor needs to borrow money commercially to support the investment. Borrowing 70% of the initial investment cost, with typical interest rates of around 12% per annum, would still allow the ISBs to become profitable in year three but they would have a negative NPV after five years. A negative NPV would be a deterrent to potential lenders and business investors alike. This is an important finding from this work, highlighting that while there are many important investments needed in the agricultural sector, conventional financing is not always well suited to supporting them. Going forward, projects entering the sector should consider providing a 50% subsidy to investors and investors should first use the lower cost diffused light store.





## Conclusions

Thirty months prior to the REACH-Uganda project's intervention, there was no organized seed potato system. Since then, a vibrant seed potato system has been developed, capable by 2023 of delivering 5,000 mt of seed on an annual basis. This may appear small, but it is in fact a highly significant accomplishment, given that this represents approximately 25% of the market. Gains made in availability of seed potato have broad impacts, increasing incomes for farmers and contributing to food security at the household level and beyond. The project's progress toward the establishment of a seed potato system clearly demonstrates a replicable model exists that can be scaled up to satisfy Uganda's seed

potato needs. Further, the results achieved demonstrate that, after an initial period of support, the system can be self-perpetuating and is capable of delivering results for actors throughout the system. To maximize the traction gained in the sector, we recommend that this strategy be replicated in other geographic areas of Uganda where there are concentrations of potato farmers, thereby recognizing and responding to the nationwide nature of the crop and its growers. The work undertaken by the ISB owners, with the support of the project, is just starting to bear fruit. In essence, the exciting stage has only just begun.

## Annex 5: Economic Analysis of Screenhouse (Subsidy-ISB)

Costing of screenhouse mini-tuber production (capacity of screenhouse is approximately 1,536 plantlets)

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Soil excavation & collection (5 tipperful sterilising units by 2 man day)	Man days	2	1	2	5,000	10,000	Farmer only sells basic seed
Transport (5 tipperfuls @15,000 used for 2 season) i.e 2.5 tipperfuls per season	Tipperfuls	2.5	1	2.5	15,000	37,500	
Labour loading soil	Tipperfuls	2.5	1	2.5	5,000	12,500	
Sand purchase; 1 big tipperful at 70,000 , loading 5,000 and transport 50,000 used for 2 seasons i.e 125,000)	Tipperfuls	0.5	1	0.5	125,000	62,500	
Gunny bags for soil sterlization (18 bags@1200 )	Pcs	18	1	18	1,200	21,600	
Labour soil sieving and bagging and loading into sterlization unit 2 pple @2 days	Man days	2	2	4	5,000	20,000	
Soil/sand sterilization (3 rounds @ 2 pple loading and cooking @ UGX5,000)	Man days	4	3	12	5,000	60,000	
Off-loading (3 rounds @2pple half day @ 5,000)	Man days	1	3	3	5,000	15,000	
Firewood purchase	Lot	1	1	1	34,000	34,000	
Labour for transporting firewood	Contract	1	1	1	10,000	10,000	
Labour for removal of used soil and Cleaning of boxes (6 pple @5,000)	Man days	6	1	6	5,000	30,000	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Labour for Mixing of sand/soil & filling in boxes : 4 pple for 1 day	Man days	4	1	4	5,000	20,000	
Plntlet collection from KAZARDI (1 day transport 50,000 )	Trips	1	1	1	50,000	50,000	
Plantlet purchase	Numbers	1536	1	1536	550	844,800	Farmer purchases 768 invitro plantlets, propagates to generate 1,536 rooted apical cuttings
Fertilizer N.P.K 17:17; 4.8 kgs @2500	Kgs	4.8	1	4.8	2,500	12,000	
Planting (6 pple in 1 day @5,000)	Man days	6	1	6	5,000	30,000	
Watering (1 person for 1 hr twice a day i.e 2 hrs per day 2/8 =0.25 man days for approx. 40 days	Man days	0.25	40	10	5,000	50,000	
Weeding (1 <sup>st</sup> weeding/ soil loosening 1 pplefor 1 day@5000	Man days	1	1	1	5,000	5,000	
Soil/Sand filling boxes ( 2 pple for 3 times)	Man days	2	3	6	5,000	30,000	
Stucking/supporting wires/ropes; 3layers @2 pple for a day	Man days	2	3	6	5,000	30,000	
String (rolls) 4 rolls recycled for four seasons i.e 1 roll per season	Rolls	1	1	1	7,000	7,000	
Nails (Kgs)	Kgs	1	1	1	4,000	4,000	
Leaf pruning (2 times @1 pple for a day @5,000)	Man days	1	2	2	5,000	10,000	
Fungicides				0		-	
i) Fungicides (Systemic ; Ridomil 0.25 kgs @70,000; 2 sprays)	Kgs	0.25	1	0.25	70,000	17,500	
ii) Fungicides (Contact ; Mancozeb 0.5 kgs @13,000, 2 sprays)	Kgs	0.5	1	0.5	13,000	6,500	
Labour fungicide, insectide & foliar fert spraying ( 4 sprays@0.5hr i.e 0.5/8 =0.0625 man days @ 5000)	Man days	0.0625	4	0.25	5,000	1,250	
Insecticide (agrothoate)125 ml) i.e 0.125 liters @ 18000 per litre	Litres	0.125	1	0.125	18,000	2,250	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Labour for dehauling and disposal of haulms (1 pple for half day)	Man days	0.5	1	0.5	5,000	2,500	
Harvesting and counting (6 pple for a day)	Man days	6	1	6	5,000	30,000	
Harvesting poly bags(24@ Shs.200)	Pcs	24	1	24	200	4,800	
Sorting after curing and storing & insecticide/ malathion dust appln (1 pple @ 0.25 days)	Man Days	0.25	1	0.25	5,000	1,250	
Marathion dust (250 gm)	Kgs	0.25	1	0.25	8,000	2,000	
Sanitation: Jick (2 bottles @750 ml @5000 )- Lts	Bottles	2	1	2	5,000	10,000	
<b>Total expenditure</b>						<b>1,483,950</b>	
<b>Total mini-tubers produced (13 minitubers/plantlet)</b>	Numbers					<b>19,968</b>	
<b>Cost per mini-tuber (19,968 tubers) (Shs)</b>						<b>74<sup>1</sup></b>	unit production cost ugx.74/=
<b>Pre-basic seed production (generation II)</b>							
Land hire 1 acre	Acres	1	1	1	300,000	300,000	19,968 mini-tubers plant approx. 1 acre
Bush clearing (2 litres herbicide @ shs.20,000)	Liters	2	1	2	20,000	40,000	
Labour for water and Herbicide appln (2 pple @ shs.5000)	Man days	2	1	2	5,000	10,000	
Labour for Water for herbicide appln	Man days	2	1	2	5,000	10,000	
Primary Secondary cultn combined (approx 1 acre)	Contract	2	1	2	50,000	100,000	
Secondary cultivation (1 acre)	Contract	2	1	2	110,000	220,000	
Seed cost (mini-tubers)	Batch	1	1	1	1,483,950	1,483,950	total cost of producing mini-tubers

<sup>1</sup> The propagation of plantlets into apical cuttings, reduces the cost of plantlet by over 50%, thus reducing the pre unit cost of mini-tubers from shs240 to shs74. In addition, cost pe unit has reduced as the mini-tubers has increased from the previous 10/plantlet to the current 13/plantlet, which explains the additional 19% reduction in cost.

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Fertilizer (16 bags N.P.K 17:17: 1 bag @ shs.105,000)	Bags	16	1	16	105,000	1,680,000	
Transport fertilizer	Bags	16	1	16	5,000	80,000	
Planting (11 pple for one day @ shs.5000)	Man days	19	1	19	5,000	95,000	
Weeding/hilling (1 <sup>st</sup> and 2 <sup>nd</sup> weeding)	Man days	16	2	32	5,000	160,000	
Contact Fungicides (7 kgs mancozeb at shs.12,000 )	Kg	7	1	7	12,000	84,000	
Systemic Fungicides (Ridomil 2.0 kgs at Shs.70,000)	Kg	2	1	2	70,000	140,000	
Insecticide (1 liter agrothoate)	Liters	1	1	1	15,000	15,000	
Labour for Spraying (5 sprays @2 pple @ shs. 5,000)	Man days	2	5	10	5,000	50,000	
Labour for Water for fungicide appln (2 person @5000 for 5 sprays)	Man days	2	1	2	5,000	10,000	
Dehaulming (7 pple @ Shs.5000)	Man days	7	1	7	5,000	35,000	
Harvesting/digging out tubers (28 people for 1 day @ 5000)	Man days	28	1	28	5,000	140,000	
Gunny bags (36 gunny bags@ 1200)	Pcs	36	1	36	1,200	43,200	
Transportation of seed from field to stores (57 bags of 100 kgs)	Bags	57	1	57	2,000	114,000	
Insecticide (Malathion dust )for storage pests (360 g bottle)	Kg	0.7	1	0.7	10,000	7,000	
<b>Total expenditure</b>	<b>Shs</b>					<b>4,817,150</b>	
<b>Total yield 6,000 kgs</b>	<b>Kgs</b>					<b>6,000.00</b>	
<b>Post harvest loss; 0.2MT</b>	<b>Kgs</b>					<b>200.00</b>	
<b>Cost per kg of pre-basic seed</b>	<b>Shs</b>					<b>828</b>	
Generation II seed available for planting/sale	Kgs	5820	1	5820	2,500	14,550,000	
<b>Net income</b>						<b>9,732,850</b>	
<b>Net income per kg of pre-basic seed</b>						<b>1,672</b>	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
<b>Basic seed production</b>							
Land hire 7 acres	Acres	7	1	7	300000	2,100,000	
Bush clearing (14 litres herbicide @ shs.20,000)	Liters	14	1	14	20000	280,000	
Labour Herbicide appln (14 pple @ shs.8000)	Man days	14	1	14	8,000	112,000	
Water for herbicide appln	Jerrycans	105	1	105	1,000	105,000	
Primary Secondary cultn combined (approx.7 acres)	Contract	7	1	7	250,000	1,750,000	
Secondary cultivation (7 acres)	Contract	7	1	7	250,000	1,750,000	
Seed cost				5820	843	4,906,260	
Transport (seed 100,000 plus loading and offloading shs.20,000)	Contract	3	1	3	120,000	360000	
Fertilizer (20 bags N.P.K 17:17: @ shs.105,000)	Bags	20	1	20	105000	2100000	
Transport fertilizer	Bags	20	1	20	5000	100000	
Planting (57 pple for 3 time @ shs.7000)	Man days	57	3	171	7000	1197000	
Weeding (1 <sup>st</sup> and second weeding)	Acres	7	2	14	125,000	1,750,000	
Contact Fungicides (12 kgs mancozeb at shs.12,000 )	Kg	12	1	12	12,000	144,000	
Systemic Fungicides (Ridomil 16 kgs at Shs.70000)	Kg	16	1	16	70,000	1,120,000	
Labour for Spraying (3 sprays @ 11 pple @ shs. 7,000)	Man days	11	3	33	7,000	231,000	
Water for fungicide appln (415 jerrycans @1000)	Jerrycans	415	1	415	1,000	415,000	
Dehauling (17 pple @ Shs.7000)	Man days	17	1	17	7,000	119,000	
Harvesting and transport to store (37 people for 7 days @ 7000)	Man days	37	7	259	7,000	1,813,000	
Gunny bags (582 gunny bags@ 1000)	Pcs	582	1	582	1,000	582,000	
Sisal string	Rolls	6	1	6	6,000	36,000	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Loading and off-loading	Contract	3	1	3	20,000	60,000	
Pouring and spreading seed in store (20 pple @5000)	Man days	20	1	20	5,000	100,000	
Post harvest handling (sorting 20 pple@5000)	Man days	20	1	20	5,000	100,000	
<b>Total expenditure on 7 acres</b>	<b>Shs</b>					<b>21,230,260</b>	
<b>Total Production cost per acre</b>	<b>Shs</b>					<b>3,032,894</b>	
<b>Total yield 38,412kgs</b>	<b>Kgs</b>					<b>38,412</b>	1kg of prebasic: 6.6kgs of basic seed
<b>Post harvest loss 3%</b>	<b>Kgs</b>					<b>1,152</b>	
<b>Saleble yield</b>	<b>Kgs</b>					<b>37,260</b>	
<b>Cost per kg of asic seed</b>	<b>Shs</b>					<b>570</b>	
<b>Revenue from sale of pre-basic seed</b>	<b>Shs</b>				<b>2,500</b>	<b>93,150,000</b>	
<b>Net revenue/loss</b>	<b>Shs</b>					<b>71,919,740</b>	
<b>Net revenue/loss per kg of basic seed</b>	<b>Shs</b>					<b>1,930</b>	

Note: It takes approximately 18 months to produce basic seed from plantlets considering domancy stages.

## Cost-Income Summary

			Years				
			Year 1	Year 2	Year 3	Year 4	Year 5
<b>Annual income</b>	<b>Basic Seed</b>		-	<b>71,919,740</b>	<b>143,839,480</b>	<b>143,839,480</b>	<b>143,839,480</b>
	Mini-tubers	Season 1	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)
		Season 2	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)
	Pre-basic seed	Season 1		(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)
		Season 2	(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)
Seasonal production costs	Basic seed	Season 1	-	(21,230,260)	(21,230,260)	(21,230,260)	(21,230,260)
		Season 2		(21,230,260)	(21,230,260)	(21,230,260)	(21,230,260)
<b>Net income/loss</b>			<b>(7,874,160)</b>	<b>16,678,800</b>	<b>88,598,540</b>	<b>88,598,540</b>	<b>88,598,540</b>

## Cash Flow Projections

		Years				
		Year 1	Year 2	Year 3	Year 4	Year 5
Annual cash inflows		(7,874,160)	16,678,800	88,598,540	88,598,540	88,598,540
Annual depreciation (SH)		(2,578,500)	(2,578,500)	(2,578,500)	(2,578,500)	(2,578,500)
Annual depreciation (DLS)		(1,746,000)	(1,746,000)	(1,746,000)	(1,746,000)	(1,746,000)
Net cashflows		(12,198,660)	12,354,300	84,274,040	84,274,040	84,274,040
Annual cumulative cashflow		(12,198,660)	155,640	84,429,680	168,703,720	252,977,760

## Net Present Value

Project (screenhouse)

Discount Rate: 8%

Period	Cash Flow	PV
0	(30,352,500)	
1	(12,198,650)	(11,295,046)
2	12,354,300	10,591,821
3	84,274,040	66,899,450
4	84,274,040	61,943,935
5	84,274,040	57,355,496
NPV	155,143,156	185,495,656
		155,143,156

## Annex 6: Economic Analysis of Screenhouse (Loan-ISB)

Costing of screenhouse mini-tuber production (capacity of screenhouse is approximately 1,536 plantlets)

