



Ministry of Foreign Affairs

Potato Roadmap Uganda 2021

Commissioned by the Netherlands Enterprise Agency

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2021

POTATO

Roadmap for Uganda

Delphy and IFDC-UGANDA



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Abbreviations

RVO	Dutch Enterprise Agency (Rijksdienst Voor Ondernemend Nederland)
UNSPPA	Uganda National Seed Potato Producers Association
EAC	East African Community (trading block comprising of Kenya, Tanzania, Rwanda, Burundi, and South Sudan)
NSCS	National Seed Certification Services
DCIC	Department of Crop Inspection and Certification
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
PVP	Plant Variety Protection
PPH	Plant Protection and Health
UPOV	International Union for the Protection of New Varieties of Plants
PVPA	Plant Variety Protection Act
ARIPO	African Regional Intellectual Property Organization
IP	Intellectual Property
NPT/NPTs	National Performance Trials
NARO	National Agricultural Research Organization
DUS	Distinctness, Uniformity and Stability (of a variety)
NVRC	National Variety Release Committee (department for MAAIF)
COMESA	Common Market for Eastern and Southern Africa

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- UNADA** Uganda National Agro-input Dealers Association
- NAADS** National Agricultural Advisory Services
- FNS** Food and Nutrition Security (the Netherlands development policy)
- SDGP** Sustainable Development Goals Partnerships (program of RVO)
- VCU** Value for cultivation or use (VCU) of agricultural crops (a procedure)
- SHOS** Screen House Owners' Association
- ASARECA** Association for Strengthening Agricultural Research in Eastern and Central Africa
- NSO** Netherlands Space Office



Introduction

The document aims to provide a clear overview of the possible interventions, trade linkages, and (business) opportunities that could be interesting for stakeholders in the (Ugandan) potato value chain. This document focuses on assessing the Ugandan potato value chain for the potential market linkages, potential value addition, and potential introduction of improved agricultural practices and post-harvest handling. It gives an overview of the current situation of the potato sector in Uganda, maps the value chain actors, activities, and geographical spread. This document will provide the dynamics between the demand and supply side. It gives information about the logistics, standards, certification system (laws and regulations) and will identify investment opportunities and possible business partners within Uganda's potato sector. The document provides clear business opportunities and recommendations for follow up with RVO instruments.

Concluding: the potato roadmap aims to provide a hollistic overview of the current challenges and opportunities in the potato sector in Uganda.



Summary

General potato market

Below the highlights and characteristics of the sector:

- ♣ The national potato production was estimated at 327,300 MT from an estimated area of 111,100 Hectares (Ha).
- ♣ Potato production generally increased from 155,000 MT in 2005/06 to 327,000 MT in 2018 (UBOS, 2018) which could have been attributed to increased land under production. The area of an average smallholder farm is estimated to 0.97ha, while other farms have an average area of 5.74 ha. At the national level the average farm size is 1.51 ha.
- ♣ Alternative staple crops for potatoes are currently cassava, sweet potato, maize and beans, and rice.
- ♣ Potato is becoming ever more competitive because of the relatively high gross profit.
- ♣ More than 2,300 agro-dealers registered in Uganda
- ♣ Most of the produced basic seed (75%) is supplied by the Uganda National Seed Potato Producers Association (UNSPPA).
- ♣ The use of home-saved seed of low yielding varieties, the application of poor management practices, the little attention farmers pay to product quality, water restrictions, soil exhaustion and the prevalence of viruses and diseases like late blight and bacterial wilt are major production challenges.
- ♣ Potato processing in Uganda is still at a basic scale with only a limited range of processed products. Ware potatoes are processed in only chips and crisps.

Linking the complete potato value chain offers promising opportunities

Uganda already has several advantages related to the potato sector. Six private mini tuber seed producers are active but are not able to fully match the demand in the market. Importing high quality seed potatoes is possible, however, this comes with very strict regulations. The registration of new varieties is possible but takes time and approving and introduction of new varieties is not always directly related to performance. Unfortunately, the official protection of new potato varieties is not properly organised (breeders rights).

The first presence of large-scale farmers starting to grow potatoes can be seen. It is paramount for the development of the sector to grow and/or multiply (seed) potatoes in a professional way scales up the capacity and availability of high quality (seed) potatoes for the different markets. The climate, altitude, availability of water, and (volcanic) soils are promising and

provide ideal circumstances for high quality potato farming Unfortunately, crop rotation is still not applied much at small scale farmer level. The first improved varieties are already available for farmers in Uganda with good results.

A variety of information sources (public extension, private extension, farmer group, trader) are available, but not always easily assessable for farmers. Farmer's organisations need to take the lead in rolling this out and can play a pivotal role. This can also be an opportunity for women's Sacco's involved in potato farming to professionalize their operations.

Linking the complete potato value chain offers promising opportunities. A better mutual understanding between all the actors (including government bodies), allows making impact steps to improve the entire value chain.

Opportunities for the Netherlands and Uganda

Uganda could provide promising opportunities for both Dutch and Ugandan companies in the potato sector. Setting up the potato value chain more professionally with the help of Dutch knowledge and Ugandan involvement will help to give smallholder farmers a better insight in the value chain. We anticipate that this can benefit small holder farmers, for example by securing a ready market. Bunding of the small holder farmers is important. Trading with the individual is impossible.

The Dutch varieties can offer the local farmer a lot of advantages: better resistance against pests and diseases, cleaner seed potatoes, better performance. Good and proper short-term storage is a challenge. (Night) Temperatures are too high to stall them just in a shed. For a constant and consistent supply of potatoes, it's necessary to build proper storage facilities.

It's important to continuously weigh up the different impacts of mini tubers related to imported seed potatoes-Building up a new variety with mini tubers will cost considerable amounts of time and costs are steep. Further to this, it also comes with high risks every multiplication step-Importing high quality seed potato is costly the first season but can build up quicker and gives normally better yields.

It would be a big advantage to review the registration process and regulation on a number of new varieties. Capacity building interventions need to be paired with the introduction of new varieties, combined with an improved knowledge of good agricultural practices and potato farming in general. Otherwise, it will only be a matter of time before the quality of the newly released varieties will deteriorate.

Involvement Dutch government

Entering the potato sector in Uganda seems to be challenging. The market is big, the opportunities seem promising. Still, most of the Dutch stakeholders in the potato value chain are not very active in Uganda. The Dutch government can assist with interventions to attract Dutch companies to enter the Ugandan potato value chain. The Netherlands can help the Ugandan potato value chain tremendously with their (potato) knowledge. With the help of the Dutch government, we can play an instrumental role in the following areas:

- ❖ Setting up a professional quality system for certified seeds through the help of NAK AGRO
- ❖ Using the enormous knowledge in the sector to train the extension services, so the extension services can train the farmers about applying good agricultural practices
- ❖ (Lobby for) quality research for diseases and soil. Growing potatoes without crop rotation will give soil related diseases. The Netherlands can assist and train local people to set up a mapping of soils and their characteristics
- ❖ Storage skills when storage locations are there
- ❖ Strengthen and expand a professional potato value chain with needs for high quality inputs for processors and assist in a plan to put added value to the potatoes, for example through cooperation.

The Help of the Dutch government and the embassy is necessary. Most Dutch companies at this moment, are not focusing on Uganda completely, due to the struggles there are.

Setting up programs to stimulate Dutch involvement in the sector will be a stimulus for the Ugandan potato sector to develop and to see the results of that development quickly, as well as an incentive for Dutch potato companies to enter the Ugandan market and have the possibility to set-up a sustainable way of doing business without directly have big losses if processes need to be improved.