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Soil excavation & collection (5 tipperfulssterilising units by 2 man day)	Man days	2	1	2	5,000	10,000	Farmer only sells basic seed
Transport (5 tipperfuls @15,000 used for 2 season) i.e 2.5 tipperfuls per season	Tipperfuls	2.5	1	2.5	15,000	37,500	
Labour loading soil	Tipperfuls	2.5	1	2.5	5,000	12,500	
Sand purchase; 1 big tipperful at 70,000 , loading 5,000 and transport 50,000 used for 2 seasons i.e 125,000)	Tipperfuls	0.5	1	0.5	125,000	62,500	
Gunny bags for soil sterlization (18 bags@1200 )	Pcs	18	1	18	1,200	21,600	
Labour Soil sieving and bagging and loading into sterlization unit 2 pple @2 days	Man days	2	2	4	5,000	20,000	
Soil/Sand Sterilization (3 rounds @ 2 pple loading and cooking @ UGX5,000)	Man days	4	3	12	5,000	60,000	
Off-loading (3 rounds @2pple half day @ 5,000)	Man days	1	3	3	5,000	15,000	
Firewood purchase	Lot	1	1	1	34,000	34,000	
Labour for transporting firewood	Contract	1	1	1	10,000	10,000	
Labour for removal of used soil and Cleaning of boxes (6 pple @5,000)	Man days	6	1	6	5,000	30,000	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Labour for Mixing of sand/soil & filling in boxes : 4 pple for 1 day	Man days	4	1	4	5,000	20,000	
Plntlet collection from KAZARDI (1 day transport 50,000 )	Trips	1	1	1	50,000	50,000	
Plantlet purchase	Numbers	1536	1	1536	550	844,800	Farmer purchases 768 invitro plantlets, propagates to generate 1,536 rooted epical cuttings
Fertilizer N.P.K 17:17; 4.8 kgs @2500	Kgs	4.8	1	4.8	2,500	12,000	
Planting (6 pple in 1 day @5,000)	Man days	6	1	6	5,000	30,000	
Watering (1 person for 1 hr twice a day i.e 2 hrs per day 2/8 =0.25 man days for approx. 40 days	Man days	0.25	40	10	5,000	50,000	
Weeding (1 <sup>st</sup> weeding/ soil loosening 1 pplefor 1 day@5000	Man days	1	1	1	5,000	5,000	
Soil/Sand filling boxes ( 2 pple for 3 times)	Man days	2	3	6	5,000	30,000	
Stucking/supporting wires/ropes; 3layers @2 pple for a day	Man days	2	3	6	5,000	30,000	
String (rolls) 4 rolls recycled for four seasons i.e 1 roll per season	Rolls	1	1	1	7,000	7,000	
Nails (Kgs)	Kgs	1	1	1	4,000	4,000	
Leaf pruning (2 times @1 pple for a day @5,000)	Man days	1	2	2	5,000	10,000	
Fungicides				0		-	
i) Fungicides (Systemic ; Ridomil 0.25 kgs @70,000; 2 sprays)	Kgs	0.25	1	0.25	70,000	17,500	
ii) Fungicides (Contact ; Mancozeb 0.5 kgs @13,000, 2 sprays)	Kgs	0.5	1	0.5	13,000	6,500	
Labour fungicide, insectide & foliar fert spraying ( 4 sprays@0.5hr i.e 0.5/8 =0.0625 man days @ 5000)	Man days	0.0625	4	0.25	5,000	1,250	
Insecticide (agrothoate)125 ml) i.e 0.125 liters @ 18000 per litre	Litres	0.125	1	0.125	18,000	2,250	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Labour for Dehaulming and disposal of haulms (1 pple for half day)	Man days	0.5	1	0.5	5,000	2,500	
Harvesting and counting (6 pple for a day)	Man days	6	1	6	5,000	30,000	
Harvesting poly bags(24@ Shs.200)	Pcs	24	1	24	200	4,800	
Sorting after curing and storing & insecticide/ malathion dust appln (1 pple @ 0.25 days)	Man days	0.25	1	0.25	5,000	1,250	
Marathion dust (250 gm)	Kgs	0.25	1	0.25	8,000	2,000	
Sanitation: Jick( 2 bottles @750 ml @5000 )- Lts	Bottles	2	1	2	5,000	10,000	
<b>Total expenditure</b>						<b>1,483,950</b>	
<b>Total mini-tubers produced (13 minutubers/plantlet)</b>	Numbers					<b>19,968</b>	
<b>Cost per mini-tuber (19,968 tubers) (Shs)</b>						<b>74</b>	unit production cost ugx.74/=
<b>Pre-basic seed production (generation II)</b>							
Land hire 1 acre	Acres	1	1	1	300,000	300,000	19,968 mini-tubers plant approx. 1 acre
Bush clearing (2 litres herbicide @ shs.20,000)	Liters	2	1	2	20,000	40,000	
Labour for water and Herbicide appln (2 pple @ shs.5000)	Man days	2	1	2	5,000	10,000	
Labour for Water for herbicide appln	Man days	2	1	2	5,000	10,000	
Primary Secondary cultn combined (approx 1 acre)	Contract	2	1	2	50,000	100,000	
Secondary cultivation (1 acre)	Contract	2	1	2	110,000	220,000	
Seed cost (mini-tubers)	Batch	1	1	1	1,575,508	1,575,508	total cost of producing mini-tubers
Fertilizer (16 bags N.P.K 17:17: 1 bag @ shs.105,000)	Bags	16	1	16	105,000	1,680,000	
Transport fertilizer	Bags	16	1	16	5,000	80,000	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Planting (11 pple for one day @ shs.5000)	Man days	19	1	19	5,000	95,000	
Weeding/hilling (1 <sup>st</sup> and 2 <sup>nd</sup> weeding)	Man days	16	2	32	5,000	160,000	
Contact Fungicides (7 kgs mancozeb at shs.12,000 )	Kg	7	1	7	12,000	84,000	
Systemic Fungicides (Ridomil 2.0 kgs at Shs.70,000)	Kg	2	1	2	70,000	140,000	
Insecticide (1 liter agrothoate)	Liters	1	1	1	15,000	15,000	
Labour for Spraying (5 sprays @2 pple @ shs. 5,000)	Man days	2	5	10	5,000	50,000	
Labour for Water for fungicide appln (2 person @5000 for 5 sprays)	Man days	2	1	2	5,000	10,000	
Dehauling (7 pple @ Shs.5000)	Man days	7	1	7	5,000	35,000	
Harvesting/digging out tubers (28 people for 1 day @ 5000)	Man days	28	1	28	5,000	140,000	
Gunny bags (36 gunny bags@ 1200)	Pcs	36	1	36	1,200	43,200	
Transportation of seed from field to stores (57 bags of 100 kgs)	Bags	57	1	57	2,000	114,000	
Insecticide (Malathion dust )for storage pests (360 g bottle)	Kg	0.7	1	0.7	10,000	7,000	
<b>Total expenditure</b>	<b>Shs</b>					<b>4,908,708</b>	
<b>Total yield 6,000 kgs</b>	<b>Kgs</b>					<b>6,000</b>	
<b>Post harvest loss; 0.2MT</b>	<b>Kgs</b>					<b>200</b>	
<b>Cost per kg of pre-basic seed</b>	<b>Shs</b>					<b>843</b>	
Generation II seed available for planting/sale	Kgs	5820	1	5820	2,500	14,550,000	
<b>Net income</b>						<b>9,641,292</b>	
<b>Net income per kg of pre-basic seed</b>						<b>1,657</b>	
<b>Basic seed production</b>							

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Land hire 7 acres	Acres	7	1	7	300,000	2,100,000	
Bush clearing (14 litres herbicide @ shs.20,000)	Liters	14	1	14	20,000	280,000	
Labour Herbicide appln (14 pple @ shs.8000)	Man days	14	1	14	8,000	112,000	
Water for herbicide appln	Jerrycans	105	1	105	1,000	105,000	
Primary Secondary cultn combined (approx.7 acres)	Contract	7	1	7	250,000	1,750,000	
Secondary cultivation (7 acres)	Contract	7	1	7	250,000	1,750,000	
Seed cost				5820	843	4,906,260	
Transport (seed 100,000 plus loading and offloading shs.20,000)	Contract	3	1	3	120,000	360,000	
Fertilizer (20 bags N.P.K 17:17: @ shs.105,000)	Bags	20	1	20	105,000	2,100,000	
Transport fertilizer	Bags	20	1	20	5,000	100,000	
Planting (57 pple for 3 time @ shs.7000)	Man days	57	3	171	7,000	1,197,000	
Weeding (1 <sup>st</sup> and second weeding)	Acres	7	2	14	125,000	1,750,000	
Contact Fungicides (12 kgs mancozeb at shs.12,000 )	Kg	12	1	12	12,000	144,000	
Systemic Fungicides (Ridomil 16 kgs at Shs.70000)	Kg	16	1	16	70,000	1,120,000	
Labour for Spraying (3 sprays @ 11pple @ shs. 7,000)	Man days	11	3	33	7,000	231,000	
Water for fungicide appln (415 jerrycans @1000)	Jerrycans	415	1	415	1,000	415,000	
Dehauling (17 pple @ Shs.7000)	Man days	17	1	17	7,000	119,000	
Harvesting and transport to store (37 people for 7 days @ 7000)	Man days	37	7	259	7,000	1,813,000	
Gunny bags (582 gunny bags@ 1000)	Pcs	582	1	582	1,000	582,000	
Sisal string	Rolls	6	1	6	6,000	36,000	
Loading and off-loading	Contract	3	1	3	20,000	60,000	

Activity/item	Units	Quantity	Frequency	Total	Unit Cost (Shs)	Total amount (Shs)	Comments
Pouring and spreading seed in store (20 pple @5000)	Man days	20	1	20	5,000	100,000	
Post harvest handling (sorting 20 pple@5000)	Man days	20	1	20	5,000	100,000	
<b>Total expenditure on 7 acres</b>	<b>Shs</b>					<b>21,230,260</b>	
<b>Total Production cost per acre</b>	<b>Shs</b>					<b>3,032,894</b>	
<b>Total yield 38,412kgs</b>	<b>Kgs</b>					<b>38,412</b>	1kg of prebasic: 6.6kgs of basic seed
<b>Post harvest loss 3%</b>	<b>Kgs</b>					<b>1,152</b>	
<b>Saleable yield</b>	<b>Kgs</b>					<b>37,260</b>	
<b>Cost per kg of asic seed</b>	<b>Shs</b>					<b>570</b>	
<b>Revenue from sale of pre-basic seed</b>	<b>Shs</b>				<b>2,500</b>	<b>93,150,000</b>	
<b>Net revenue/loss</b>	<b>Shs</b>					<b>71,919,740</b>	
<b>Net revenue/loss per kg of basic seed</b>	<b>Shs</b>					<b>1,930</b>	

Note: It takes approximately 18 months to produce basic seed from plantlets considering dormancy stages.

## Cost-Income Summary

			Years				
			Year 1	Year 2	Year 3	Year 4	Year 5
<b>Annual income</b>	<b>Basic Seed</b>		-	<b>71,919,740</b>	<b>143,839,480</b>	<b>143,839,480</b>	<b>143,839,480</b>
	Mini-tubers	Season 1	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)
		Season 2	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)	(1,483,950)
	Pre-basic seed	Season 1	-	(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)
		Season 2	(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)	(4,906,260)
Seasonal production costs	Basic seed	Season 1	-	(21,320,260)	(21,320,260)	(21,320,260)	(21,320,260)
		Season 2	-	(21,320,260)	(21,320,260)	(21,320,260)	(21,320,260)
<b>Annual net revenue/loss</b>			<b>(7,874,160)</b>	<b>16,498,800</b>	<b>88,418,540</b>	<b>88,418,540</b>	<b>88,418,540</b>

## Cash Flow Projections

		Years				
		Year 1	Year 2	Year 3	Year 4	Year 5
Annual cash in/out flows		(7,874,160)	16,498,800	88,418,540	88,418,540	88,418,540
Annual depreciation (SH)		(5,157,000)	(5,157,000)	(5,157,000)	(5,157,000)	(5,157,000)
Annual depreciation (DLS)		(3,492,000)	(3,492,000)	(3,492,000)	(3,492,000)	(3,492,000)
Loan interest		-	(12,843,882)	(4,518,026)	(3,037,582)	1,374,155
Net cash in/out flow		(16,523,160)	(4,994,082)	75,251,514	76,731,958	81,143,695
Annual cumulative cash in/outflow		(16,523,160)	(21,517,242)	53,734,272	130,466,230	211,609,925

## Payback Period

	Years					
	Time Zero	Year 1	Year 2	Year 3	Year 4	Year 5
Initial outlay	60,705,000					
Cashflow		(16,523,160)	(4,994,082)	75,251,514	76,731,958	81,143,695
Cumulative cashflows	(60,705,000)	(77,228,160)	(82,222,242)	(6,970,728)	69,761,230	150,904,925

## Net Present Value

**Project (screenhouse)**

**Discount Rate: 8%**

Period	Cash Flow	PV
0	(60,705,000)	
1	(16,523,160)	(15,299,222)
2	(4,994,082)	(4,281,620)
3	75,251,514	59,737,078
4	76,731,958	56,400,280
5	81,143,695	55,225,035
NPV	91,076,550	151,781,550
		91,076,550

## Annex 7: Economic Analysis of Dutch Seed Potato Production (Commercial Farm)

### Seed Importation Model

#### Potato Production Costs/Acre

Activity/item	Units	Quantity	Frequency	Total	Unit cost (Shs)	Total amount (Shs)
Land hire 1 acre	Acre	1	1	1	200,000	200,000
Bush clearing	Man days	-	-	-	-	-
Primary cultivation	Acre (Diesel)	16	2	32	3,750	120,000
Secondary cultivation	Acre (Diesel)	16	1	16	3,750	60,000
Seed potato	Kgs	800	1	800	5,444	4,355,200
Fertilizer	Kgs	50	2	100	2,600	260,000
Transport fertilizer	Diesel	2	1	2	3,750	7,500
Planting	Diesel	15	1	15	3,750	56,250
1 <sup>st</sup> Weeding	Diesel	10	1	10	3,750	37,500
2 <sup>nd</sup> Weeding	Diesel	10	1	10	3,750	37,500
Contact Fungicides	Kgs	0	11	4	22,000	96,800
Systemic fungicide	Kgs	0	11	3	85,000	233,750
Labour for spraying	Man days	1	11	6	5,000	27,500
Water for fungicide application	Jerrycans	30	4	120	500	60,000
Dehauling	Man days	6	1	6	5,000	30,000
Harvesting and transport to store and off-loading	Man days	25	1	25	5,000	125,000
Harvesting and transport to store	Diesel	8	1	8	3,750	30,000
Gunny bags	Pcs	150	1	150	1,000	150,000
Sorting and grading	Man days	2	1	2	5,000	7,500

Activity/item	Units	Quantity	Frequency	Total	Unit cost (Shs)	Total amount (Shs)
Storage cost	Month	4	1	4	100,000	400,000
Other costs (repiar & maintainance)	Quarterly	1	1	1	757,020	757,020
<b>Total expenditure</b>	<b>Shs</b>	-	-	-	-	<b>7,051,520</b>
Total yield 8,000 kgs	Kgs	-	-	-	-	8,000
Post harvest loss 10%	Kgs	-	-	-	-	800
Saleble yield	Kgs	-	-	-	-	7,200
Cost per kg of seed potato	Shs	-	-	-	-	979
Revenue from sale of seed potato	Shs	-	-	-	3,000	21,600,000
<b>Net revenue/loss</b>	<b>Shs</b>	-	-	-	-	<b>14,548,480</b>
Net revenue/loss per kg of seed potato	Shs	-	-	-	-	2,021

## Annex 8: Economic Analysis Production of Dutch Ware Potato

Economic analysis of Dutch seed for ware potato production (Farmer buys seed potato and sells to high end market directly)

Activity/Item	Unit	Quantity	Frequency	Total	Unit price	Amount
Land hire	Acre	1	1	1	200,000	200,000
Bush clearing	Man days	0	-	-	-	-
Primary cultivation	Man days	32	1	32	5,000	160,000
Secondary cultivation	Man days	28	1	28	5,000	140,000
Seed potato	Kgs	800	1	800	3,000	2,400,000
Planting	Man days	20	1	20	5,000	100,000
Fertilizer (NPK)	Kgs	50	2	100	2,600	260,000
1 <sup>st</sup> Weeding	Man days	20	1	20	5,000	100,000
2 <sup>nd</sup> Weeding	Man days	10	1	10	5,000	50,000
<b>Pesticides</b>						-
Deva syper	Litres	1	1	1	25,000	25,000
Top fenos	Litres	1	2	2	30,000	60,000
<b>Fungicides</b>						-
Preventive mancozeb	Kgs	1	2	2	15,000	30,000
Curative mistress	Kgs	3	2	2	45,000	90,000
Spray pump hire	Man days	1	4	4	10,000	40,000
Water for spraying	Jerican	30	4	120	500	60,000
Spraying	Man days	30	4	120	1,000	120,000
Dehauling	Man days	5	1	5	5,000	25,000
Harvesting	Man days	20	1	20	5,000	100,000

<b>Activity/Item</b>	<b>Unit</b>	<b>Quantity</b>	<b>Frequency</b>	<b>Total</b>	<b>Unit price</b>	<b>Amount</b>
Transport	Man days	20	1	20	5,000	100,000
Bags	Piece	50	1	50	1,000	50,000
Total production costs	Shs					4,110,000
Total yield 7,000kgs	Kgs					7,000
Post harvest loss 10%	Kgs					700
Saleble yield	Kgs					6,300
Cost per kg of ware potato	Shs					652
Revenue from sale of ware potato	Shs				1300	8,190,000
Net revenue/loss	Shs					4,080,000
Net revenue/loss per kg of ware potato	Shs					648

## Economic analysis of Dutch seed for ware potato production (farmer buys seed potato and sells in local market in Rwenzori)

Activity/Item	Unit	Quantity	Frequency	Total	Unit price	Amount
Land hire	Acre	1	1	1	200,000	200,000
Bush clearing	Man days	0	-	-	-	-
Primary cultivation	Man days	32	1	32	5,000	160,000
Secondary cultivation	Man days	28	1	28	5,000	140,000
Seed potato	Kgs	800	1	800	3,000	2,400,000
Planting	Man days	20	1	20	5,000	100,000
Fertilizer (NPK)	Kgs	50	2	100	2,600	260,000
1 <sup>st</sup> Weeding	Man days	20	1	20	5,000	100,000
2 <sup>nd</sup> Weeding	Man days	10	1	10	5,000	50,000
<b>Pesticides</b>						-
Deva syper	Litres	1	1	1	25,000	25,000
Top fenos	Litres	1	2	2	30,000	60,000
<b>Fungicides</b>						-
Preventive mancozeb	Kgs	1	2	2	15,000	30,000
Curative mistress	Kgs	3	2	2	45,000	90,000
Spray pump hire	Man days	1	4	4	10,000	40,000
Water for spraying	Jerican	30	4	120	500	60,000
Spraying	Man days	30	4	120	1,000	120,000
Dehauling	Man days	5	1	5	5,000	25,000
Harvesting	Man days	20	1	20	5,000	100,000
Transport	Man days	20	1	20	5,000	100,000
Bags	Piece	50	1	50	1,000	50,000
Total production costs	Shs					4,110,000
Total yield 7,000kgs	Kgs					7,000

Activity/Item	Unit	Quantity	Frequency	Total	Unit price	Amount
Post harvest loss 10%	Kgs					700
Saleable yield	Kgs					6,300
Cost per kg of ware potato	Shs					652
Revenue from sale of ware potato	Shs				1100	6,930,000
Net revenue/loss	Shs					2,820,000
Net revenue/loss per kg of ware potato	Shs					448

## Economic analysis of Dutch seed for ware potato production (Farmer receives subsidised seed potato and sells to NBC)

Activity/Item	Unit	Quantity	Frequency	Total	Unit price	Amount
Land hire	Acre	1	1	1	200,000	200,000
Bush clearing	Man days	0	-	-	-	-
Primary cultivation	Man days	32	1	32	5,000	160,000
Secondary cultivation	Man days	28	1	28	5,000	140,000
Seed potato (cost subsidized)						
Planting	Man days	20	1	20	5,000	100,000
Fertilizer (NPK)	Kgs	50	2	100	2,600	260,000
1st Weeding	Man days	20	1	20	5,000	100,000
2 <sup>nd</sup> Weeding	Man days	10	1	10	5,000	50,000
<b>Pesticides</b>						-
Deva syper	Litres	1	1	1	25,000	25,000
Top fenos	Litres	1	2	2	30,000	60,000
<b>Fungicides</b>						-
Preventive mancozeb	Kgs	1	2	2	15,000	30,000
Curative mistress	Kgs	3	2	2	45,000	90,000
Spray pump hire	Man days	1	4	4	10,000	40,000
Water for spraying	Jerican	30	4	120	500	60,000
Spraying	Man days	30	4	120	1,000	120,000
Dehauling	Man days	5	1	5	5,000	25,000
Harvesting	Man days	20	1	20	5,000	100,000
Transport	Man days	20	1	20	5,000	100,000
Bags	Piece	50	1	50	1,000	50,000
Total production costs	Shs					1,710,000

Activity/Item	Unit	Quantity	Frequency	Total	Unit price	Amount
Total production costs (excluding seed)	Shs					1,710,000
Total yield 7,000kgs	Kgs					7,000
Post harvest loss 10%	Kgs					700
Saleble yield	Kgs					6,300
Cost per kg of ware potato	Shs					271
Revenue From sale of ware potato	Shs				750	4,725,000
Net revenue/loss	Shs					3,015,000
Net revenue/loss per kg of ware potato	shs					479

## Annex 9: Economic Analysis of Pearl Seed Business Model

### Economic Analysis of Lowland Rice Seed Production (Out-growers model)

Activity/Item	Units	Quantity	Unit price	Total amount	Comments
Land hire	Mcre	1	200,000	200,000	outgrower provides land
Land preparation	Man days	28	5,000	140,000	
Planting	Man days	20	5,000	100,000	
Seed	Kgs	10	5,000	50,000	Paid by pearl seed
Fertilizer	Kgs	100	3,500	350,000	pre-financed by pearl seed
Pesticides	Litres	3	30,000	90,000	pre-financed by pearl seed
Herbicides	Litres	1.5	25,000	37,500	pre-financed by pearl seed
Weeding	Man days	22	5,000	110,000	
Harvesting	Man days	16	5,000	80,000	
Post harvest handling	Man days	3	5,000	15,000	
<b>Total cost</b>	<b>Shs</b>			<b>1,122,500</b>	<b>Less seed cost</b>
Total yield	Kgs			1,500	
Post harvest loss (5%)	Kgs			75	
Saleble yield	Kgs			1,425	
Production cost per unit	Kgs			788	
Selling Price/kg	Shs			2,000	
Revenue	Shs			2,850,000	
Less amount of pre-financed activities				477,500	
<b>Net income for farmers</b>				<b>1,727,500</b>	

## Seed Production (Out-growers model) to Rice Production - Smallholder

Activity/Item	Units	Quantity	Unit price	Total amount	Comments
Land hire	Mcre	1	200,000	200,000	outgrower provides land
Land preparation	Man days	28	5,000	140,000	
Planting	Man days	20	5,000	100,000	
Seed	Kgs	10	4,000	40,000	paid by pearl seed
Fertilizer	Kgs	50	3,500	175,000	paid by pearl seed
Pesticides	Litres	3	30,000	90,000	paid by pearl seed
Herbicides	Litres	1.5	25,000	37,500	paid by pearl seed
Weeding	Man days	22	5,000	110,000	
Harvesting	Man days	16	5,000	80,000	
Post harvest	Man days	2	5,000	10,000	
<b>Total cost</b>	<b>Shs</b>			<b>982,500</b>	
Total yield	Kgs			1,500	
Post harvest loss (3%)	Kgs			45	
Saleble yield	Kgs			1,455	
Cost per kg of seed	Kgs			675	
Selling Price/kg	Shs			1,000	
Income	Shs			1,455,000	
<b>Net income</b>	<b>Shs</b>			<b>472,500</b>	

## Economic analysis seed company

Activity/Item	Units	Quantity	Unit price	Total amount	Comments
Total yield	Kgs			1,500	
Post harvest loss (5%)	Kgs			75	
Saleble yield	Kgs			1,425	
Selling Price/kg	Shs			2,000	
Revenue	Shs			2,850,000	
Less amount of pre-financed activities				477,500	
Actual amount paid to outgrowers	Shs			2,372,500	
add transport costs/kg	Shs	1,425	120	171,000	
add processing costs/kg	Shs	1,425	50	71,250	
add packaging cost/kg	Shs	1,425	80	114,000	
<b>Total cost</b>				<b>2,728,750</b>	<b>total cost incurred by pearl seed/acre</b>
Total volume of certified seed	Kgs			1,283	
price of certified seed	Kgs			4,000	
Income				5,130,000	
<b>Net income</b>				<b>2,401,250</b>	<b>net income earned by pearl seed/acre</b>

## Annex 10: Summary of Integrated Training Modules

The integrated training guides followed the same format for all main crops (rice, potato) and the ancillary crops (soya bean, beans, cabbage and onion).

Activity/Item	Units
Pre-planting practices	Goal setting and visioning
	Site selection for crop production
	Seed selection
	Land preparation
	Production of seedlings. (Lowland rice only)
	Irrigation and water management
Planting and Crop Management	Crop planting
	Weeds management
	Control of common pests and diseases
	Soil fertility/nutrients management
	Water management
	Weeding and earthing up
	Pests & diseases management
Harvesting and postharvest handling	Harvesting & Post-harvest Handling (PHH)
	Harvest and threshing (lowland rice).
	Marketing
FaaB	Goal setting
	Habits of a successful market-oriented farmer
	Projected income statement
	Crop variety selection
	Profit maximisation
	Joint decision making (gender)
Income diversification	Selecting a profitable crop enterprise
	Financial discipline
	Crop rotation

Milestone	Topic	Activity	Expected outputs/ objectives
<b>Milestone 1: Pre-planting Practices in CB</b>			
M1.1	Access to weather forecast information for 2019	<ul style="list-style-type: none"> <li>◦ Acquire relevant 2019 weather forecast information, sensitize, and mentor the farmers on</li> <li>◦ interpretation of the forecast and disseminate the information to the assigned FGs</li> </ul>	<p><b>95% of registered farmers are:</b></p> <ul style="list-style-type: none"> <li>◦ Sensitized and mentored on how to use the weather forecast information.</li> <li>◦ List of FGs with relevant knowledge on 2019 weather forecast incorporated into their seasonal crop calendar.</li> </ul>
M1.2	Site selection (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record all costs incurred in site selection, land hire, soil testing.</li> <li>◦ Train farmers how to select a suitable site for Climbing bean production.</li> <li>◦ Train farmers on the importance of soil testing.</li> <li>◦ Train the farmer on the importance of involving all house members in deciding on suitable site for Climbing bean production (accessibility to men, women and youth and disabled members)</li> </ul> <p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Rotate beans after potato, not beans after legumes to maintain soil fertility or intercrop with maize, young cassava, coffee, bananas as a cover crop.</li> <li>√ Select a field with well drained fertile soil.</li> <li>√ Test your soil to determine the fertility level so as to apply only the required nutrients.</li> </ul>	<p><b>95% of registered farmers are:</b></p> <ul style="list-style-type: none"> <li>◦ Trained, understand, and have records of all costs incurred on site selection.</li> <li>◦ Trained and know the importance of soil testing.</li> <li>◦ Trained and know qualities of suitable sites for beans production.</li> <li>◦ Trained and understand the importance of involving household members in site selection</li> </ul>
M1.3	Land preparation (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record all costs incurred (e.g herbicides, labour) and dates of land preparation.</li> <li>◦ Train farmers the appropriate time for land preparation, how to prepare land using both manual and herbicide methods (types of herbicides and dilution rates)</li> <li>◦ Train farmers on importance of using herbicide in cost reduction and other mechanisms of reducing costs at land preparation</li> <li>◦ Train farmers the importance of soil and water conservation structures</li> <li>◦ Train farmers on the importance of applying organic manure where accessible for bean production.</li> <li>◦ Train farmers on importance of sharing roles appropriately among men, women and youth during land preparation.</li> </ul>	<p><b>95% of registered farmers are:</b></p> <ul style="list-style-type: none"> <li>◦ Know all costs incurred on land preparation and has records in individual record book.</li> <li>◦ Understands, and are able to demonstrate all the logical steps involved in land preparation for planting climbing bean including the following: <ul style="list-style-type: none"> <li>√ Herbicide use.</li> <li>√ Primary &amp; secondary tillage</li> <li>√ ISFM in climbing bean</li> </ul> </li> <li>◦ Understand the roles of each category of household members in land preparation</li> </ul>

Milestone	Topic	Activity	Expected outputs/ objectives
M1.3	Land preparation (3hrs)	<p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Prepare land at least 1 month before planting.</li> <li>√ Use herbicide (glyphosate) to kill weeds 2-4 weeks before ploughing.</li> <li>√ Apply glyphosate 20 mls per liter of water for young annual weeds and 40 mls per liter for young perennial weeds such as couch grass.</li> <li>√ Apply herbicides in the morning before 10.00 am at least 6 hours before it rains.</li> <li>√ Construct water and soil conservation structures such as check dams, terraces, trenches and bunds.</li> <li>√ Plant fruit trees, shrubs and grass along the contour bunds.</li> <li>√ Apply organic manure where accessible.</li> <li>√ Deep plough/dig moist soil, harrow, level before planting</li> </ul>	
M1.4	Seed selection (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record all costs incurred on seed purchase (e.g cost of seed, transport, communication etc) and other related information such as quantity, variety and source, size. (Refer to Climbing beans variety list)</li> <li>◦ Train farmers on the importance of collective purchase of seed.</li> </ul> <p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Select improved variety suitable for the season, location, purpose and market from a reliable source e.g. NABE 12c, NABE 26c, NABE 29c</li> <li>√ Sort the seed to remove the damaged, wrinkled, diseased, different colors and abnormal sizes</li> <li>√ Conduct germination test 10 days before planting (7/10 seeds and more germinated) recommended.</li> </ul>	<p><b>95% of registered farmers are:</b></p> <ul style="list-style-type: none"> <li>◦ Understand and have records on all costs incurred on (individual and collective) seed purchase and varieties of selected seed.</li> <li>◦ Understand the importance of improved varieties, those suitable for their season, location, purpose and identified market.</li> <li>◦ Understand the importance of collective purchase of seed.</li> </ul> <p><b>Report on milestone 1; (CB pre-planting practices) required by 22<sup>nd</sup> March 2019:</b></p> <ul style="list-style-type: none"> <li>◦ Description of the training methods used.</li> <li>◦ Total number of farmers trained on pre-planting practices of CB segregated as below: <ul style="list-style-type: none"> <li>√ Males above age 35 trained.</li> <li>√ Females above age 35 trained</li> <li>√ Male youths trained.</li> <li>√ Female youths trained.</li> </ul> </li> <li>◦ Challenges encountered, solutions discussed and resolved with the farmers.</li> <li>◦ Recommendations on issues that affect the project directly or indirectly.</li> </ul>