Professional quality system

Train the farmers about applying good agricultural practises 

 **Quality research** for diseases and soil

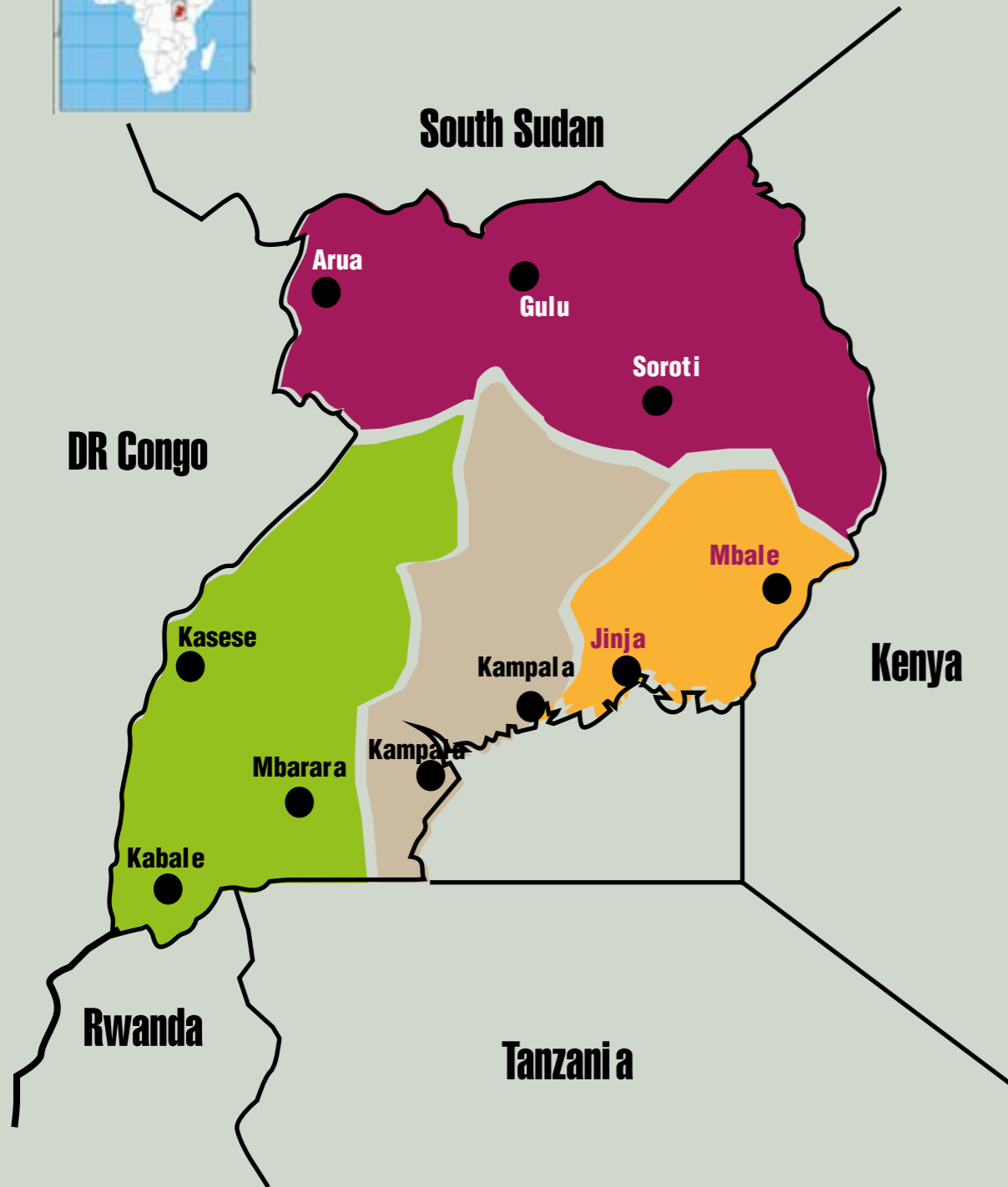
Storage skills 

 **Strengthen and expand** high quality inputs for processors and value to the potatoes through cooperation's.



Uganda Country Profile





Uganda Country Profile

The Republic of Uganda is a landlocked country in East-Central Africa. It is bordered by Kenya, South Sudan, the Democratic Republic of the Congo, Rwanda, and by Tanzania.

While being part of two unstable regions: The Great Lakes and the Horn of Africa, Uganda enjoys relative political stability and is an important player in both areas.

Climate and Natural resources

The climate is generally tropical and rainy with two dry seasons (December to February, June to August) a with semi-arid climate in north Eastern.

The country has access to important sources of fresh water. The southern part of the country includes a substantial portion of **Lake Victoria**, the world's largest tropical lake and the second largest freshwater lake which is shared among three countries: Kenya, Tanzania, and Uganda. Besides, the country also includes part of the **Nile** basin.

Uganda is particularly sensitive to the effects of climate change and extreme weather events. Stress on the ground and surface water resources will likely increase overtime, with more frequent and severe droughts negatively impacting water supply and crop and livestock production. However, new technologies, innovations, and sources of finance are beginning to contribute to greener growth and more climate-resilient economic development.

People and Society

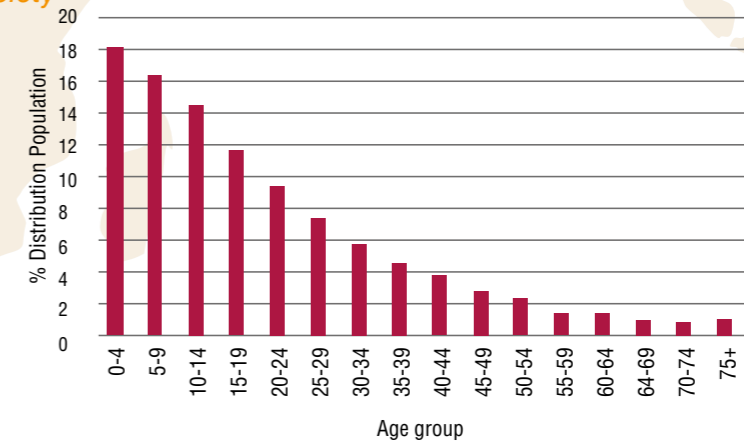
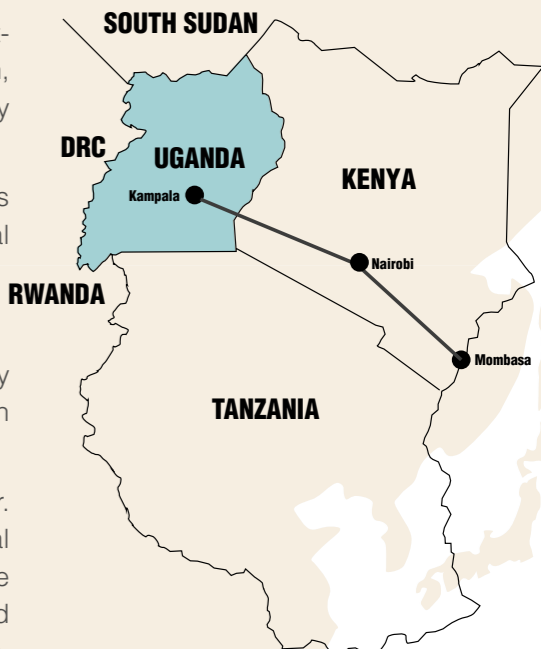


FIGURE 1:

DISTRIBUTION OF THE UGANDAN POPULATION BASED ON AGE GROUP. SOURCE: UGANDA BUREAU OF STATISTICS 2016, THE NATIONAL POPULATION AND HOUSING CENSUS 2014 – MAIN REPORT, KAMPALA, UGANDA.



The majority of the population is concentrated in the central and southern parts of the country, particularly along the shores of Lake Victoria and Lake Albert; the northeast is least populated. Population density is relatively high in comparison to other African nations and 25% of the people live in urban area. The rate of urbanization is estimated at 5.7% annually. English is the main official language, which is taught in schools, used in courts of law and most newspapers. Ganda (or Luganda) language is used most often in the capital. Further Swahili is also widely spoken.

Youth (<25 years) accounts for about two thirds of the total population. This group has high unemployment rates of about 15%. Unemployment is higher for women than for men.

Economy

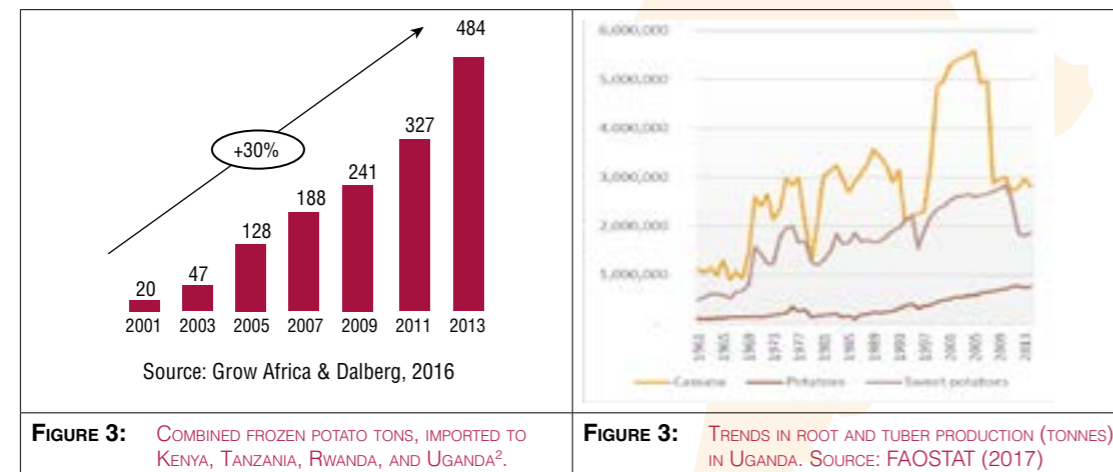
Uganda has substantial natural resources, including fertile soils, regular rainfall, substantial reserves of recoverable oil, and small deposits of copper, gold, and other minerals.