Milestone	Topic	Activity	Expected outputs/ objectives
M1.5	Record keeping (1hrs)	<p><b>Train farmers on following and how to keep the following records:</b></p> <ul style="list-style-type: none"> <li>◦ Suitable improved varieties with the desired quality parameters.</li> <li>◦ Agro-chemicals to use (fertilizers, insecticides &amp; fungicides).</li> <li>◦ Weather forecast from meteorological authorities.</li> <li>◦ Share list of inspected/recommended agro-dealers with FGs and list of selected FGs with agro-dealers.</li> <li>◦ Facilitate meeting between FGs and agro-dealers.</li> <li>◦ share list of SSPs with FGs and agro-dealers and facilitate meetings among them</li> <li>◦ share list of soil testing service providers to FGs</li> </ul> <p><b>Train farmers on following and how to keep the following records:</b></p> <ul style="list-style-type: none"> <li>◦ Developing a Projected Income Statement (PIS) and its importance.</li> <li>◦ How to record actual costs</li> <li>◦ How to record yields, marketable and non-marketable)</li> <li>◦ Prices at peak harvest, off-peak and off season.</li> <li>◦ How to calculate Gross income, Net profit/loss</li> </ul>	<ul style="list-style-type: none"> <li>◦ 95% of registered farmers in the database are trained, understand and record the following information in their household record book.</li> <li>◦ Suitable improved varieties</li> <li>◦ Agro-chemicals.</li> <li>◦ Weather forecast and seasonal calendar</li> <li>◦ Have List of inspected/recommended agro-dealers</li> <li>◦ list of SSPs shared with FGs and agro-dealers</li> <li>◦ List of selected FGs/FBGs shared with agro-dealers.</li> <li>◦ Key action points resolved during meeting with agro-dealers.</li> </ul> <p><b>% of registered Farmers in the database trained; understand and keep records of the following:</b></p> <ul style="list-style-type: none"> <li>√ PIS</li> <li>√ Actual costs</li> <li>√ Actual yields, marketable and non-marketable)</li> <li>√ Prices at peak harvest, off-peak and off season</li> <li>√ Gross Income, Net profit/loss</li> </ul>
<b>Milestone 2: Planting and Crop Management in CB</b>			
M2.1	Planting (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record all costs incurred on planting (labour, transport costs, fertilizer,) and other related information such as dates, spacing.</li> <li>◦ Train farmers on the conditions of soil for planting and the good agronomic practices like fertilizer application rate, seed rate, seed inoculation, spacing, line planting,</li> <li>◦ Train farmers how to stake beans properly.</li> <li>◦ Train farmers on importance of share roles/tasks appropriately among men, women and youth during planting.</li> </ul>	<p><b>95% of registered farmers in the database are trained:</b></p> <ul style="list-style-type: none"> <li>◦ Understand how to and record all costs incurred on planting.</li> <li>◦ Know and understand: <ul style="list-style-type: none"> <li>√ Correct spacing for beans</li> <li>√ Proper staking</li> <li>√ Proper crop rotation</li> <li>√ Fertilizer rates, methods and time of fertilizer application.</li> <li>√ Inoculation in beans production.</li> <li>√ Roles of each category of household members in planting of beans</li> </ul> </li> </ul>

Milestone	Topic	Activity	Expected outputs/ objectives
M2.1	Planting (3hrs)	<p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Plant 25-30kgs/acre at the onset of rains, in rows.</li> <li>√ Space at 75cm X 15cm (1 seed/hill) or 75cm X 30cm (2 seeds/hill) at a depth of 5cm</li> <li>√ Stake within 2 weeks after germination at 50cm apart using 8000 stakes of 1.5-2M long per acre</li> <li>√ Use strings at 30 cm interval from the ground as substitute for wooden stakes</li> <li>√ Use inorganic fertilizers as follows;</li> <li>√ TSP or DAP 40kg/acre (soda bottle top for every 40cm furrow),</li> <li>√ SSP 90kgs/acre (soda bottle top for every 20cm),</li> <li>√ Apply 120kg - 200kg of NPK 17:17:17 per acre during planting in furrows if TSP, DAP or SSP are not available.</li> </ul>	
M2.2	Weeds management (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record all costs incurred on weeding (labour, herbicides)</li> <li>◦ Train farmers on the importance of timely weeding.</li> <li>◦ Train farmers the importance of sharing roles/tasks appropriately among men, women and youth during weeding.</li> </ul> <p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Do weeding as you stake, 2 weeks after germination</li> <li>√ Do second weeding by hand pulling 2 weeks after first weeding.</li> <li>√ Keep the field weed free throughout the crop growth period.</li> <li>√ Avoid late weeding as it results into low yields and reduced income.</li> </ul>	<p><b>95% of registered farmers in the database are trained:</b></p> <ul style="list-style-type: none"> <li>◦ Keep records of costs incurred at weeding and other practices</li> <li>◦ Know and practice proper weeds management.</li> <li>◦ Know the advantages of early and proper weeds control.</li> <li>◦ Know roles of each category of household members in weeds management</li> </ul>
M2.3	Pests & diseases managements (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers how to record costs incurred on disease management (quantities and cost of fungicides, insecticides, spray pumps, labour, and source).</li> <li>◦ Train farmers on integrated pest and disease management (Use resistant or tolerant varieties, early planting, crop rotation, intercropping, sanitary measures and chemical application. Link farms to SSP located in their areas</li> <li>◦ Train farmers on safe use of fungicides and pesticides.</li> <li>◦ Train farmers on importance of sharing roles/tasks appropriately among men, women and youth during disease and pest management.</li> </ul>	<p><b>95% of registered farmers in the database are trained:</b></p> <ul style="list-style-type: none"> <li>◦ Keep record of costs incurred during pest management</li> <li>◦ Know, practice, explain and record all practices involved in proper control of pests and diseases including. <ul style="list-style-type: none"> <li>√ Pest/ diseases identification</li> <li>√ Management practices.</li> <li>√ Safe use of chemicals</li> <li>√ Rates of chemical application.</li> </ul> </li> <li>◦ Know the roles of each of household members in control of common pests and diseases.</li> </ul>

Milestone	Topic	Activity	Expected outputs/ objectives
M2.3	Pests & diseases managements (3hrs)	<p><b>Key skills:</b></p> <ul style="list-style-type: none"> <li>√ Use clean treated seed and Do crop rotation.</li> <li>√ Keep the field weed-free and Plant early at onset of major rains.</li> <li>√ Do birds scaring and Apply insecticides at first sight of insect pests (e.g aphids, cutworms, leaf-miners etc) in the field.</li> <li>√ Use fungicides to control fungal diseases like Anthracnose, leaf rust and blights and Apply fungicides to control early and late blights : <ul style="list-style-type: none"> <li>◦ 1<sup>st</sup> application use contact fungicide (Mancozeb) at 40g per 15 liters or 50g in 20liters of water at 1 week after crop emergence.</li> <li>◦ 2<sup>nd</sup> application, with systemic fungicide (metalaxyl-based) at first sight of late and early blight disease symptoms (Refer to list of fungicides).</li> <li>◦ Use only contact fungicide if no symptom of fungal diseases is observed, to avoid unnecessary costs.</li> </ul> </li> </ul>	
M2.4	Soil fertility/ nutrients management in beans (3hrs)	<ul style="list-style-type: none"> <li>◦ Train farmers the importance of doing soil testing for better decision on fertilizer type and rate to apply.</li> <li>◦ Train farmers why the general recommendation is to use well-balanced nutrients as follows; <ul style="list-style-type: none"> <li>√ Apply 120kg – 200kg of NPK 17:17:17 per acre during planting in furrows if TSP, DAP or SSP are not available.</li> </ul> </li> <li>◦ Train farmers why they should practice Conservation Agric. including: <ul style="list-style-type: none"> <li>√ Minimum tillage,</li> <li>√ Limited burning of plant residues</li> <li>√ Incorporation of crop residues into the soil to improve soil organic matter.</li> <li>√ Crop rotation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◦ List of farmers trained who practice, explain and record all practices involved in soil fertility/nutrients management including: <ul style="list-style-type: none"> <li>√ Basal fertilizer application</li> <li>√ Top-dressing application of fertilizers.</li> <li>√ Proper weeds management.</li> <li>√ Crop rotation.</li> <li>√ General ISFM</li> </ul> </li> <li>◦ Roles of each category of household members in soil fertility/nutrients management in beans resolved and recorded in household record book.</li> <li>◦ Description of the training methods used.</li> <li>◦ Total number of FGs trained on different topics</li> <li>◦ Lists described in the outputs and report format</li> <li>◦ Challenges encountered, solutions discussed and resolved with the farmers.</li> <li>◦ Recommendations on issues that affect the project directly or indirectly.</li> </ul>
M2.5	Adoption of Climate Smart Agriculture (CSA) strategy (3hrs)	<ul style="list-style-type: none"> <li>◦ Roll out the CSA adoption strategies with farmers through farmer field days and exchange visits: <ul style="list-style-type: none"> <li>√ Crop diversification</li> <li>√ Drought tolerant varieties</li> <li>√ Early maturing varieties</li> <li>√ Soil testing for proper nutrients application</li> </ul> </li> <li>◦ Train farmers the importance of soil and water conservation structures e.g, terraces, contour bunds, check dams.</li> </ul>	<ul style="list-style-type: none"> <li>◦ List of farmers that have adopted some of the CSA strategies indicating which strategies adopted by the farmer.</li> <li>◦ List of Farmers with soil and water conservation structures <ul style="list-style-type: none"> <li>√ Male youths trained.</li> <li>√ Female youths trained.</li> </ul> </li> </ul>

Milestone	Topic	Activity	Expected outputs/ objectives
<b>Milestone 3: CB Harvesting, PHH and Marketing</b>			
M3.1	Harvesting & PHH (3hrs)	<ul style="list-style-type: none"> <li>Train farmers how to record all costs incurred on harvesting (labour, transport, storage facilities, harvesting tools and equipment, pesticides) and other related information such as dates, quantity harvested etc).</li> <li>Train farmers on the appropriate stage for harvesting, the proper tools to use.</li> <li>Train farmers how to sort and grade before storage</li> <li>Train farmers on appropriate storage facilities</li> <li>Train farmers on storage pests and how to Control them using appropriate pesticides and repellants e.g. Malathion, African marigold.</li> <li>Train farmers how to share roles/tasks appropriately among men, women and youth during harvesting and post-harvest handling.</li> </ul>	<p><b>95% of registered farmers in the database are trained:</b></p> <ul style="list-style-type: none"> <li>Know and have records of all practices and costs involved in harvest and post-harvest handling of Climbing beans <ul style="list-style-type: none"> <li>√ Know the appropriate harvest tools, methods. and equipment</li> <li>√ Know proper storage facilities</li> <li>√ Quality control practices during H&amp;PHH</li> <li>√ Pests &amp; disease management in Climbing beans storage.</li> </ul> </li> <li>Knowledge of roles played by each of household members in Harvest and PHH</li> </ul>
M3.1	Bean Marketing (3hrs)	<ul style="list-style-type: none"> <li>Train farmers the importance of involving household members in agreeing on the quantity to sell, when, price and how proceeds will be used.</li> <li>Train farmers on factors to consider in marketing (Knowing market before production, use of standardized packaging according to the customer demand, long-term marketing arrangement)</li> <li>Train farmers how to get the unit cost of production to determine the optimal market price,</li> <li>Train farmers how take records of sales</li> <li>Train the farmers on advantages of collective marketing</li> <li>Train the farmers on advantages of Linking up with other farmers, traders, extension workers and customers</li> <li>Train the farmers how to add value to Climbing beans to increase profits e.g. sorting, grading, weighing, packaging and branding.</li> <li>Train farmers how to analyze the records to determine profits</li> </ul>	<p><b>95% of registered farmers in the database are trained:</b></p> <ul style="list-style-type: none"> <li>Have record all practices involved marketing of bean seed including; <ul style="list-style-type: none"> <li>√ Potential markets/buyers before production.</li> <li>√ Credible MSMEs/buyers for long-term engagement on marketing.</li> <li>√ Knowledge of unit cost and profit.</li> <li>√ Actual sale prices at peak harvest, off-peak and off-season.</li> <li>√ Possible value addition practices.</li> <li>√ Gross income from group sale for beans</li> </ul> </li> <li>Knowledge of the roles of each of household members in marketing beans</li> </ul> <p><b>Report on milestone 3; (Climbing beans harvest, PHH &amp; Marketing) including report on all milestones required by 28<sup>th</sup> June 2019:</b></p> <ul style="list-style-type: none"> <li>Description of the training methods used.</li> <li>Total number of farmers trained on Harvest, PHH &amp; Marketing of CB segregated as below. <ul style="list-style-type: none"> <li>√ Males above age 35 trained.</li> <li>√ Females above age 35 trained</li> <li>√ Male youths trained.</li> <li>√ Female youths trained.</li> </ul> </li> <li>Challenges encountered, solutions discussed and resolved with the farmers.</li> <li>Recommendations on issues that affect the project directly or indirectly.</li> </ul>

## Annex 11: Partner Cost Share Breakdown 2017-2021

### Cost Share Report from Private Sector for the Period January 2017- June 2021; Amounts in Euros

Partner	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Total Sum of Expected Contribution (Euros)	Total Sum of Actual Contribution (Euros)	IFDC	Budget line	Partner
Bitamba Enterprise (ISB)	16,895	17,787	105%	4,488	3,876	86%	21,384	21,663	82%	Intervention fund (Cardno), 1.7	18%
Byampa Enterprises Limited (BYAMPA)	3,796	4,579	121%	1,144	3,573	312%	4,940	8,153	56%	Infrastructure, PPP, and Capacity Building Grant Fund	44%
Chemonges Stephen	17,091	18,815	110%	4,513	6,519	144%	21,604	25,334	74%	Intervention fund (Cardno), 1.7	26%
Crop Life Uganda Limited	39,683	40,054	101%	26,330	28,017	106%	66,012	68,071	59%	1.5	41%
CKB Cleen & Quality Seed Potato Production Enterprise	65,493	58,226	89%	29,034	11,526	40%	94,527	69,752	83%	Infrastructure, PPP, and Capacity Building Grant Fund, 1.7	17%
CLARKE FARM	170,224	197,377	116%	67,899	47,210	70%	238,124	244,587	81%	Infrastructure, PPP, and Capacity Building Grant Fund	19%
CYSCAS International	50,150	41,176	82%	25,161	51,693	205%	75,312	92,870	44%	1.7	56%
Dinner's Group Limited	54,937	50,375	92%	47,747	30,015	63%	102,684	80,390	63%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 1.2, 1.3, 1.4	37%

Partner	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Total Sum of Expected Contribution (Euros)	Total Sum of Actual Contribution (Euros)	IFDC	Budget line	Partner
Farm Input Care Center (FICA) LTD	156,743	101,531	65%	52,784	84,299	160%	209,528	185,829	55%	Infrastructure, PPP, and Capacity Building Grant Fund	45%
Grain pulse Limited (GPL)	12,457	8,968	72%	15,380	8,628	56%	27,837	17,595	51%	Communications (launch, commodity events), 1.8	49%
Kakie International Ltd	131,257	113,025	86%	52,397	42,359	81%	183,654	155,384	73%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund	27%
Kapchesombe Green Change Farmers' Cooperative (KGCFK)	37,988	43,463	114%	18,589	11,587	62%	56,577	55,050	79%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 1.2, 1.7, 1.8, 2.2	21%
Kibimba Limited	128,001	63,165	49%	273,201	43,406	16%	401,203	106,571	59%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 1.3	41%
Kigezi Farmer's Resource Centre Limited (KFRC)	12,418	12,692	102%	9,034	16,472	182%	21,452	29,165	44%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 1.7	56%
Lwoba Holding	7,608	7,037	92%	6,553	9,223	141%	14,161	16,259	43%	Infrastructure, PPP, and Capacity Building Grant Fund, 1.3, 1.8	57%
Maziba Progressive Farmers Resource Center Ltd (MPFRC)	15,306	16,848	110%	4,964	3,829	77%	20,270	20,677	81%	Intervention fund (Cardno), 1.7	19%

Partner	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Total Sum of Expected Contribution (Euros)	Total Sum of Actual Contribution (Euros)	IFDC	Budget line	Partner
Mengya Intergrated Farmers Association( MIFA)	85,808	76,820	90%	37,293	16,338	44%	123,101	93,158	82%	Communications (launch, commodity events), 1.7, 1.8	18%
Muyambi William	8,888	15,713	177%	4,177	7,692	184%	13,065	23,404	67%	1.7	33%
Namakwaland Farm/High Grow Agri (HGA)	402,336	194,871	48%	331,244	391,793	118%	733,580	586,664	33%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 1.2	67%
Netherlands Potato Organization (NAO)	22,146	39,745	179%	24,374	34,619	142%	46,520	74,364	53%	1.6	47%
New Bukumbi Coffee Processors Limited (NBC)	64,949	113,149	174%	29,304	23,611	81%	94,254	136,760	83%	Infrastructure, PPP, and Capacity Building Grant Fund	17%
PEARL seed	75,218	67,678	90%	92,479	48,934	53%	167,697	116,612	58%	Intervention fund (Cardno)	42%
Psalms Food Industries Limited (PFIL)	156,365	113,853	73%	477,645	507,445	106%	634,010	621,298	18%	Intervention fund (Cardno), 1.4	82%
Solar Now	6,583	2,705	41%	1,635	1,636	100%	8,218	4,341	62%	1.4	38%
ST. Richards Group of Companies (RGC)	26,839	27,165	101%	54,837	43,101	79%	81,676	70,266	39%	Intervention fund (Cardno), Infrastructure, PPP, and Capacity Building Grant Fund, 2.2	61%
SWT Tanners Limited (SWT)	502,851	116,940	23%	8,360,832	3,948,784	47%	8,863,683	4,065,723	3%	Infrastructure, PPP, and Capacity Building Grant Fund, 1.4, 2.1	97%

Partner	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Sum of Expected Contribution (Euros)	Sum of Actual Contribution (Euros)	% age Contribution reached	Total Sum of Expected Contribution (Euros)	Total Sum of Actual Contribution (Euros)	IFDC	Budget line	Partner
The MicroFinance Support Centre Limited (MSC)	15,319	6,303	41%	8,105	6,567	81%	23,424	12,870	49%	Intervention fund (Cardno), 1.3, 1.4, 1.8	51%
Welishe Stephen	12,116	16,130	133%	6,128	4,382	72%	18,244	20,512	79%	Intervention fund (Cardno), 1.7	21%
<b>Totals</b>	<b>2,299,466</b>	<b>1,586,190</b>		<b>10,067,274</b>	<b>5,437,134</b>		<b>12,366,741</b>	<b>7,023,324</b>			

## IFDC REACH-Uganda Project-Bitamba Enterprise: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Bitamba Enterprise(ISB)
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and installation screen house	7786	835.75
Construction of 134 M <sup>2</sup> diffused light store	7,136	3,004
Promoting clean quality seed	440	440
Supply of 2 Plastic water tanks of 10,000L	1,534	209
<b>Total</b>	<b>16,895</b>	<b>4,488</b>

Activity	Actual cost contribution										
	IFDC						Bitamba Enterprise(ISB)				
	Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020
	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Purchase and installation screen house	-	-	-	8,817		Intervention Fund (Cardno)	-	-	-	406.00	
Construction of 134 M <sup>2</sup> diffused light store	-	-	-	7,461	242	1.7	-	-	-	3,020.87	448.94
Promoting clean quality seed	-	-	-				-	-	-		
Supply of 2 Plastic water tanks of 10,000L	-	-	-		1,268	1.6	-	-	-		
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>16,278</b>	<b>1,510</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>3,427</b>	<b>449</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	16,278	96%
Bitamba Enterprises	3,427	76%

## IFDC REACH-Uganda Project-Byampa Enterprises Ltd.: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Byampa Enterprises Limited (BYAMPA)
Years	2017-2021	2017-2021
Activity		
Developing New packs	440	
Procurement of weighing scale & sealing machine		88
Promote new product in the market		440
Upgrading of prodn. Location, installation of electricity, installation of water Tank		616
Procurement of washing & peeling machine	1029	
Purchase of slicing machine	1372	
Purchase of stove fryer (single small)	955	
<b>Total</b>	<b>3,796</b>	<b>1,144</b>

Activity	Actual cost contribution											
	IFDC						Budget Line Charged	Byampa Enterprises Limited (BYAMPA)				
	2017	2018	2019	2020	2021	2017		2018	2019	2020	2021	
Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		
Developing New packs	-	-	-	753.08		Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-			
Procurement of weighing scale & sealing machine	-	-	-				-	-	-	54.54		

Actual cost contribution											
IFDC							Byampa Enterprises Limited(BYAMPA)				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Promote new product in the market	-	-	-				-	-	-		
Uprading of prodn. Location,installation of electricity,installation of water Tank										3,518.78	
Procurement of washing & peeling machine				1,467.50		Infrastructure, PPP, and Capacity Building Grant Fund					
Purchase of slicing machine				1,219.64		Infrastructure, PPP, and Capacity Building Grant Fund					
Purchase of stove fryer(sigle small)				1,139.13		Infrastructure, PPP, and Capacity Building Grant Fund					
<b>Total</b>	-	-	-	<b>4,579</b>	-		-	-	-	<b>3,573</b>	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	4,579	121%
Byampa Enterprises Limited (BYAMPA)	3,573	312%

## IFDC REACH-Uganda Project-Chemonges Stephen: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Chemonges Stephen
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and Installation Screen Houses	7,786	836
Construction of 134 M <sup>2</sup> diffused light store	8,866	3,237
Promoting clean quality seed	440	440
<b>Total</b>	<b>17,091</b>	<b>4,513</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	Chemonges Stephen				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Purchase and Installation Screen Houses	-	-	-	8,817		Intervention Fund (Cardno)	-	-	-	3,205	
Construction of 134 M <sup>2</sup> diffused light store	-	-	-	8,940	1,058.51	1.7	-	-	-		3,314
Promoting clean quality seed	-	-	-				-	-	-		
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>17,757</b>	<b>1,059</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>3,205</b>	<b>3,314</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	17,757	104%
Chemonges Stephen	3,205	71%

## IFDC REACH-Uganda Project- CROP LIFE Uganda: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	CROP LIFE Uganda
Years	2017-2021	2017-2021
<b>Activity (Spray service providers training)</b>		
Spray service providers training-Contract No 2018/REACH/UGA/069	39,683	
Awareness/selection		760.44
SSP training/graduation		8,185.86
Equipment for SSPs		1,147.36
Project management		12,787.27
Coaching and data collection		380.22
IPM Training		1,330.76
Monitoring SSPs Kisoro and Kabale		1,737.82
<b>Total</b>	<b>39,683</b>	<b>26,330</b>

Years	Actual cost contribution											
	IFDC						Budget Line Charged	CROP LIFE Uganda				
	2017	2018	2019	2020	2021	2017		2018	2019	2020	2021	
<b>Activity (Spray service providers training)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	
Spray service providers training-Contract No 2018/REACH/UGA/069	3,587	28,941	7,526	0		1.5	4,069		0	0		
Awareness/selection				0				289.64	0	0		
SSP training/graduation				0				110.59	0	0		

Actual cost contribution											
IFDC							CROP LIFE Uganda				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity (Spray service providers training)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Equipment for SSPs				0				6.69	0	0	
Project management				0				10,448.79	7,053	0	
Coaching and data collection				0				380.22	0	0	
IPM Training				0				4,898.10	0	0	
Monitoring SSPs Kisoro and Kabale				0				760.44		0	
<b>Total</b>	<b>3,587</b>	<b>28,941</b>	<b>7,526</b>	<b>-</b>	<b>-</b>		<b>4,069</b>	<b>16,894</b>	<b>7,053</b>	<b>-</b>	<b>-</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	40,054	101%
CROP LIFE Uganda	28,017	106%

**IFDC REACH-Uganda Project-CKB Clean & quality seed potato producers Enterprises: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

	Budgeted costs	
	IFDC	CKB Clean & Quality seed potato producers Enterprises
Years	2017-2021	2017-2021
<b>Activity</b>		
Develop Specifications of 242M <sup>2</sup> SH	440	
Construction of additional screen house (242M <sup>2</sup> )	6,381	1,712.85
Assessment & design of irrigation system	440	
Construct 3 farm ponds with capacity of 500 cum of water with harvesting system	31,449	18,544.09
Installation of 3.2 acres pressure compensating drip irrigation system	15,501	5,007.48
Training in operation and management of irrigation system	281	
Develop specifications of 200M <sup>2</sup> DLS	880	
Construction of diffused light store of 200M <sup>2</sup> on the basis of the specifications	10,121	3,769.73
<b>Total</b>	<b>65,493</b>	<b>29,034</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	CKB Clean & Quality seed potato producers Enterprises				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	
Develop Specifications of 242M <sup>2</sup> SH	-	-	447.23	-	-	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	-	

Actual cost contribution											
IFDC							CKB Clean & Quality seed potato producers Enterprises				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Construction of additional screen house (242 m <sup>2</sup> )	-	-	5,573.49	1,756.21			-	-	2,806.65	621.44	
Assessment & design of irrigation system	-	-	-			Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	-	
Construct 3 farm ponds with capacity of 500 cum of water with harvesting system	-	-	-	23,516.84	2,439.44		-	-	-	1,372.89	208.11
Installation of 3.2 acres pressure compensating drip irrigation system	-	-	-	14,547			-	-	-	869.50	
Training in operation and management of irrigation system	-	-	-				-	-	-	-	
Develop specifications of 200M <sup>2</sup> DLS	-	-	824.97			1.7	-	-	-	4,621.36	1,026.02
Construction of diffused light store of 200M <sup>2</sup> on the basis of the specifications	-	-		8,879	242	1.7	-	-	-	-	
<b>Total</b>	-	-	<b>6,846</b>	<b>48,699</b>	<b>2,681</b>		-	-	<b>2,807</b>	<b>7,485</b>	<b>1,234</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	55,545	85%
CKB Clean & Quality seed potato producers Enterprises	10,292	35%

## IFDC REACH-Uganda Project-CLARKE Farm: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Budgeted costs	
	IFDC	CLARKE Farm
	2017-2021	2017-2021
<b>Activity</b>		
importation of 13MT Taurus Basic Seed for ware potato production	14,076	-
Importation of 13MT Taurus elite seed for seed potato production	17,595	-
Promotional campaign to popularize Dutch potato	3,519	-
Installation of appropriate irrigation infrastructure	-	43,987
Purchase of potato seeder, ridger and harvester	10,135	-
Construction of the concrete foundation	24,210	14,118
Construction of steel structure to install the cold room	15,835	9,794
Facilitation for seed potato production license		
Purchase and installation of storage cold room	52,784	-
Fabrication systems- Forklift	32,071	
<b>Total</b>	<b>170,224</b>	<b>67,899</b>

Years	Actual cost contribution										
	IFDC					Budget Line Charged	CLARKE Farm				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
<b>Activity</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>				
importation of 13MT Taurus Basic Seed for ware potato production	-	-	-		24740.76	Agribusiness Service Provider (CARDNO)	-	-	-	-	

Actual cost contribution											
IFDC						CLARKE Farm					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Importation of 13MT Taurus elite seed for seed potato production	-	-	-				-	-			
Promotional campaign to popularize Dutch potato	-	-	-				-	-			
Installation of appropriate irrigation infrastructure	-	-	-		18524.89	Agribusiness Service Provider (CARDNO)	-	-			208.11
Purchase of potato seeder, ridger and harvester	-	-	-	651.00		Infrastructure, PPP, and Capacity Building Grant Fund	-	-		9270.86	
Construction of the concrete foundation	-	-	-	29,954.25	3060.86		-	-			
Construction of steel structure to install the cold room	-	-	-		9067.50	Agribusiness Service Provider (CARDNO)	-	-	1,717	26841.85	1,026.02
Facilitation for seed potato production license					2592.70	1.6	-	-		9379.80	
Purchase and installation of storage cold room	-	-	-	86,875		Infrastructure, PPP, and Capacity Building Grant Fund					1,234
Fabrication systems- Forklift					21,909.90			-			
<b>Total</b>	-	-	<b>6,846</b>	<b>48,699</b>	<b>2,681</b>		-	-	-	<b>1,717</b>	<b>45,493</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	117,481	69%
CLARKE Farm	1,717	3%

## IFDC REACH-Uganda Project-CYCAS/KAZARDI: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Activity	Budgeted costs	
		IFDC 2017-2021	CYCAS/KAZARDI 2017-2021
National Trials on True Potato Seed	Cycas International monitoring/supervision		28,583
	CycasUganda monitoring/supervision- Kampala Agronomist		3,355
	True Potato Seed Breeder supervision (Bejo International)		
	Naro Trials- Payment to Kazardi - Contract No. 2018/REACH/UGA/008	14,845	
	IFDC on farm trials	6,673	
	Transport and per diem for IFDC driver and staff	4,509	
	conducting DUS data collection for Dutch potato candidate varieties in Season 2018A		
	Fuel	2,281	
	Per diem for Cycas agronomist	0	1,074
	Bejo (NL) Staff air ticket	0	3,221
	Bejo (NL) Staff accommodation	0	1,610
	Bejo (NL) Technical support fees	0	8,588
	Bejo (NL) Staff professional fees Ug	0	10,736
	Xclusive cuttings plant nursery trials	1,953	0
	Orientation trip to the Netherlands	2,319	6,858
	Air tickets	0	3,691
	Accommodation (2 nights)	0	2,684
	Local transport (9 participants)	0	483
	Per diem for 6 person 120 usd per person per day	2,319	0
	Others (project Management)	0	2,013

		Budgeted costs	
		IFDC	CYCAS/KAZARDI
Activity			
Performance evaluation of TPS hybride varieties in Uganda	Seed Nusery (seed bed) and its management	280	-
	Planting and TPS trial evaluations (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	2,988	-
	Management of the TPS fields in 5 sites (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	1,109	-
	Data collection on TPS performance (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	6,525	-
	Harvesting (facilitation for staff ) in (West Nile, Eastern region, western region and Kabale and Kisoro) for 5 TPS xperimental trials	2,964	-
	10% of the total cost- Contingency	1,387	-
<b>Total</b>		<b>50,150</b>	<b>72,895</b>

Actual cost contribution												
		IFDC					Budget Line Charged	CYCAS/KAZARDI				
		2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)						
National Trials on True Potato Seed	Cycas International monitoring/supervision	-	-	-	-	-	-	9,744	14,292	-	-	
	CycasUganda monitoring/supervision- Kampala Agronomist	-	-	-	-	-	-	2,135	1,677	-	-	
	True Potato Seed Breeder supervision (Bejo International)	-	-	-	-	-	-	14,116	-	-	-	
	Naro Trials- Payment to Kazardi - Contract No. 2018/REACH/UGA/008	5,623	21,245	-	-	-	1.7	-	-	-	-	
	IFDC on farm trials	5,328	-	-	-	-	1.7	-	-	-	-	