Agriculture is one of the most important sectors of the economy, employing 72% of the work force. The sector contributes around 23 percent to annual GDP, making agricultural growth a promising mean out of poverty. The country's export market suffered a major slump following the outbreak of conflict in South Sudan, but has recovered lately, largely due to record coffee harvests (16% of exports) and increasing gold exports (10% of exports). There is a small industrial sector that is dependent on imported inputs such as refined oil and heavy equipment.

Uganda is an active member of the East African Community (EAC), a trading block comprising of Kenya, Tanzania, Rwanda, Burundi, and South Sudan. The EAC has a total market size of 168 million consumers. The EAC had a robust economic growth rate of 5.9%. In 2017, the East African Community remained the main destination for Uganda exports, followed by European Union. However, China is also becoming an ever more relevant trading partner and it is expected that economic ties with China will probably be strengthened further as Western partners are often perceived as cumbersome with their attention to good governance and corruption¹.

The Potato Perspective

An expanding market



The Potato is an important food security and cash crop for African smallholder farmers with limited options in rural areas. In Africa, it is among the five fastest expanding food crops as its production has more than doubled over the past 20 years. Especially in Eastern Africa demand is currently outgrowing the supply due to growing population, changing consumer trends and increased purchasing power of the middle class². Uganda is no exception to this trend, presenting a gradual but steady increase in production (Figure 3). The market for potatoes is currently very dynamic. The bulk of the potato yields used to be sold as ware potato and eaten as boiled vegetables, but recently the introduction of urban takeaway, fast food restaurants have increased consumption of processed potato.

Factors contributing to the increasing demand for potato chips in Uganda are changing consumers' taste towards value added products, rejuvenation of the urban population, increasing tourism industry, affordable prices of chips and increasing income of urban population promoting the consumption of higher-value processed potato products.

Potato facts

- Product growth typically goes paired with expansion in the area of land farmed rather than by intensifying their activity or by tackling productivity constraints. The area under production has increased steadily over the years, principally under smallholder production systems, which are characterized by small land parcels of 0.25 to 5 ha and a low productivity⁴.
- The national potato production was estimated at 327,300 MT from an estimated area of 111,100 Hectares (Ha). Potato production generally increased from 155,000 MT in 2005/06 to 327,000 MT in 2018 (UBOS, 2018) which could have been attributed to increased land under production.

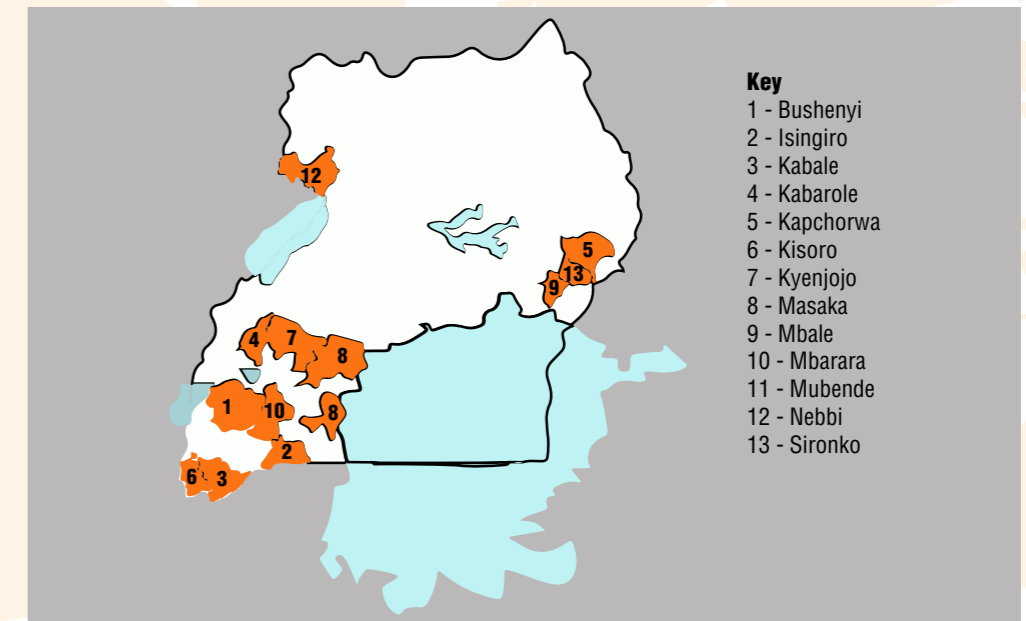
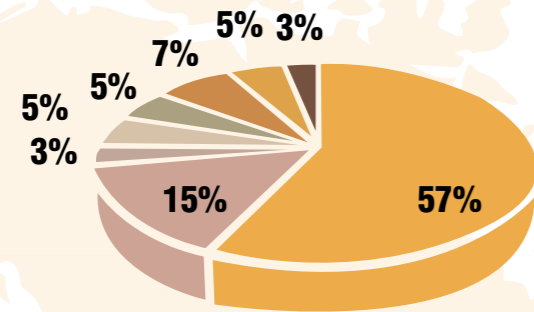


FIGURE 5: MAIN POTATO PRODUCING DISTRICTS

Uganda Potato production by District (2001)



- Kabale
- Kisoro
- Mbarara
- Luwero
- Masaka
- Mbale
- Rukungiri
- Kapchorwa

FIGURE 5: UGANDAN POTATO PRODUCTION BY DISTRICT IN 2001

A few districts are the source of most potatoes produced (Figure 4 and 5)

Smallholder farmers account for 89% of all Ugandan farmers and deliver up to 80 percent of the annual total agricultural output. The area of an average smallholder farm is estimated to 0.97ha, while other farms have an average area of 5.74 ha. At the national level the average farm size is 1.51 ha⁶.

- ♣ Uganda has the lowest productivity and production in the EAC region. Farmers’ efforts have been hampered by minimal seed quality, old varieties, old agricultural methods and minimum fertilizer and crop protection use, in addition to susceptibility to late blight and other diseases. While the global average amounts to 30-40 MT/ha the Ugandan average yields are reported to be between 5 and 6.5 MT/ha ^{2,7}
- ♣ In Uganda, potato farmers have generally 2 growing seasons (season A from March to July and season B from September to January) in which roughly an equal amount of potatoes are produced (Figure 6) ⁴.

DISTRICTS	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEPT	OCT	NOV	DEC
KISORO AND MBARARA	HARVEST	PLANTING		HARVEST					PLANTING			HARVEST
MBALE AND KAPCHORWA			PLANTING			HARVEST		PLANTING				HARVEST

FIGURE 6: POTATO PRODUCTION CALENDAR IN THE DISTRICTS OF KISORO, MBARARA, MBALE AND KAPCHORWA ⁴



- ♣ In Uganda, the best quality varieties are Victoria and Rutuku for chips or French fries and Kachpot1 and Rwangume for crisps. These are mostly grown in the Western region in Uganda and to a lesser extent in Eastern Uganda. Farmers have access to a wide range of local and improved varieties. Kachpot1 and Rwangume are the most recently released varieties from the research stations. Victoria is the most marketable variety²,
- ♣ Alternative staple crops for potato are cassava, sweet potato, maize and beans and rice. Potato is becoming ever more competitive compared to these other crops because of the relatively high gross profit. Studies confirmed a shift towards increased potato consumption over traditional staple food like maize and cassava⁴.
- ♣ The gross profit margin/ha of ware potato production ranges from 17% to 77% with a return on investment ranging from 21% to
- ♣ 343% depending on the local production costs and market prices. In general, profitability is higher for seed potato production than for ware potato^{4,8} and consequently the incomes of population dependent on potato production in Kigezi sub-region. The low yields are largely driven by non-adoption of productivity enhancing technologies -fertilizer, improved seed (varieties), and agro chemicals. Estimates from IITA agronomic survey data indicate that use of high quality seed with fertilizer increases potato yield from 6.4 MT per hectare to 16.5 MT per hectare, which leads to an increase in potato production, at national level, by ca 257% in produce and by the same market also as income of a farmer.



Analyses of laws and regulations



Analyses of laws and regulations

National Seed Certification Services (NSCS) is one of the three divisions under the Department of Crop Inspection and Certification (DCIC) of the Ministry of Agriculture Animal Industry and Fisheries (MAAIF).