Actual cost contribution											
IFDC							CYCAS/KAZARDI				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Transport and per diem for IFDC driver and staff		927				1.7	-		-	-	
Conducting DUS data collection for Dutch potato candidate varieties in Season 2018A		2,740				1.7	-		-	-	
Fuel	-	-	-	-			-	1,141	-	-	
Per diem for Cycas agronomist	-	-	-	-			-	537	-	-	
Bejo (NL) Staff air ticket	-	-	-	-			-	1,074	-	-	
Bejo (NL) Staff accommodation	-	-	-	-			-	537	-	-	
Bejo (NL) Technical support fees	-	-	-	-			-	2,863	-	-	
Bejo (NL) Staff professional fees Ug	-	-	-	-			-	3,579	-	-	
Xclusive cuttings plant nursery trials	-	-	-	-			-	-	-	-	
Orientation trip to the Netherlands	-	-	-	-			-	-	-	-	
Air tickets	-	-	-	-			-	-	-	-	
Accommodation (2 nights)	-	-	-	-			-	-	-	-	
Local transport (9 participants)	-	229	-	-		1.7	-	-	-	-	
Per diem for 6 person 120 usd per person per day	-	-	-	-			-	-	-	-	
Others (project Management)	-	-	-	-			-	-	-	-	

Actual cost contribution											
IFDC							CYCAS/KAZARDI				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Performance evaluation of TPS hybride varieties in Uganda	Seed Nursery (seed bed) and its management	-	-	-							
	Planting and TPS trial evaluations (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	-	-	-			-	-	-	-	
	Management of the TPS fields in 5 sites (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	-	-	-	5,084			-	-	-	-
	Data collection on TPS performance (Kachwekano, Kalegyere, Rwebitaba, Buginyanya, Zombo)	-	-	-				-	-	-	-
	Harvesting (facilitation for staff) in (West Nile, Eastern region, western region and Kabale and Kisoro) for 5 TPS experimental trials	-	-	-				-	-	-	-
	10% of the total cost-Contingency	-						-	-	-	-
<b>Total</b>	<b>10,951</b>	<b>25,141</b>	<b>-</b>	<b>5,084</b>	<b>-</b>		<b>25,995</b>	<b>25,698</b>	<b>-</b>	<b>-</b>	<b>-</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	41,176	82%
CYCAS/KAZARDI	51,693	71%

## IFDC REACH-Uganda Project-Diner's Group Ltd: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Diner's Group Ltd
Years	2017-2021	2017-2021
<b>Activity</b>		
Visiting MSC with FBGs to introduce the engagement and acquisition of affordable credit by members of FBGs.	2,683	
Conduct meetings between Responsible Supplier and FBGs to begin supplying paddy or bringing their paddy for milling at the factory.	780	
Development of rebranding design	6,775	18,654.78
Printing new brand.	2,236	2,236.14
Training of FBGs	17,865	2,258.50
Purchase of truck	22,361	22,361
Purchase of first 2 motorcycles	2,236	2,236.14
Supply of 215 pieces of taurplines for agribusiness activities, invoice No 103		
<b>Total</b>	<b>54,937</b>	<b>47,747</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	Diner's Group Ltd				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	
Visiting MSC with FBGs to introduce the engagement and acquisition of affordable credit by members of FBGs.		2,263				1.4		252			

Actual cost contribution											
IFDC						Diner's Group Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Conduct meetings between Responsible Supplier and FBGs to begin supplying paddy or bringing their paddy for milling at the factory.		641				1.4		419.36			
Development of rebranding design		5,926				1.2		2,516.15			
Printing new brand								2,516.15			
Training of FBGs		11,419	1,608	2,423		1.3			406	370	
purchase of truck			22,361			Intervention Fund (Cardno)				22,452	
Purchase of first 2 motorcycles			1,083			Intervention Fund (Cardno)			1,083		
Supply of 215 pieces of taurplines for agribusiness activities, invoice No 103			2,651			Infrastructure, PPP, and Capacity Building Grant Fund					
<b>Total</b>	-	<b>20,249</b>	<b>27,703</b>	<b>2,423</b>	-		-	<b>5,703</b>	<b>23,941</b>	<b>370</b>	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	50,375	92%
Diner's Group Ltd	30,015	63%

**IFDC REACH-Uganda Project-Farm Input Care Center (FICA) Ltd: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

Years	Budgeted costs	
	IFDC	Farm Input Care Center (FICA) Ltd
	2017-2021	2017-2021
<b>Activity</b>		
1.3 Importation of 12.5 MT of basic seed for ware potato Production	13,548	0
1.5 Importation of 12.5 MT elite seed for seed potato production	16,935	0
Installation of appropriate irrigation infrastructure required farm infrastructure	-	26,392
Purchase of potato seeder, ridger and harvester	10,135	-
Construction of concrete foundation	-	26,392
Installation of steel structure	19,354	
Purchase and installation of storage cold room	96,771	
Facilitation for seed potato pproduction license	32,071	
<b>Total</b>	<b>156,743</b>	<b>52,784</b>

Years	Actual cost contribution										
	IFDC					Budget Line Charged	Farm Input Care Center (FICA) Lts				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
<b>Activity</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>
1.3 Importation of 12.5 MT of basic seed for ware potato Production	-	-	-		12,370	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	-	

Actual cost contribution											
IFDC						Farm Input Care Center (FICA) Lts					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
1.5 Importation of 12.5 MT elite seed for seed potato production	-	-	-		12,370.38	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	-	
	-	-	-				-	-	-	-	
Installation of appropriate irrigation infrastructure required farm infrastructure	-	-	-		11,995.42	Interventions Fund (Cardno)	-	-	-	21,302.01	27657.63481
Purchase of potato seeder, ridger and harvester	-	-	-	16,642.04		Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	-	
	-	-	-				-	-	-	-	
Construction of concrete foundation	-	-	-				-	-	-	13,196.09	22142.77485
Installation of steel structure	-	-	-		9,289.91	Interventions Fund( Cardno)	-	-	-	-	
Purchase and installation of storage cold room	-	-	-		36,270.00	Interventions Fund( Cardno)	-	-	-	-	
Facilitation for seed potato production license					2,592.70	1.60					
<b>Total</b>	-	-	-	<b>16,642</b>	<b>84,889</b>		-	-	-	<b>34,498</b>	<b>49,800</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	101,531	65%
Farm Input Care Center (FICA) Lts	34,498	65%

**IFDC REACH-Uganda Project- Grain pulse Limited (GPL) Cost Share Report for the Period January 2017 - June 2021;**  
Amounts in Euros

Years	Budgeted costs	
	IFDC	Grain pulse Limited (GPL)
	2017-2021	2017-2021
<b>Activity</b>		
Training of selected stockits(Eastern)	3,273	616
Training of selected stockits( South West)	836	211
Training of agents/CATs on crop specific business	-	264
Demostration plots Establishment	3,985	4,012
Printing of Banners	1,320	-
Printing of pocket guide	-	950
printing of Leaflets	-	1,188
Radio Talk shows( 8 talk shows) -East	1,522	-
Radio Jingle- East	-	3,809
Radio Talk shows( 8 talk shows) -West	1,522	-
Radio Jingle -SW	-	4,330
<b>Total</b>	<b>12,457</b>	<b>15,380</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	Grain pulse Limited (GPL)				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
	<b>Amt</b>	<b>Amt</b>	<b>Amt</b>	<b>Amt</b>	<b>Amt</b>		<b>Amt</b>	<b>Amt</b>	<b>Amt</b>	<b>Amt</b>	<b>Amt</b>
	<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>		<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>	<b>(Euros)</b>
Importation of 13MT Taurus Basic Seed for ware potato production				2,573		1.8				616	

Actual cost contribution											
IFDC							Grain pulse Limited (GPL)				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Importation of 13MT Taurus elite seed for seed potato production										211	
Promotional campaign to popularize Dutch potato										264	
Installation of appropriate irrigation infrastructure				4,007.23		1.8				1,494.59	
Purchase of potato seeder, ridger and harvester				-						-	
Construction of the concrete foundation				-						950.12	
Construction of steel structure to install the cold room				-						1,187.65	
Facilitation for seed potato production license				1,334.95		Communications (launch, commodity events)				-	
				-						-	
Purchase and installation of storage cold room				1,052.39		Communications (launch, commodity events)				1,926.63	
Fabrication systems- Forklift			-	-						1,977.65	
<b>Total</b>	-	-	-	<b>8,968</b>	-		-	-	-	<b>8,628</b>	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	8,968	72%
Grain pulse Limited (GPL)	8,628	56%

## IFDC REACH-Uganda Project-Kakie International Ltd: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Budgeted costs	
	IFDC	Kakie International Ltd
	2017-2021	2017-2021
<b>Activity</b>		
Importation of Taurus certificate seed for ware potato production	14,076	-
Importation of Taurus elite seed for seed potato production	17,595	
Installation of appropriate irrigation infrastructure	32,269	33,289
Importation of Farm equipment and machine	10,135	-
Construction of the concrete foundation	-	19,108
Installation of the steel structure	13,196	-
Purchase and installation of storage cold room	43,987	-
Facilitation for seed potato production license		
<b>Total</b>	<b>131,257</b>	<b>52,397</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	Kakie International Ltd				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Importation of Taurus certificate seed for ware potato production	-	-		13,400	9,516	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-		
Importation of Taurus elite seed for seed potato production	-	-		17,595	12,430	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-		

Actual cost contribution											
IFDC						Kakie International Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Installation of appropriate irrigation infrastructure	-	-		25,000		Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-		32,991
Importation of Farm equipment and machine	-	-					-	-	-		
Construction of the concrete foundation	-	-			5,269		-	-	-	7,284	2,085
Installation of the steel structure	-	-			3,241		-	-	-		
Purchase and installation of storage cold room	-	-		23,981		Intervention Fund (Cardno)	-	-	-		
Facilitation for seed potato production license					2,593	1.6					
<b>Total</b>	-	-		<b>79,976</b>	<b>33,049</b>		-	-	-	<b>7,284</b>	<b>35,075</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	79,976	61%
Kakie International Ltd	7,284	14%

**IFDC REACH-Uganda Project- Kapchesombe Green Change Farmers Association (KGCFA): Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

Years	Budgeted costs	
	IFDC	Kapchesombe Green Change Farmers Association (KGCFA)
	2017-2021	2017-2021
<b>Activity</b>		
Conduct fesibility study and design	419	
Contruction of gravity irrigation system (Water transmission to the farmers filed &Install drip Irrigation system)	26,359	7,732
Procure sprinlers ,risers and connection horse pipe		2,013
KGCFc form & train water user committee		419
Conducting Trainings (Payment for FEW conducting trainings in FAAB, GAP and gender)	453	553.55
Purchase and transport of basic seed of specified variety	679	4,076.16
Exposure trip to South west (Kabale)	629	629.04
Hire consultant for design & bill of quantities (Preparing of design and costings for a standard diffuse light store)	503	-
Construct DLS store	8,492	2,830.66
Field days		335.49
Radio Talk showa	453	
<b>Total</b>	<b>37,988</b>	<b>18,589</b>

Actual cost contribution											
Years	IFDC					Budget Line Charged	Kapchesombe Green Change Farmers Association (KGCFA)				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Conduct fesibility study and design		527.83				1.2					

Actual cost contribution											
IFDC							Kapchesombe Green Change Farmers Association (KGCFA)				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Construction of gravity irrigation system		2,367				1.8		671	2,006		
Water transmission to the farmers filed & Install drip Irrigation system			23,764			Intervention Fund (Cardno)					
Procure sprinlers ,risers and connection horse pipe											
KGCF form & train water user committee		324	109			1.8					
Conducting Trainings		2,717				2.2					
Purchase and transport of basic seed of specified variety			1168			Infrastructure, PPP, and Capacity Building Grant Fund			1,849		
Exposure trip to South west (Kabale)			44			Infrastructure, PPP, and Capacity Building Grant Fund					
Hire consultant for design & bill of quantities			599			1.7					
Construct DLS store				11,472		1.7			7,060		
Field days											
Radio Talk showa				372							
<b>Total</b>	<b>-</b>	<b>5,937</b>	<b>25,684</b>	<b>11,843</b>	<b>-</b>		<b>-</b>	<b>671</b>	<b>3,856</b>	<b>7,060</b>	<b>-</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	43,463	114%
Kapchesombe Green Change Farmers Association (KGCFA)	11,587	62%

## IFDC REACH-Uganda Project-Kibimba Group Ltd: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Budgeted costs	
	IFDC	Kibimba Group Ltd
Activity	2017-2021	2017-2021
Aquisition of license to produce certified seed	-	2,560.52
Aquisition of foundation seed(1.5MT)	0	91,552
Production of certified seed	-	44,723
Seed testing and certification	897	906.98
Purchase of seed processing machine	92,187	89,865.75
Purchase of packaging materials	-	15,923.60
Contracting a service provider to brand KL rice seed	8,323	7,961.80
Contracting & Payment of Extension workers	13,554	6,105.52
Procurement of 4 motorcyles	2,147	2,146.69
Establish 20 demo plots( Inputs)	2,783	2,430.32
Conduct 40 field days at green & brown stages for each site	8,111	9,025.59
<b>Total</b>	<b>128,001</b>	<b>273,201</b>

Years	IFDC					Budget Line Charged	Kibimba Group Ltd				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Aquisition of license to produce certified seed							-	-	1,610		
Aquisition of foundation seed (1.5MT)							-	-	227		

Actual cost contribution											
IFDC						Kibimba Group Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Production of certified seed							-	-			
Seed testing and certification							-	-			
Purchase of seed processing machine			45,822.99			Intervention Fund (Cardno)	-	-	38,638.19		
Purchase of packaging materials							-	-			
Contracting a service provider to brand KL rice seed							-	-			
Contracting & Payment of Extension workers			578	11,579		Infrastructure, PPP, and Capacity Building Grant Fund 1.3	-	-	134.17		
Procurement of 4 motorcyces			1,871.10	1,887		Intervention Fund (Cardno)	-	-	1,871.10		
Establish 20 demo plots( Inputs)			176.47	337		Infrastructure, PPP, and Capacity Building Grant Fund	-	-	447.23	478.58	
Conduct 40 field days at green & brown stages for each site				915		Infrastructure, PPP, and Capacity Building Grant Fund	-	-			
<b>Total</b>	-	-	<b>48,448</b>	<b>14,717</b>			-	-	<b>42,927</b>	<b>479</b>	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	63,165	49%
Kibimba Group Ltd	43,406	16%

**IFDC REACH-Uganda Project-Kigezi Farmers Resource Center: Cost Share Report for the Period January 2017 - June 2021;**  
Amounts in Euros

	Budgeted costs	
	IFDC	Kigezi Farmers Resource Center
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and installation of screen house of 144 M <sup>2</sup> based on the specification and design	3265	3,265
Construction of diffused light store of 220 M <sup>2</sup> base on the specifications and design	7587	4,651
Promoting clean quality seed potato through radio talk show	671	671.00
Promoting clean quality seed potato through national agricultural shows	894	447.23
<b>Total</b>	<b>12,418</b>	<b>9,034</b>

Actual cost contribution											
Years	IFDC					Budget Line Charged	Kigezi Farmers Resource Center				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Purchase and installation of screen house of 144 M <sup>2</sup> based on the specification and design			5,376			Intervention Fund (Cardno)			253	620	
Construction of diffused light store of 220 M <sup>2</sup> base on the specifications and design				6,366		Infrastructure, PPP, and Capacity Building Grant Fund				10,158	

Actual cost contribution											
IFDC							Kigezi Farmers Resource Center				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Promoting clean quality seed potato through radio talk show				665	161	1.7					5441
Promoting clean quality seed potato through national agricultural shows			124.23			2	-	-			208.11
<b>Total</b>	-	-	5,500	7,031	161		-	-	253	10,778	5,441

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	12,531	101%
Kigezi Farmers Resource Center	11,031	122%

## IFDC REACH-Uganda Project-Lwoba Holding: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Budgeted costs	
	IFDC	Lwoba Holding
	2017-2021	2017-2021
<b>Activity</b>		
Payment of facilitation to 2 field agents -\$200/Month for 12month	1,959	528
Procurement of 2 motorcycles.	1,073	1,073
Construction of concrete drying yard.	3,696	4,072
Training LH staff in Post-harvest handling	440	440
Conduct meeting to review post-harvest handling	440	440
<b>Total</b>	<b>7,608</b>	<b>6,553</b>

Years	Actual cost contribution										
	IFDC					Budget Line Charged	Lwoba Holding				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
<b>Activity</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>				
Payment of facilitation to 2 field agents -\$200/Month for 12month	-	-	-	1,208	512	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	539	277
Procurement of 2 motorcycles.	-	-	-	972	-	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	1,114	1040
Construction of concrete drying yard.	-	-	-	3,430	230	1.8	-	-	-	3,054	3185

Actual cost contribution											
IFDC						Lwoba Holding					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Training LH staff in Post-harvest handling	-	-		285.00		1.8	-	-	-		7
Conduct meeting to review post-harvest handling	-	-	-	400.00			-	-	-		7
<b>Total</b>	-	-	-	<b>6,295</b>	<b>742</b>		-	-	-	<b>4,707</b>	<b>4,515</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	6,295	83%
Lwoba Holding	4,707	72%

**IFDC REACH-Uganda Project-Maziba Progressive Farmers Resource Center Ltd (MPFRC): Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

	Budgeted costs	
	IFDC	MPFRC
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and Installation Screen Houses	7,786	836
Construction of 134 M <sup>2</sup> diffused light store	7,081	3,688
Promoting Clean Quality Seed	440	440
<b>Total</b>	<b>15,306</b>	<b>4,964</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	MPFRC				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	
Purchase and Installation Screen Houses				8,817		Intervention Fund (Cardno)				1,158	
Construction of 134 M <sup>2</sup> diffused light store				7,789	242	1.7				2,024	646
Promoting Clean Quality Seed											
<b>Total</b>	-	-	-	<b>16,606</b>	<b>242</b>		-	-	-	<b>3,183</b>	<b>646</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	16,606	108%
MPFRC	3,183	64%

## IFDC REACH-Uganda Project-MIFA: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	MIFA
Years	2017-2021	2017-2021
<b>Activity</b>		
Irrigation system design (Conduct feasibility study & design)	528	351.90
Install drip Irrigation system	32,519	300
Train farmers on drip irrigation syetem	1,426	
Farmers sensitized on the whole irrigation syetem (Pipes & drip)	1,320	
Developing sourcing plan	2,199	439.87
Screen House design specification	-	-
Procure and install 2 screen houses	31,781	6,591.68
Conduct training farmers in screen house operation & Mgt	3,959	175.95
Exposure Trip to south west	1,144	175.95
Hire consultant for design & bill of quantities for DLS	528	-
Construct DLS Phase 1	8,998	2,969.12
Construct DLS Phase 2		23,752.97
Hire consultant to design logo for MIFA seed potato	704	
Procure bags with design	704	3,518.96
Procurement of seed		
<b>Total</b>	<b>85,808</b>	<b>38,276</b>

Actual cost contribution											
IFDC							MIFA				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Irrigation system design (Conduct feasibility study & design)	-	528				1.8	335			-	
Install drip Irrigation system	-	12,235	33,061			1.8	2,516			-	
Train farmers on drip irrigation syetem	-	5,268				1.8				-	
Farmers sensitized on the whole irrigation syetem (Pipes & drip)	-									-	
Developing sourcing plan	-		10,465.87							-	
Screen House design specification	-									-	
Procure and install 2 screen houses	-			3,397	461	Intervention Fund (Cardno)			4,625	-	1487
Conduct training farmers in screen house operation & Mgt	-									-	
Exposure Trip to south west	-									-	
Hire consultant for design & bill of quantities for DLS	-		599.04			1.7				-	
Construct DLS Phase 1	-			8,817		1.7				-	
Construct DLS Phase 2	-									-	7375
Hire consultant to design logo for MIFA seed potato	-			665		1.7				-	
Procure bags with design	-										
Procuerement of seed	-			1,323		1.7					
<b>Total</b>	-	<b>18,031</b>	<b>44,126</b>	<b>14,202</b>	<b>461</b>		-	<b>2,852</b>	<b>4,625</b>	-	<b>8,862</b>

<b>Summary</b>	<b>Total contributions amount (Euros)</b>	<b>Percentage of budgeted contribution achieved</b>
IFDC	76,359	89%
MIFA	7,477	20%

## IFDC REACH-Uganda Project-Muyambi William: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Muyambi William
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and installation of screen house	4,070	1,744
Construction of 134 m <sup>2</sup> - Diffused Light store	3068	1,315
Promoting clean quality seed through Radio Talk shows	1,750	1,118
<b>Total</b>	<b>8,888</b>	<b>4,177</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	Muyambi William				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Purchase and installation of screen house				7,762		1.7			-	2,000.00	
Construction of 134 m <sup>2</sup> - Diffused Light store				7,789	161	1.7			-	4,562.65	1,129.03
Promoting clean quality seed through Radio Talk shows											
<b>Total</b>	-	-	6,846	48,699	2,681		-	-	-	6,563	1,129

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	15,713	175%
Muyambi William	6,563	157%

## IFDC REACH-Uganda Project-Namakwaland: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

Years	Budgeted costs	
	IFDC	Namakwaland
Activity	2017-2021	2017-2021
Engage small scale growers to grow potato using modern production method and also buy back their produce		
Produce certified quality seed potato for Ugandan potato growers		16,774
Establishing post harvest facility including cold room to confirm optimum quality standard of seed potato		157,235
Market study of processed potato in Uganda and EAC region.		
Develop Business plan for the farm	4,194	
Monitoring Activities		
Establishing efficient marketing and distribution channels		
Transportation of seed potato		
Purchase seed potato		
Purchase seed potato -Markies Variety		8,797
Purchase of Markies Seed size 2 (9MT)	43,987	
Transportation from Mombasa (FIT)		
Obtain license from Dutch potato propagators to multiply seed potato in Uganda		
Seek approval from MAAIF to produce seed potatoes in Uganda	3,519	
Importation of 52MT Elite seed potato of Market and Taurus	48,386	8,797
Production of seed potato of Dutch potato Varieties In Ug,	0	87,974
Promotional campaign to popularize Dutch seed potato	3,518.96	
purchase & distribution 16MT Dutch potato seed to popularize among farmers	4,750.59	
Connecting Naakwaland Farm on the National electric grid	59,382.42	19,794.14
Construction of metal structure	31,872.09	31,872.09
Purchase of 2 Cold Rooms	92,913.70	
Installation/ Construction of Cold Room		
<b>Total</b>	<b>292,523</b>	<b>331,244</b>

Actual cost contribution											
IFDC							Namakwaland				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)								
Engage small scale growers to grow potato using modern production method and also buy back their produce	1,753						1,836				
Produce certified quality seed potato for Ugandan potato growers	5,328						275,330	34,335			
Establishing post harvest facility including cold room to confirm optimum quality standard of seed potato	1,753						9,178				
Setting up receiving, washing, sorting, drying facilities							27,533				
Setting up bagging facilities							9,178				
Market study of processed potato in Uganda and EAC region.		19,841									
Develop Business plan for the farm		5,635									
Monitoring Activities		221									
Establishing efficient marketing and distribution channels											
Transportation of seed potato				18,750		Intervention Fund (Cardno)					
Purchase seed potato				17,595		Intervention Fund (Cardno)					
Purchase seed potato -Markies Variety											
Purchase of Markies Seed size 2 (9MT)				3,977		Intervention Fund (Cardno)					

Actual cost contribution											
IFDC						Namakwaland					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Transportation from Mombasa (FIT)				3,155		Intervention Fund (Cardno)					
Obtain license from Dutch potato propagators to multiply seed potato in Uganda											
Seek approval from MAAIF to produce seed potatoes in Uganda											
Importation of 52MT Elite seed potato of Market and Taurus						Infrastructure, PPP, and Capacity Building Grant Fund				2,165	
Production of seed potato of Dutch potato Varieties In Ug,						Infrastructure, PPP, and Capacity Building Grant Fund					
Promotional campaign to popularize Dutch seed potato											
purchase & distribution 16MT Dutch potato seed to popularize among farmers											
Connecting Naakwaland Farm on the National electric grid				57,827.60		Infrastructure, PPP, and Capacity Building Grant Fund				19,459.84	
Construction of metal structure										3,098.44	
Purchase of 2 Cold Rooms				29,606.90		Infrastructure, PPP, and Capacity Building Grant Fund					
Installation/ Construction of Cold Room				15,692.30		Infrastructure, PPP, and Capacity Building Grant Fund					
<b>Total</b>	<b>22,572</b>	<b>25,697</b>	<b>-</b>	<b>146,603</b>	<b>-</b>		<b>323,054</b>	<b>36,013</b>	<b>-</b>	<b>32,725</b>	<b>-</b>

<b>Summary</b>	<b>Total contributions amount (Euros)</b>	<b>Percentage of budgeted contribution achieved</b>
IFDC	194,871	48%
Namakwaland	391,793	118%

**IFDC REACH-Uganda Project-National Potato Organisation (NAO): Cost Share Report for the Period January 2017 - June 2021;**  
**Amounts in Euros**

	Budgeted costs	
	IFDC	NAO
Years	2017-2021	2017-2021
Activity		
National Variety Performance Trials		12,398
Clearance and Handling costs for Potato seed Varieties	7,397	
Facilitation for conducting DUS data collection for Dutch potato candidate varieties in Season 2018A -2018/REACH/UGA/066		
NAO- Vehicle hire to S.West and Eastern regions to facilitate tour of Dutch seed companies to NVPTs and harvesting of trials		
Monitoring & supervision-Harvesting of on-farm potato demos in Zombo Zeu parish		
Importation of Planting Materials( seed from Netherland)	794	
Agency fees and handling charges- potato seed (KAZARDI)		
Monitoring & Joint Inspection with Seed companies of NVPT Varieties		
Planting	11,578	4,006
Data Collection and evaluations		6,519
Trail Management	2,376	1,452
<b>Total</b>	<b>22,146</b>	<b>24,374</b>

Actual cost contribution											
IFDC							NAO				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
National Variety Performance Trials	16,894					1.6	10,245	11,348			
Clearance and Handling costs for Potato seed Varieties		2,776				1.6					
Facilitation for conducting DUS data collection for Dutch potato candidate varieties in Season 2018A -2018/REACH/UGA/066		2,732				1.6					
NAO- Vehicle hire to S.West and Eastern regions to facilitate tour of Dutch seed companies to NVPTs and harvesting of trials		863				1.6					
Monitoring & supervision- Harvesting of on-farm potato demos in Zombo Zeu parish		1,730				1.6		1,050			
Importation of Planting Materials( seed from Netherland)				3,831		1.6					
Agency fees and handling charges- potato seed (KAZARDI)				1,444		1.6					
Monitoring & Joint Inspection with Seed companies of NVPT Varieties				6,289		1.6					
Planting										4,006	
Data Collection and evaluations				3,186		1.6				6,519	
Trail Management										1,452	
<b>Total</b>	<b>16,894</b>	<b>8,101</b>	<b>-</b>	<b>14,749</b>	<b>-</b>		<b>10,245</b>	<b>12,398</b>	<b>-</b>	<b>11,977</b>	<b>-</b>

<b>Summary</b>	<b>Total contributions amount (Euros)</b>	<b>Percentage of budgeted contribution achieved</b>
IFDC	39,745	179%
NAO	34,620	142%

**IFDC REACH-Uganda Project-New Bukumbi Coffee Processors Limited (NBC) Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

Years	Budgeted costs	
	IFDC	NBC
	2017-2021	2017-2021
<b>Activity</b>		
Importation & delivery of 26 mt of seed	53,482	0
Training 32 progressive farmers in Potato Agronomy & PHH	750	750
Purchase of crop Insurance	310	310
Linkage meeting and Learning visit of 32 progressive farmers to Namakwaland Farm	750	750
Construction of 120M <sup>2</sup> ambient store with capacity to store 360bags of 100kg	10,800	7,200
Purchase of 1200 potato storage pallets creates	2,340	5,460
<b>Total</b>	<b>68,432</b>	<b>14,470</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	NBC				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)				
Importation & delivery of 26 mt of seed				43,836	49,482	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	208	
Training 32 progressive farmers in Potato Agronomy & PHH				760		Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	2,500	
Purchase of crop Insurance							-	-	-	989	

Actual cost contribution											
IFDC						NBC					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Linkage meeting and Learning visit of 32 progressive farmers to Namakwaland Farm							-	-	-	1,127.83	
Construction of 120M <sup>2</sup> ambient store with capacity to store 360bags of 100kg				16,800	2,271	Infrastructure, PPP, and Capacity Building Grant Fund	-	-	-	14,729.35	4056.589539
Purchase of 1200 potato storage pallets creates							-	-			
<b>Total</b>	-	-	-	<b>61,397</b>	<b>51,752</b>		-	-	-	<b>19,555</b>	<b>4,057</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	113,149	174%
NBC	23,611	81%

## IFDC REACH-Uganda Project-PEARL seed: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	PEARL seed
Years	2017-2021	2017-2021
Activity		
Procure Foundation seed of Witta9 seed	-	1189
Procure foundation seed for newly released variety	-	238
Completion of the housing infrastructure (wall & floor)		70,379
Completion of mechanical dryer		17,595
Seed treatment		1,759
Procure seed processing units	61,582	
Conduct radio talk shows	1,759	
Participate in regional and national agricultural shows	1,759	
Train host farmers ing Good management practices	1,759	
Demonstration plot establishment	1,320	1,320
Conduct 10 brown field days	3,519	
Conduct 10 green field days	3,519	
Clearing processing unit		
Installation and commissioning seed processing units		
<b>Total</b>	<b>75,218</b>	<b>92,479</b>

Actual cost contribution											
IFDC							PEARL seed				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Procure Foundation seed of Witta9 seed	-	-	-				-	-	-	1,297	8,882
Procure foundation seed for newly released variety	-	-	-				-	-	-	288	
Completion of the housing infrastructure (wall & floor)	-	-	-				-	-	-	8,797	5,104
Completion of mechanical dryer	-	-	-				-	-	-		6836
Seed treatment	-	-	-				-	-	-		1694.12463
Procure seed processing units	-	-	-	67,678.37		Intervention Fund (Cardno)	-	-	-		
Conduct radio talk shows	-	-	-				-	-	-		
Participate in regional and national agricultural shows	-	-	-				-	-	-		
Train host farmers ing Good management practices	-	-	-				-	-	-		
Demonstration plot establishment	-	-	-				-	-	-		
Conduct 10 brown field days	-	-	-				-	-	-		
Conduct 10 green field days	-	-	-				-	-	-		
Clearing processing unit	-	-	-				-	-	-	7,918	6,263
Installation and commissioning seed processing units	-	-	-				-	-	-		1,856
<b>Total</b>	-	-	-	<b>67,678</b>	-		-	-	-	<b>18,299</b>	<b>30,634</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	67,678	90%
PEARL seed	18,299	20%

**IFDC REACH-Uganda Project-Psalms Food Industries Ltd: Cost Share Report for the Period January 2017 - June 2021;**  
Amounts in Euros