NSCS is mandated by law to control quality assurance and is charged with regulatory services for seeds and planting materials right from plant breeding (variety development) all through, variety release, multiplication, and distribution.

Legal instruments for Uganda's Agriculture Sector

1. Plant Variety Protection (PVP) Act of 2014

An Act to provide for the promotion of the development of new plant varieties and their protection as a means of enhancing breeders innovations and rewards through granting of plant breeders' rights and for other related matters. Besides protection for foreign varieties an important body to secure the protection of international varieties. An good operational functioning body as PVP would help to get attention of seed potato companies to multiply in Uganda. The act is unfortunately not yet (fully) operational in Uganda (Kakoza A 2019) but working towards its operationalisation.

- ♣ Office being established
- ♣ Team in place to do examine of varieties.

2. Plant Protection and Health (PPH) Act 2016

A new version of the PVP 2014 addressing; the movement of germplasm and phytosanitary issues in the control of crop pests and diseases. The act is to consolidate and reform the law relating to protection of plants against destructive diseases, pests and weeds, to prevent the introduction and spread of harmful organisms that may adversely affect Uganda's Agriculture, the natural environment and livelihood of the people, to ensure sustainable plant and environmental protection (Plant protection and health act, 2015). Besides it need to stimulate the introduction of new plants in accordance with international commitments on plant protection.

Status of Uganda's membership to International Union for Protection of New Varieties of Plants (UPOV)

The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization with headquarters in Geneva (Switzerland). Its mission is to provide and promote an effective system of plant variety protection, to encourage the development of new varieties of plants, for the benefit of society.

In the bid for Uganda to conform to UPOV, the Plant Variety Protection Act (PVPA) came into law in June 2014. Generally, the Act gives due recognition to the public rights of local community breeders, particularly those associated with traditional breeding methods. Overall, it does not affect traditional or local community-based practices but extends its applicability to plant varieties, derivatives of the plant varieties, plant breeders, and export of seeds of plant varieties (PVPA 2014, s 1).

Under Section 33(1)(b) of the PVPA, an application of Plant Breeders' rights is granted where the plant variety is new (sec. 23), distinct (sec. 24), uniform (sec. 25), and stable (sec. 26). This is in harmony with Article 5(1) of the International Convention for the Protection of New Varieties of Plants (UPOV).

Additionally, Uganda is a member of the **African Regional Intellectual Property Organization (ARIPO)** under the Arusha Protocol for the protection of New Varieties of Plants signed on the 6th July 2015, as a regional PVP regime with a purpose of pooling resources together for development, promotion, and harmonization of Intellectual Property (IP) laws and policies (Sikinyi, E., 2016). Membership is dependent on the possession of legal instruments in place such as the PVP and PPH acts.

This Protocol is modeled along with the latest principles of UPOV in 1991. For breeders over the world (including seed potato companies) an important organization to protect their varieties by having it registered through UPOV. Unfortunately it doesn't give a lot added value of better inputs of indigenous farming communities, particularly the traditional rights for farmers to save, exchange or sell farm-saved seeds.

Therefore, member countries of ARIPO can implement principles like those of UPOV in their own countries.

Introduction and evaluation and release of new varieties

- i. Introduction of new materials/varieties whose origin or health status are not known must undergo phytosanitary tests to check for possible quarantine diseases and pest infestation. Furthermore they must undergo evaluation under National Performance Trials (NPTs) by a government institution mandated to undertake agricultural research, the National Agricultural Research Organization (NARO) for at least three (3) seasons, the third season being for checking/verification of the consistency of results for adaptability to agro-ecological condition, yield, disease and pests tolerance and other environmental stresses, and any other attribute deemed of interest against the local check varieties.

Additionally, the NSCS of MAAIF is mandated to test the varieties being introduced for, Distinctness, Uniformity, and Stability (DUS) for at least 3 seasons.

- ii. Variety release process

Variety release is the role of the National Variety Release Committee (NVRC) of MAAIF, which convenes at specific periods in a year.

NARO applies to the NVRC for the release of the varieties evaluated with data for both NPTs and DUS tests by NSCS.

The NVRC reviews varieties against local check variety and upon satisfactory performance, the variety is released for commercial utilization. The variety/varieties are registered in the National Variety register or variety list with all the information about to it.

a. Provisions

Uganda is member of COMESA. Under the COMESA Protocols, a variety released in more than one member countries will theoretical undergo a quicker process of registration. They only need a process of one season evaluation provided supporting data (both NPTs and DUS data) from the countries where it was released is shared for validation. Such strategy through harmonization of regional integration protocols will help to avoid duplication of work and reduce the evaluation period for varieties which will only take one season than the anticipated three seasons (more than 1.5 years) consequently will facilitate quick movement and access of germplasm within the region. (SOURCE: NSCS team interview). Read more about COMESA further in this report.

b. Gazetting of released varieties

This is a ministerial announcement of the released varieties in the press, which is normally not done in Uganda. Instead, the released varieties are registered on a **National Variety list** with all their related information but the NVRC is working in the same direction towards gazetting of released varieties.

Challenges of the potato sector as perceived by NSCS

- ♣ Unclear seed system with no defined roles by actors, no clear guidelines for the system. To be effective and efficient, the system should be a private Sector-led seed system focusing on production and supply large quantities of quality seed.
- ♣ Poor attitudes towards the use of quality seed potato. Most farmers perceive quality seed to be inferior with less performance compared to their home-save seed.
- ♣ Minimal Government investment in the potato sector, which has left the sector underdeveloped.
- ♣ Inadequate supply of planting materials to farmers which affects the supply of seed and ware potatoes to other chain levels such as value addition and processing.
- ♣ Increased diseased materials due to lack of clearly defined guidelines in the seed system that allows everyone to get engaged in seed production without proper management practices under the disguise of ware potato.





Opportunities of the potato sector as perceived by NSCS

- ♣ There is increased demand for potato and potato processed products due to the increasing population.
- ♣ There is a low disease and pest surveillance compared to other countries such as the potato cyst nematodes recently introduced in the region.
- ♣ The Ugandan potato sector has a comparative advantage to production in the region due to fertile soils and conducive climatic conditions.

Interventions/improvements needed

- ♣ Development of guidelines for inspection and certification of vegetatively propagated materials. Guidelines for grains and pulses were already made on the premise of need and returns on investment of the crops.
- ♣ Development of certification labels for identification and differentiation of different seed classes.
- ♣ Building capacity of the private sector to invest in production and marketing, promotion of potato and potato products as a way of awareness creation to stimulate demand.
- ♣ Development of standards and appropriate packaging.

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Increased demand for potato and potato processed products





Overview of the current market and key players of the potato sector in Uganda

The value chain

This section presents an overview of the actors involved in the Ugandan potato value chain, beginning with a visual representation (Figure 7). Follows a description of the most relevant actors.