	Budgeted costs	
	IFDC	Psalms Food Industries Ltd
Years	2017-2021	2017-2021
Activity		
Brand development for Psalms Food Industries Ltd & Hand over of Brand & Branding Manual and Launching new brands	156,365	
Sales Team training		
Study the opportunity of new product development (fortified food)		
Training of farmers in Post-harvest handling and quality management		
Establishment of a potato storage facility (factory-based)		163,618.05
Business Planing		
Product process improvement/processing equipment upgrade		
Market promotional driver for PSALMS		
Disribution Van		
Purchase and installation of fryer		
Purchase and installation of packaging machine		
20% payment for Multi head packing machine 10 head double servo		
Purchase of Capital machinery for food processing industry - 20% payment		
Additional potato Slicer		
Additional potato peeler		
Expansion of factory area from 179m2 to 392m2 (additional)		228,560.82
Market activation of new flavors		
Purchase and installation of packaging machine (additional costs)		52,061.05

	Budgeted costs	
	IFDC	Psalms Food Industries Ltd
Purchase and installation of fryer (additional costs)		
Purchase of computers		
Purchase of Office furniture		
Installation of warehouse storage shelves		
Expansion of board room		
Purchase of distribution van		
Flavor samples and logistics		
Sourcing for flavours		
Upgrade of multi-head ware for the packaging machine		
Purchase of additional backup circular fryer		
Purchase of additional potato slicer (700 Kg/ph)		
Upgrading of fryer to semi-automatic with 3 flavor applicators		
Purchase and installation of machinaries		
Installation of 100KVA generators		28,000.00
Facilitate farmers to grow Taurus Variety		5,405.00
<b>Total</b>	<b>156,365</b>	<b>477,645</b>

Actual cost contribution											
IFDC							Psalms Food Industries Ltd				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Brand development for Psalms Food Industries Ltd & Hand over of Brand & Branding Manual and Launching new brands	0	14,448		0	0	1.4	0	9,113		0	
Sales Team training	0		761	0	0	1.4	0	1,409.04		0	
Study the opportunity of new product development (fortified food)	0	16,732		0	0	Intervention Fund (Cardno)	0			0	
Training of farmers in Post-harvest handling and quality management	0			0	0		0			0	
Establishment of a potato storage facility (factory-based)	0			0	0		0	48,645.48		0	
Business Planing	0	1530.65		0	0	1.2	0			0	
Product process improvement/ processing equipment upgrade	0			0	0		0	35,347.65		0	
Market promotional driver for PSALMS	0			0	0		0	9,710.64		0	
Disribution Van	0			0	0		0	12,972		0	
Purchase and installation of fryer	0		37,567	0	0	Intervention Fund (Cardno)	0			0	
Purchase and installation of packaging machine	0		24,951	0	0	Intervention Fund (Cardno)	0			0	
20% payment for Multi head packing machine 10 head double servo	0		7,129	0	0	Intervention Fund (Cardno)	0			0	

Actual cost contribution											
IFDC						Psalms Food Industries Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)								
Purchase of Capital machinery for food processing industry - 20% payment	0		10,733	0	0	Intervention Fund (Cardno)	0			0	
Additional potato Slicer	0			0	0		0		4,769	0	
Additional potato peeler	0			0	0		0		4,769	0	
Expansion of factory area from 179m2 to 392m2 (additional)	0			0	0		0		205,122	0	
Market activation of new flavors	0			0	0		0		8,710	0	
Purchase and installation of packaging machine (additional costs)	0			0	0		0		13,591	0	
Purchase and installation of fryer (additional costs)	0			0	0		0		45,826	0	
Purchase of computers	0			0	0		0		2,055	0	
Purchase of Office furniture	0			0	0		0		3,208	0	
Installation of warehouse storage shelves	0			0	0		0		1,910	0	
Expansion of board room	0			0	0		0		10,637	0	
Purchase of distribution van	0			0	0		0		23,207	0	
Flavor samples and logistics	0			0	0		0		1,088	0	
Sourcing for flavours	0			0	0		0		699	0	
Upgrade of multi-head ware for the packaging machine	0			0	0		0		2,266	0	208.11

Actual cost contribution											
IFDC							Psalms Food Industries Ltd				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Purchase of additional backup circular fryer	0			0	0		0		7,648	0	
Purchase of additional potato slicer (700 Kg/ph)	0			0	0		0		3,757	0	
Upgrading of fryer to semi-automatic with 3 flavor applicators	0			0	0		0		11,628	0	1,026.02
Purchase and installation of machinaries	0			0	0		0		39,356	0	
Installation of 100KVA generators	0			0	0		0			0	1,234
Facilitate farmers to grow Taurus Variety	0			0	0		0			0	
<b>Total</b>	-	<b>32,711</b>	<b>81,142</b>	-	-		-	<b>117,199</b>	<b>390,246</b>	-	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	113,853	73%
Psalms Food Industries Ltd	507,445	106%

## IFDC REACH-Uganda Project-SOLAR NOW: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	SOLAR NOW
<b>Years</b>	2017-2021	2017-2021
<b>Activity</b>		
Identify about 10 farmers from which to select 5 host farmers for the Demonstrations		
Visit the farmers to discuss the idea of establishing a demonstration for irrigation at their farms and how these will be funded		
Train farmers in solar powered irrigation	6,583	
Lay the 1 <sup>st</sup> solar powered irrigation kit and plant the crops.		
Cost share on irrigation pumps		1,635
<b>Total</b>	<b>6,583</b>	<b>1,635</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	SOLAR NOW				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>				
Identify about 10 farmers from which to select 5 host farmers for the Demonstrations	-	-	-	-	-		-		-	-	
Visit the farmers to discuss the idea of establishing a demonstration for irrigation at their farms and how these will be funded	-		-	-	-		-	171.94	-	-	

Actual cost contribution											
IFDC						SOLAR NOW					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Train farmers in solar powered irrigation	-	2,705	-	-	-	1.4	-	361	-	-	
Lay the 1 <sup>st</sup> solar powered irrigation kit and plant the crops.	-	-	-	-	-		-	348	-	-	
Cost share on irrigation pumps	-	-	-	-	-		-	755	-	-	
<b>Total</b>	<b>-</b>	<b>2,705</b>	<b>-</b>	<b>-</b>	<b>-</b>		<b>-</b>	<b>1,636</b>	<b>-</b>	<b>-</b>	<b>-</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	2,705	41%
SOLAR NOW	1,636	100%

**IFDC REACH-Uganda Project-ST Richard Group of companies: Cost Share Report for the Period January 2017 - June 2021;**  
Amounts in Euros

Years	Budgeted costs	
	IFDC	ST Richard Group of companies
	2017-2021	2017-2021
<b>Activity</b>		
Expansion of drying yard	0	14,021
Purchase of moisture meters (3pcs of Moisture meters for St Richards Group of companies)	805	-
Training of Village Agents In PHH	362	324
Improvement of the building for milling machine	-	18,131
Purchase of multi stage milling machine	25,672	22,361
<b>Total</b>	<b>26,839</b>	<b>54,837</b>

Years	Actual cost contribution										
	IFDC					Budget Line Charged	ST Richard Group of companies				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
<b>Activity</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>		<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>	<b>Amt (Euros)</b>
Expansion of drying yard											37,913.58
Purchase of moisture meters			1,233		-	Infrastructure, PPP, and Capacity Building Grant Fund					
Training of Village Agents In PHH				260.00	-	2.2					

Actual cost contribution											
IFDC							ST Richard Group of companies				
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Improvement of the building for milling machine					-					5,187.82	
Purchase of multi stage milling machine			25,672		-	Intervention Fund (Cardno)					
<b>Total</b>	-	-	26,905	260	-		-	-	37,914	5,188	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	27,165	101%
ST Richard Group of companies	43,101	79%

## IFDC REACH-Uganda Project-SWT Tanners Ltd: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	SWT Tanners Ltd
Years	2017-2021	2017-2021
Activity		
Training FGs	25413	-
Training Farmer Business Groups(FBGs)		-
Soil and Land Suitability Assessment for Commercial Irrigated-Rice Production in Eastern Uganda		
Business trip to SWT with leaders		
Setting up modern rice processing facilities in Kampala		852,147
Condition assessment of the road		
Supply of Culvert Pipes		
Quality Assurance supervision of construction work of a 5.2 km road in Bulambuli district.	238,148	
Quality Assurance for IFDC rehabilitation project in Bulambuli		
Airfare for Syed Tasadduq, Syed Ijaz and Syed Imran SWT DCA Al Quds Tours and Travel		
Reimbursement of cost incurred in constructing Nalondo-Buriano Road		
Procurement of Land		3,551,691
General and Topographical survey of the land		
Developing master plan( Consultancy fees)		
Develop Business plan( Consultancy fees)		
Construction of access road (phase I 5km)		
Construction of Access Road Phase II (12km)	163,632	131,961
Construction of Farm Building		844,550
Construction of H2Q Channel with In the Field	4,399	181,812

	Budgeted costs	
	IFDC	SWT Tanners Ltd
Installation of Auto Clean	65,980	131,961
Procurement of Selected Items		2,666,711
Procurement of Paddy from Farmers		
Farmer group training on GAP & PHH	5,278	
<b>Total</b>	<b>502,851</b>	<b>8,360,832</b>

Actual cost contribution											
Years	IFDC					Budget Line Charged	SWT Tanners Ltd				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)				
Training FGs		3961.00		0.0	0.0						
Training Farmer Business Groups(FBGs)		1,957.05			0.0	2.1					
Soil and Land Suitability Assessment for Commercial Irrigated-Rice Production in Eastern Uganda		4,408			0.0	1.4					
Business trip to SWT with leaders		236			0.0	2.1		419			
Setting up modern rice processing facilities in Kampala					0.0			858,844			
Condition assessment of the road			1,789		0.0	Infrastructure, PPP, and Capacity Building Grant Fund					
Supply of Culvert Pipes			34,115		0.0	Infrastructure, PPP, and Capacity Building Grant Fund					

Actual cost contribution											
IFDC						SWT Tanners Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)								
Quality Assurance supervision of construction work of a 5.2 km road in Bulambuli district.			3,990		0.0	Infrastructure, PPP, and Capacity Building Grant Fund					
Quality Assurance for IFDC rehabilitation project in Bulambuli			2,117		0.0	Infrastructure, PPP, and Capacity Building Grant Fund					
Airfare for Syed Tasadduq, Syed Ijaz and Syed Imran SWT DCA Al Quds Tours and Travel			2,190		0.0	Intervention Fund (Cardno)					
Reimbursement of cost incurred in constructing Nalondo-Buriano Road			55,793		0.0	Infrastructure, PPP, and Capacity Building Grant Fund					
Procurement of Land					0.0				1,588,775		
General and Topographical survey of the land					0.0				7,252		
Developing master plan( Consultancy fees)					0.0				894		
Develop Business plan( Consultancy fees)					0.0				1,469		
Construction of access road (phase I 5km)					0.0				196,757		
Construction of Access Road Pharse II (12km)				6,384	0.0	Infrastructure, PPP, and Capacity Building Grant Fund				130,054	
Construction of Farm Building					0.0					65,259	
Construction of H2Q Channel with In the Field					0.0					96,628	
Installation of Auto Clean					0.0						

Actual cost contribution											
IFDC						SWT Tanners Ltd					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)		Amt (Euros)								
Procurement of Selected Items					0.0					617,087	
Procurement of Paddy from Farmers					0.0					385,343	
Farmer group training on GAP & PHH					0.0						
<b>Total</b>	-	10,562	99,993	6,384	-		-	859,264	1,795,149	1,294,371	-

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	116,940	23%
SWT Tanners Ltd	3,948,784	47%

**IFDC REACH-Uganda Project-The Micro Finance Support Centre Limited (MSC): Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros**

	Budgeted costs	
	IFDC	MSC
Years	2017-2021	2017-2021
<b>Activity</b>		
Payment of 3 Agricultural Loans Offices	9,501	
Payment of 1 Agricultural Loans Offices		3,167
Procurement of 2 Motorcycles	2,140	
Procurement of 2 Motorcycles		2,140
Procurement of 2 desktop computers	951	
Procurement of 2 desktop computers		951
Conduct training of 30 CEWs in Eastern UG.	1,847	1,847
Hold joint introductory meeting	880	-
<b>Total</b>	<b>15,319</b>	<b>8,105</b>

Activity	Actual cost contribution										
	IFDC					Budget Line Charged	MSC				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Years	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	
Payment of 3 Agricultural Loans Offices	-	-	-	3,447	-	1.3	-	-	-	-	
Payment of 1 Agricultural Loans Offices	-	-	-	-	-		-	-	-	1,275	
Procurement of 2 Motorcycles	-	-	-	2,042.01	-	Intervention Fund (Cardno)	-	-	-	2,159	

Actual cost contribution											
IFDC						MSC					
Years	2017	2018	2019	2020	2021	Budget Line Charged	2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Procurement of 2 Motorcycles	-	-	-	-	-		-	-	-		
Procurement of 2 desktop computers	-	-	-	-	-		-	-	-		
Procurement of 2 desktop computers	-	-	-	-	-		-	-	-	1,056.57	
Conduct training of 30 CEWs in Eastern UG.	-	-	-	420.00	-	1.8	-	-	-	2,077.07	
Hold joint introductory meeting	-	-	-	394.12	-	1.4	-	-	-		
<b>Total</b>	-	-	-	<b>6,303</b>	-		-	-	-	<b>6,567.26</b>	

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	6,303	41%
MSC	-	0%

## IFDC REACH-Uganda Project-Welische Stephen: Cost Share Report for the Period January 2017 - June 2021; Amounts in Euros

	Budgeted costs	
	IFDC	Welische Stephen
Years	2017-2021	2017-2021
<b>Activity</b>		
Purchase and install screen House	5,454	950
Sourcing of approx 1700 plantlests	-	570
Construction of 90M <sup>2</sup> Diffused Light store	6,162	4,108
Promoting quality seed	500	500
<b>Total</b>	<b>12,116</b>	<b>6,128</b>

Actual cost contribution											
Years	IFDC					Budget Line Charged	Welische Stephen				
	2017	2018	2019	2020	2021		2017	2018	2019	2020	2021
Activity	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)		Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)	Amt (Euros)
Purchase and install screen House				5,285	2,372	Intervention Fund (Cardno)				735	
Sourcing of approx 1700 plantlests											
Construction of 90M <sup>2</sup> Diffused Light store				7,805.57	666.73	1.7			849	2,798	
Promoting quality seed											
<b>Total</b>	-	-	-	<b>13,091</b>	<b>3,039</b>		-	-	-	<b>1,584</b>	<b>2,798</b>

Summary	Total contributions amount (Euros)	Percentage of budgeted contribution achieved
IFDC	13,091	108%
Welische Stephen	1,584	26%

## Annex 12: List of Partners and Contacts

No.	Partner Name	CEO/Owner	Contacts
1	AGROMAX (U) LTD	Roni Oved Joseph	Tel: + 256414666030/756622464 Email: ronyjo@agromaxug.com
2	BITAMBA ENTERPRISES (BITAMBA)	Fabiano Bitambabeize	Tel: +256 753099864
3	BYAMPA ENTERPRISES (BYAMPA)	Byampangi Maudah	Tel: +256703750944/788873800 Email: byampangi@gmail.com
4	CHEMONGES STEPHEN	Chemonges Stephen	Tel: +256776853773
5	CKB CLEAN & QUALITY SEED POTATO PRODUCTION ENTERPRISE (CKB)	Charles K Byarugaba	Tel: +256758952460 Email: charlesbyarugaba@gmail.com
6	CLARKE FARM	Dr. Ian Clarke	Email: ian@clarke-group.org
7	DINERS' GROUP LIMITED (DGL)	Muhammed Sekatawa	Tel: 0414-661540 Mob: +256 706547269 Email: respsup609@gmail.com Email: muhammed@rs ltd.c.ug
8	FICA	Narcis T Tumushabe	Mob: +256772980233 Email: narcis2005@gmail.com
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