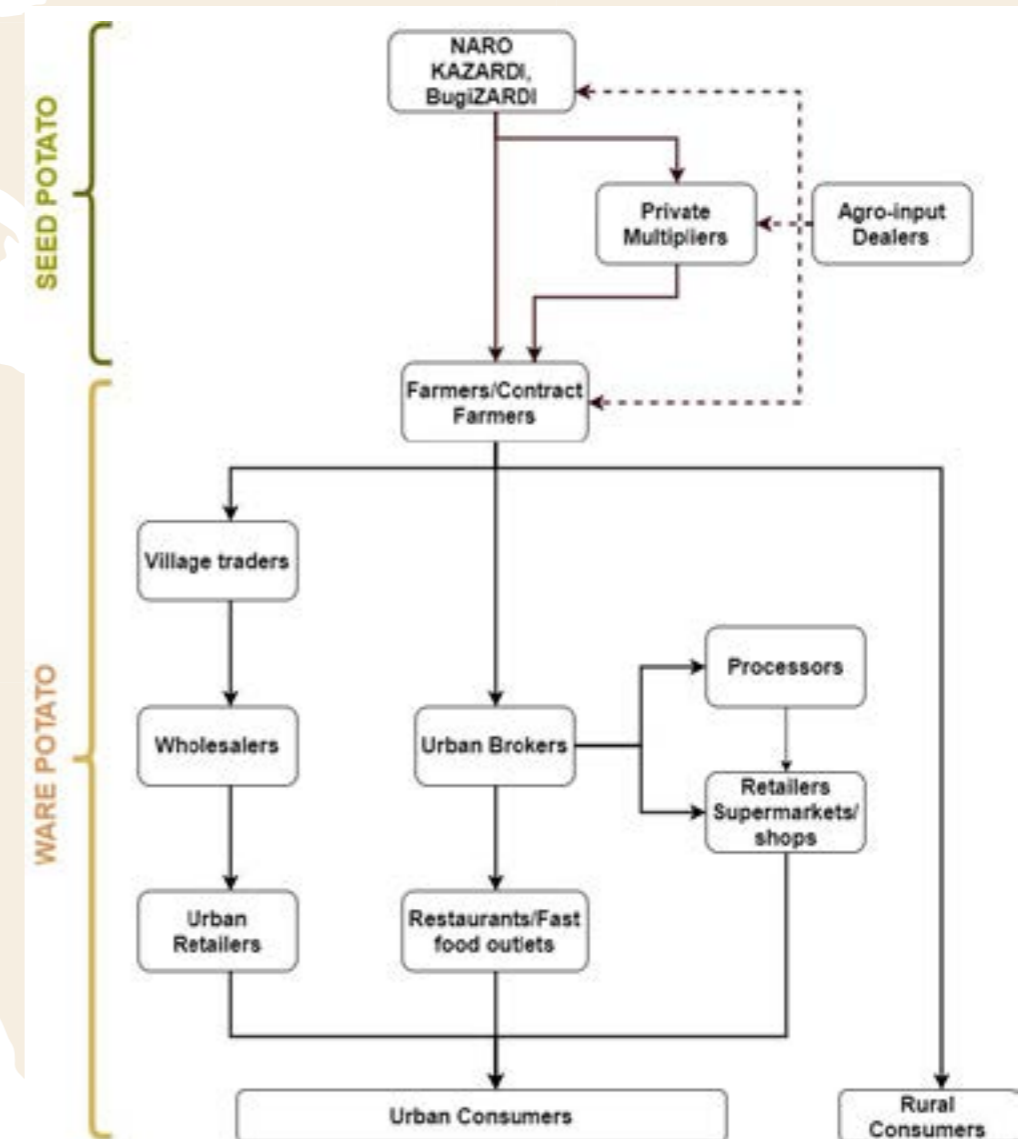
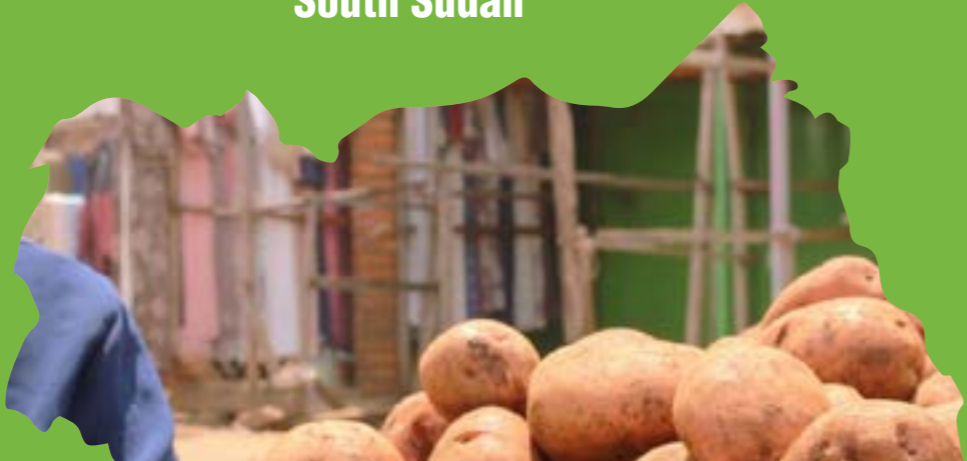


FIGURE 7.

THE UGANDAN POTATO VALUE CHAIN

South Sudan



DR Congo

Overview of the current market and key players of the potato sector in Uganda



Kenya

Rwanda

Tanzania

Agro input dealers

- ♣ There are more than 2300 agro-dealers registered in Uganda, who market and sell agrochemicals and fertilizers, mainly insecticides, fungicides, herbicides, fertilizers, and to a lesser extent improved seed.
- ♣ There is likely a large number of unregistered agro-dealers, the reason being that informality in the sector is very high (33% of traders do not have trade licenses). While informality reduces the amount of taxes paid by these actors it also constrains businesses from accessing credit, especially from formal financial institutions. Besides, it is more likely for the informal sector to provide lower-quality products, due to the lack of control mechanisms⁹ As a consequence, counterfeit chemicals are common in Uganda¹⁰ Besides the high prevalence of counterfeit products, genuine but cheap agro inputs with low effectiveness also contribute to harvest losses.
- ♣ Most Agro-dealers are registered with the Uganda National Agro-input Dealers Association (UNADA).
- ♣ In general, agro-input dealers are not well integrated in to the value chain: individual farmers, farmer groups and the National Agricultural Advisory Services (NAADS) are often confronted with a small stock available or high selling prices due to the large distances between the sources of the agro-inputs and the selling locations. Sometimes there are no agro-input shops available in rural communities at all. Reputed companies are not readily established with a wide network of presence in Uganda. This lack of accessible and affordable inputs affects their use by potato farmers and hence the potato output.

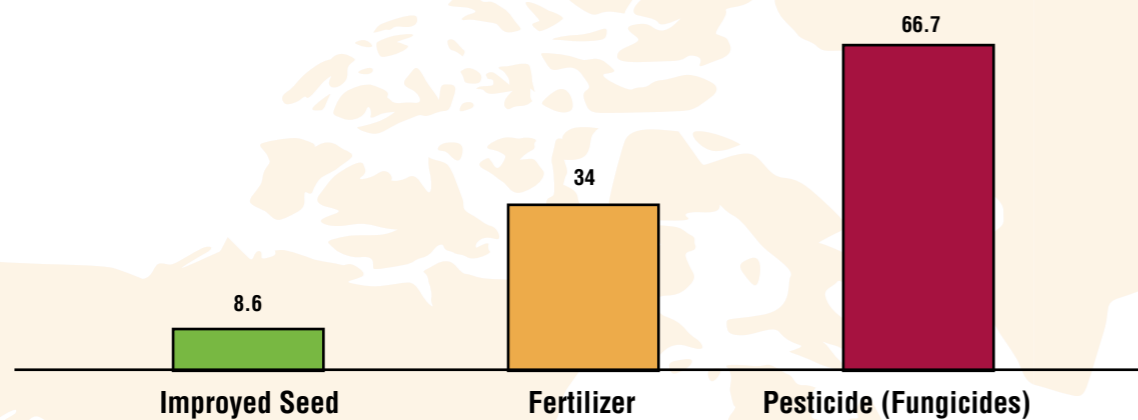
Seed potato producers.

Uganda's seed potato supply chain is supported by few main agents with very diverse levels of expertise and quality standards of seeds produced.

1. **NARO** (National Agriculture Research Organisation) is also the source of modest amounts of disease-free starter seed meant for further multiplication. Besides it supports the (seed)potato value chain through two of the 9 Zonal Agricultural Research and Development Institutes (ZARDIs):
 - a. **KAZARDI**: a public agency, which produces certified basic seed in different varieties - Victoria, Kachpot1, Rwangume, Kinigi, and Rutuku - used in the propagation of the foundation seed planted by farmers to produce ware (table) potato; KAZARDI leads the country's seed potato production due to its installed capacity to produce potato tissue culture and pre-basic seed. However, its capacity to produce basic seed is limited.
 - b. **BugiZARDI** is a semi-autonomous public agricultural research institute. While BugiZARDI does not have the infrastructure necessary to produce pre-basic and basic seed it still has a role in basic seed multiplication and dissemination. On average, 1 tonne of basic seed is annually multiplied by 11 tonnes of quality seed and disseminated to farmers. The basic seed is sourced from KAZARDI.



2. **Private seed potato multipliers (specialized)**: A team of sophisticated farmers, of whom approximately 53% are registered by Uganda National Seed Potato Producers' Association (UNSPPA); Only a small number of specialized and trained private seed potato multipliers, strategically located within potato producing communities and operated by farmers, acquire clean basic seed for multiplication from KAZARDI and BugiZARDI. It has been estimated that only 60% of the starter seed produced is purposefully multiplied by seed multipliers. The other 40% is planted by ware potato farmers¹¹.
3. **Individual farmers (informal)** who recycle seed potato from the previous harvest. The majority of potato farmers select their seed from the bulk of potatoes at harvest. In this way they don't know if the selected seed comes from a healthy mother plant or not. The recycled seed potato is usually of poor quality, still, close to 90 percent of farmers use this recycled seed potato.



Source: PASIC Community and Market Potato Value Chain Survey (May, 2015)

FIGURE 8: INDICATIVE % COMMUNITY LEVEL USE OF DIFFERENT TYPES OF INPUTS¹² AND (II).

The potential national demand for clean seed potatoes is estimated at 239,328 tons due to increased interest in potato farming and emerging processing factories. The organized seed production occupies by consequence only a fraction of the market, though it is the key to a more productive potato sector. On the other hand, only a minority of smallholders purchase seed potato in comparison to other inputs (Figure 8). If a 10-20% of the total grown hectares is taken as average demand in African countries times 2 tons per hectare, the current demand for seed potatoes will be (111,100 hectare x 15% x 2 ton/ha =) ca 33,000 ton. Growers can even multiply for more than one generation with good quality seed potatoes in the first stages of development.

There is a general lack of awareness amongst potato farmers about the importance of high-quality seed. The majority of potato farmers select their seed from the bulk of potatoes at harvest. Other factors limiting the access to and use of quality seed potatoes are limited information on the source of the seed as well as the difficulty to obtain the grade and quantities wanted because seed multipliers have in general not adopted the practice of grading, labeling and packaging seed in different units. On this moment a proper quality assurance or certification is hindered. It's a costly process and difficult to arrange for a single farmer itself.

Seed potato marketing

Most of the produced basic seed (75%) is grown and supplied to through aligned farmers of the Uganda National Seed Potato Producers Association (UNSPPA). UNSPPA also supports individual multipliers that carry out quality seed marketing in the same, other villages (19%), government programs (29%), NGOs (13%) and middlemen (3%)⁵. Some seed multipliers even sell seed beyond the local market to neighbouring districts and across neighbouring countries such as Rwanda.

As most smallholders recycle seed potato, the home-saved seed can be borrowed, given, or sold to family and neighbors or on the conventional ware potato market. In these cases, the value can be added through properly germinating the selected tubers over 3 months.

Appropriate dormancy varieties (< 2-3 months) are popular as they require less investment in storage and optimal for 2-3 production cycles per year.

Prices of seed by potato vary by region and by varieties where improved varieties are more expensive than the local ones. In general, Prices of seed potatoes are estimated to be twice as expensive as the prices of ware potatoes.

Ware potato production

While there are larger-scale commercial farmers, most Ugandan potato farmers are smallholder farmers using low-risk systems with no or little inputs. Potatoes grown for the market receive generally more attention as cash crops, still. The use of home-saved seed of low-yielding varieties, the application of poor management practices, the little attention farmers pay to product quality, water restrictions, soil exhaustion and the prevalence of viruses and diseases like late blight and bacterial wilt are major production challenges. Late blight is a problem for most potato farmers, but they don't perceive it as a major limitation because it can be controlled using fungicides unlike bacterial wilt (*Ralstonia solanacearum*).

Storage of ware potatoes for later sale and to anticipate to fluctuating prices are uncommon because of limited availability of good storage facilities or fear for losses and because of more or less year-round availability of freshly harvested potatoes. Construction costs and theft are the major factors determining the construction to separate stores.

Ware potato marketing

- ♣ **Potato farmers:** Depending on the price offered, they can choose to sell their produce at the farm-gate, by the roadside or in the weekly village markets through various market outlets: rural consumers, agents, traders, and processors. Due to the high perishability of the produce and lack of storage facilities, farmers usually harvest when being informed that a trader is coming. This harvest delay can lead to heavy losses due to rot. Farm gate prices are lowest during harvesting time and depend also on the varieties. Potato farmers are generally price takers having minimal influence on the price. Like for seed potato, adding value to ware the potato is a manner to increase farmer's income and to allow him or her to access more lucrative markets. Ware potato value addition can comprise several post-harvest operations like sorting, grading, weighing, bagging, storage, transportation, and marketing.
- ♣ **Traders:** operate especially from shops, open markets, and roadside markets. They usually have diversified sources of income to manage the risks related to trading: sale of crops, sale of livestock, salary, wages, trading business, proceeds from farmer group activities, and loans. This combination of activities may nevertheless hinder the intensification of potato marketing. Due to the lack of appropriate storage facilities and the high perishability of the produce, ware potatoes are moved rapidly from farmer to consumer with limited value addition resulting in widely fluctuating farm gate and market prices. It is reported that 50% of the traders in the Kigezi highlands operate without storage facilities. Market signals based on premium prices are weak due to a lack of grades and standards and therefore the market has little segmentation and potatoes are mostly sold as an ungraded product on the national market.
- ♣ **Brokers** provide the link for other marketing participants to each other. Rural brokers link travelling traders and wholesalers to farmers. Some village traders double as rural brokers. Urban brokers link travelling traders to wholesalers, urban retailers or processors. Brokers are paid immediately for their services on a bag/commission basis. Brokering is a lucrative business.

Ware potato processing

Potato processing in Uganda is still at a basic scale with only a limited range of processed products. Ware potatoes are processed in only chips and crisps. Potato processing in chips is mainly done by retailers like hotels, restaurants and bars, fast-food kiosks and road-side eateries. They produce on demand for immediate consumption. Kitty Enterprise is the only processor of chilled chips in Uganda supplying supermarkets.

The company sells its products in 5 countries which comprise the East African Community as well as the COMESA member states and it is still expanding. The locally manufactured snacks are distributed in supermarkets, schools and institutions and their distributors are in D.R.C, Rwanda, Kenya and South Sudan.

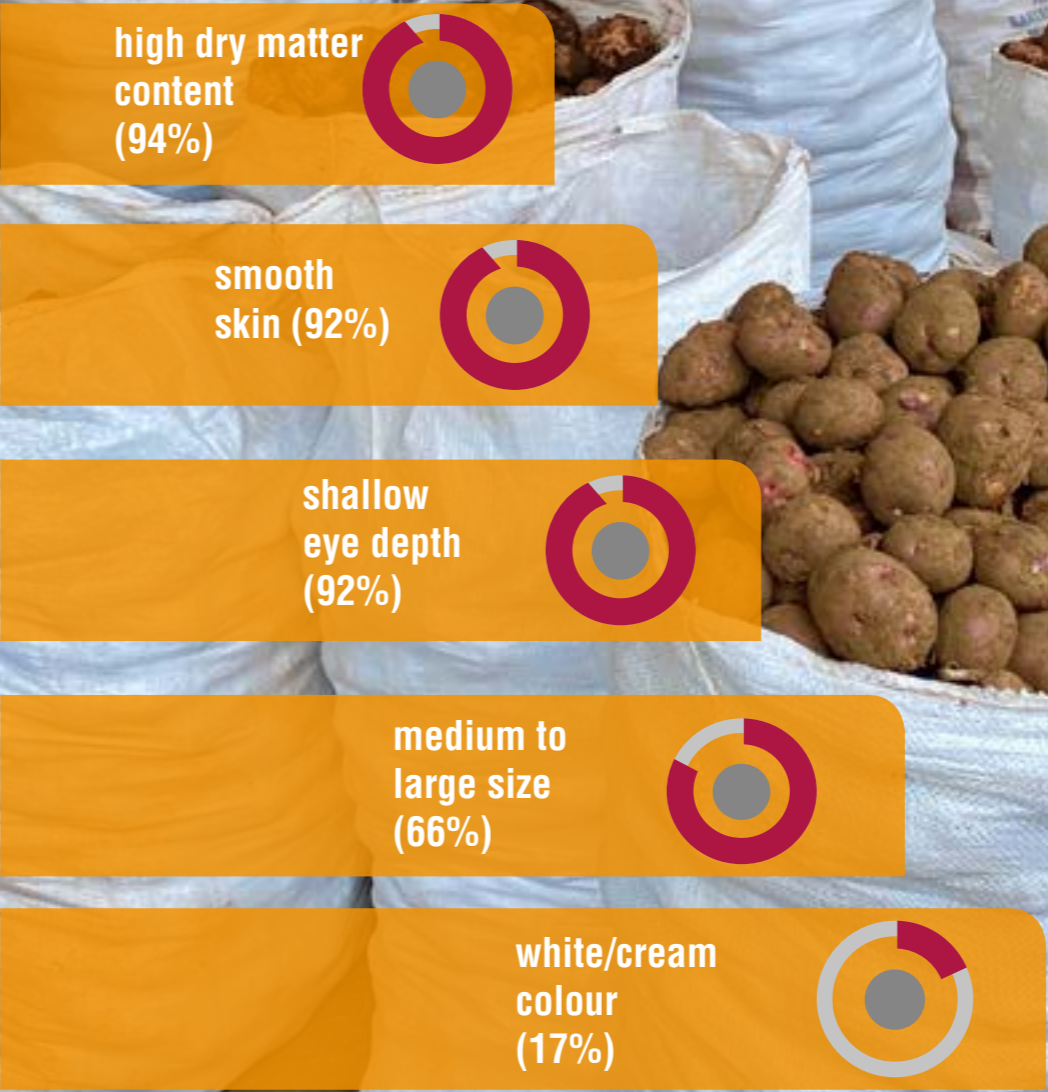
The role of the company in the potato sector is value addition, product transformation (potato crisps), and distribution with a production capacity of 500 kgs of processed crisps per day. The major quality attributes required by chips processors are in decreasing order of importance high dry matter content (94%), smooth skin (92%), shallow eye depth (92%), medium to large size (66%), and white/cream color (17%).

In an urban context, the main retail outlets for potato chips are hotels, restaurants and bars. Here, potato chips are the most consumed (93%) but also other potato products are served. 65% of the retail outlets prefer chips over the other potato products because of their increasing consumption at all socio-economic levels. The actual positive trend in the establishment of hotels, restaurants, and bars due to growing population and urbanization will increase future demand for fast foods like potato chips.

The main limitations encountered by the processors are the following:

 <p>1 Poor availability processing varieties</p> <p>Rutuku, Kinigi, Nakpot 1, Nakpot 5, Kachpot 1 and Kachpot, 2 are good varieties for chips making but quantities of these varieties grown in Uganda are insufficient to meet processors' needs. This leads to mixed varieties and consequently the low quality of the final processed products.</p>	 <p>2 Seasonality of supply</p> <p>Potatoes are sold at harvesting time as there is a lack of appropriate storage facilities. This reduces (or fully stops) the possibilities of processing during off-seasons and making processing equipment under-utilized.</p>	 <p>3 High utility costs</p> <p>High costs of key inputs for processing increase the costs of the final product and reduce competitiveness. This applies to water and electricity, but also charcoal (for small processors), cooking oil and high labor costs.</p>	 <p>3 Knowledge and skills gap</p> <p>Especially for smaller home-based enterprises, but also generally there is little knowledge and skills in chips processing, storage and frying techniques and awareness on standards.</p>
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Quality attributed required by chips processors are in decreasing order

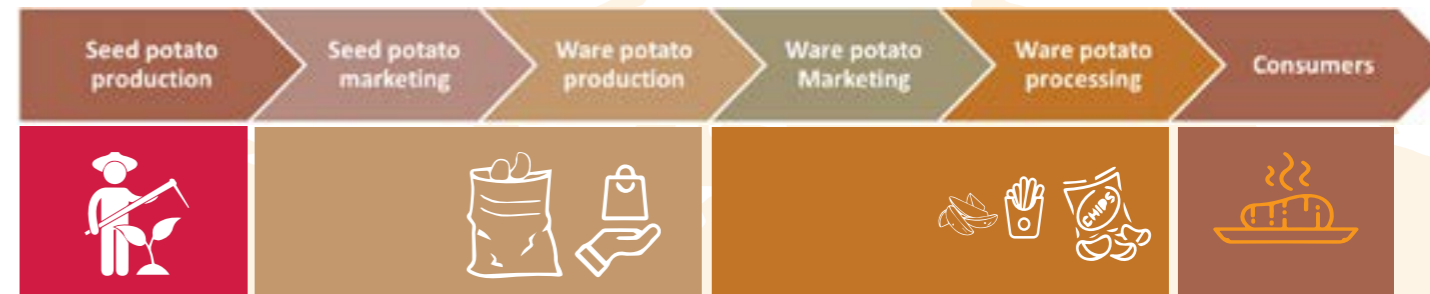


Consumers

The Potato Crop is a commonly consumed vegetable although Ugandan households spend less of their monthly consumption budget on potatoes compared to cooking bananas, sweet potatoes and cassava.

Rural and urban areas have different consumption patterns: Rural households mainly eat boiled potatoes together with other vegetables or beef. Other forms of potato preparation in rural households are rare. In urban areas processed potato products, particularly chips, are very popular particularly among the younger generation.

Chips processing is common in urban households and closely related to wealth. Low income households buy small volumes of fresh and unprocessed potatoes mainly at the retail market, high-income households buy also at the supermarket indicating a price premium for quality. The main characteristics of fresh consumed potato varieties sought by the markets are good taste and ease of cooking.



	Seed potato production	Seed potato marketing	Ware potato production	Ware potato Marketing	Ware potato processing	Consumers
ACTORS	<ul style="list-style-type: none"> KAZARDI BugiZARDI Private seed multipliers Individual farmers NARO 	<ul style="list-style-type: none"> Individual multipliers (supported by UNSPPA) Individual farmers UNSPPA 	<ul style="list-style-type: none"> Smallholder farmers Commercial farmers 	<ul style="list-style-type: none"> Potato farmers Brokers Wholesalers Potato traders 	<ul style="list-style-type: none"> Hotels, Restaurants, bars, fast food, roadside eateries. Small- and medium-scale home-based crisps makers Kitty enterprise Processing factories e.g Psalms Food industries 	<ul style="list-style-type: none"> Rural households Urban households Schools Hospitals Other institutions
CHALLENGES	<ul style="list-style-type: none"> Absence of regulatory framework for seed potato certification Generally low yields Lack of knowledge Good Agricultural Practices No proper system of soil testing and central registration and coordination of clean soils No bigger private sector involvement in seed multiplication for scaling up the production Limited capacity to produce G2 basic seed No appropriate grading, labelling and packaging of quality seed 	<ul style="list-style-type: none"> Farmer recycle seed Little knowledge by farmers on added value of quality seeds 	<ul style="list-style-type: none"> Price instability Lack of storage lack of packaging standards and materials lack of cash, lack of accurate and timely market information Unavailability of quality/clean seed 	<ul style="list-style-type: none"> Limited use of storage facilities. Perishability of the produce. Poor infrastructure and weak distribution networks Fluctuating prices Low quality potatoes (unsorted, mixed sized tubers) Inconsistent production/ supplies Poor packaging materials resulting into rotting tubers High farm gate prices that affect consumption of potatoes 	<ul style="list-style-type: none"> Relatively low (but growing) demand for processed potato Poor quality of potato supply Seasonality of supply High utility costs inadequate knowledge and skills unawareness of standards for chips processing Fluctuating prices Lack of appropriate transport facilities for raw materials (potatoes) Low consumption rates of products such as crisps compared to chips 	<ul style="list-style-type: none"> Little information available on produce quality. Relatively low average quality of produce.

Challenges

- Little information available on produce quality.
- Relatively low average quality of produce.

Consumer

- Rural households
- Urban households
- Schools
- Hospitals
- Other institutions

Seed potato Production

- KAZARDI
- BugiZARDI
- Private seed multipliers
- Individual farmers
- NARO

Challenges

- Absence of regulatory framework for seed potato certification
- Limited capacity to produce G2 basic seed
- No large private sector involvement in seed multiplication
- No appropriate grading, labelling and packaging of quality seed

Challenges

- Relatively low (but growing) demand for processed potato
- Poor quality of potato supply
- Seasonality of supply
- High utility costs
- inadequate knowledge and skills
- unawareness of standards for chips processing
- Fluctuating prices
- Lack of appropriate transport facilities for raw materials (potatoes)
- Low consumption rates of products such as crisps compared to chips

Ware Potato Processing

- Hotels, Restaurants, bars, fast food, roadside eateries.
- Small- and medium-scale home-based crisps makers
- Kitty enterprise
- Processing factories e.g Psalms Food industries

Ware Potato Production

- Smallholder farmers
- Commercial farmers

Challenges

- Price instability
- Lack of storage
- lack of packaging standards and materials
- lack of cash,
- lack of accurate and timely market information
- Unavailability of quality/clean seed

SWOT-analyses

The presence of larger-scale farmers ready to scale-up capacity, the availability of high-quality (seed) potatoes for the different markets, the climate, altitude, availability of water, and especially the fertile soils are conducive factors to grow and multiply sustainably with the help of professionals.

Crop rotation is still a challenge as it is widely ignored by small-scale farmers, meaning the soils need to be screened and tested on soil-related diseases to see how it affects the first improved varieties that are already available for farmers in Uganda. By introducing varieties that are better suited for processing, the farmers can also supply to the processors and are no longer solely reliant on the local market.

A variety of information sources (public extension services, private extension services, farmer group, traders) is available, although not always easily assessable by all farmers and this provides untapped opportunities. Farmers have limited access to various reliable information sources as well as market information and also often lack knowledge about proper use/ application of chemicals. There is a high demand for practical farmer training on the Best Agricultural Practices (of course with the good inputs) in the potato growing areas, which should in the end, result in a higher demand for quality seed. Therefore, farmers' organizations need to play an important role in this, including the already existing women's potato clubs.

Linking the complete potato value chain offers big opportunities; a better mutual understanding between all the actors (Public and Private sector) impacts on the growth within the entire ecosystem, there is a clear need for a stakeholder driven sector development with national coordination.

Below is an overview of the Strengths, Weaknesses, Opportunities and Threats of the Potato Sector in Uganda that are most relevant. The complete SWOT analysis can be found in Annex 2.



Strengths

- Good climate to grow potatoes, with very fertile soil
- Existing presence of larger-scale farmers
- Access to range of improved varieties
- Farmers and traders are organized in groups associations
- Existence of product standards for processed potato products
- (Seed) potato production and processing is a lucrative professional activity
- Innovation platforms enable multi-stakeholder exchange
- Availability of various market outlets
- A variety of information sources (public extension, private extension, farmer group, trader) is already available
- 6 private minituber seed producers



Weaknesses

- Absence of regulatory framework for seed potato Certification
- Hard to register and release a new potato variety, and no official protection (breeder rights)
- Limited capacity to produce G2 basic seed
- Almost no larger private sector companies involvement in potatoes
- Farmers lack knowledge on Good Agricultural Practices, proper use of chemicals and are generally unaware of the health risks posed by its use
- High prices of clean seed
- No or less crop rotation by potato farmers. Besides they developed perceptions and attitudes who are difficult to influence
- Lack of adequate storage facilities leading to fluctuating process
- Weak market linkages (Lack of trust/organisation between value chain stakeholders)
- Limited access to market information
- The Ugandan extension system lacks funding and qualified professionals
- Limited value addition on fresh ware potato
- Limited range of locally processed potato products
- Weak enforcement of quality related standards on potato processing
- Lack of accessible and affordable agro-inputs



Opportunities

- Big potential national demand for clean seed
- With better coordination and storage, growing for demand (year round available fresh product)
- The Uganda Hotel Owners Association is becoming more organized and has communicated a keen interest to start buying potatoes collectively.
- Farmer organizations can facilitate access to market information and group selling
- Existence of women's potato clubs to promote collective action by women improving their ability to engage in potato marketing
- Large East African Community market for potato
- Link the value chain to each other to improve in stakeholder driven sector development, with central coordination for example in a platform
- Draft of the new National Seed Policy provides for recognition and regulation of Quality Declared Seed (QDS)
- Promotion of locally produced products by government e.g Buy Uganda Build Uganda (BABU)



Threats

- Decreasing soil fertility
- Government support is selectively
- Unpredictable weather and climate change
- Possible unequal participation of women in the process of selling potato and price bargaining
- Collusion among value chain stakeholders
- Increased competition with imported potatoes due to increased productivity in neighboring countries
- Emerging potato diseases and pests



A roadmap for Dutch engagement



A roadmap for Dutch engagement

When further analysing the overview of key strategic interventions from a perspective of Dutch engagement, the following questions are key:

What are the current activities of Dutch stakeholders in Uganda?

Through various programs the Dutch government already worked intensively with interventions. Food and Nutrition Security (FNS) is one of the priority sectors of the Netherlands development policy. The long-term goal of the Netherlands FNS program in Uganda is "Ugandans have increased food and nutrient security through more resilient food systems". To achieve this goal the Embassy has defined a number of outcomes, such as;

- ♣ Economic performance and resilience of farming systems increased
- ♣ Quality of private sector development for FNS improved
- ♣ Quality of governance for FNS increased.

To achieve these outcomes the Netherlands FNS program focusses on increasing agricultural productivity and income, improving access to food, job creation for youth and sector development. An important characteristic of the programs is agri-sector transformation based on market-led principles¹⁵. Improving the potato value chain was an important topic within this FNS Program. A short overview is shown below. The full description is refer annex 4 [page 69]

- ♣ Potato trail guidance
- ♣ Developing the potato value chain in Uganda (feasibility study)
- ♣ Potato processing in Kisoro
- ♣ SDGP program for the potato value chain
- ♣ Plant variety protection program
- ♣ Participation in the Harvest Money Expo
- ♣ The promotion of Nutrition-Sensitive Potato Value Chains in East Africa
- ♣ Markets in Potato and Rice Changing program
- ♣ Different tailor made trainings related to improving local parties (Nuffic)

The two large and long term interventions within the activities of the Netherlands are highlighted below.

Resilient Efficient Agribusiness Chains in Uganda (REACH-Uganda)

REACH-Uganda (2016-2020) aims to improve farmers' market engagement, strengthen household resilience, and increase availability of agriculture support services for 40,000 farmers and businesses in the rice and potato value chains.

By employing a market systems approach to development, REACH seeks to bolster local markets so that they will function more effectively, sustainably, and beneficially for poor farmers. Instead of approaching a solution to these issues that might simply provide inputs or services, REACH aims to develop linkages between low-income rice and potato farmers and micro-, small-, and medium-sized enterprises (MSMEs).

SDGP Potato value chain

The goal of this Sustainable Development Goals Partnerships project (started in 2020) is to establish a viable seed and ware potato value chain, including 8,855 farmers and processing industry.

1. Increased availability of high quality seed potatoes

Increased availability of traceable high quality of seed potato through hydroponic multiplication of varieties with market demand, increased warehouse capacity and reduced disappearance of certified seeds into the informal chain. Clean inputs by Dutch companies HZPC, Solynta and Agrico.

Outcomes: higher yields, higher revenues of small holder potato farmers, cleaner soil ready to produce higher yields, increased value chain efficiency.

2. Innovative value addition

Complementary potato processing facilities established in Kisoro (fries) and Kampala (crisps) that will connect in total 8,855 smallholder potato growers to the market for quality fresh potatoes and processed potato products, next to the regular market of ware potatoes.

Outcomes: higher prices for quality potatoes for smallholder farmers, increased value chain efficiency.

Big market for high quality seed potatoes

If a 10-20% of the total grown hectares is taken as average demand in African countries times 2 tons per hectare as input, the current demand for seed potatoes will be (111,100 hectare x 15% x 2 ton/ha =) ca 33,000 ton. UNSPA (seen as the biggest official multiplier of seed potatoes) produced 376 tons in 2016 according to their website. Meaning there is still a big market for high quality seed potatoes. Dutch seed potato companies can export, but before becoming active on the Ugandan market, seed potato varieties that are not on the national list need to be registered. Currently, seed potato companies Danespo, HZPC, and Agrico can export some of their commercial varieties to Uganda. Some other seed potato companies are trying to get their varieties registered. The main activities of seed potato companies are focused on export high quality registered varieties to Uganda for producing high quality ware potatoes. Sometimes a second multiplication, before selling the potatoes as ware potato is allowed.

Hollanda Fairfoods is within the SDGP program aiming to set-up a processing factory for crisps. Besides that the program aims to get the processing factory in Kisoro, operational. Other Dutch companies acting in the potato value chain are not yet registered or are not known to us.



General overview point of view from Dutch companies

Looking at the huge estimated market for high quality seed potatoes to improve their productivity, Uganda seems to be a very interesting country for the potato sector of the Netherlands. For a lot of cooperation's in Uganda the understanding and need of having high quality seed potatoes and good fertilizers is clear. However, there is lack of availability of quality inputs ability to pre-finance the inputs and unclear regulations make it difficult to act quickly. Besides: seed potato companies invest normally in regional trade opportunities. The investments to set up a seed multiplication farm normally are very expensive. Investment in one country provides big opportunities for the surrounding countries. For example, through appointed shipping companies. If a seed potato company is not yet active in the region, it can be interesting to focus on Uganda as a starting point.

It's the experience of the active companies that government departments don't always cooperate. Political issues or different goals within departments make it sometimes difficult to act. An actual example is the protection of Kenia to provide seed potatoes grown in Kenia going out of the country. This contrasts with the desire of the country to be a regional hub for high-quality potatoes. A role for the Embassy and Dutch government can be there to assist in getting the clearance for transporters more easily, but especially sensitizing the governments about the importance of a more open market. As mentioned: seed potato companies will invest in multiplication stations in specific countries, this is accompanied by high investments. It's not likely that a seed potato company will invest in their own multiplication farms in each country. By knowing that, for a government, it's better to look at the possibilities to still get their benefits of it by importing the high quality seed potatoes from surrounding countries.

Opportunities for improvement

Improving the potato sector refers to all aspects of the process of sustainable intensification of potato production. This includes developing and introducing varieties that are resistant to major diseases and carry market-demanded traits, and ensuring that small-scale producers have access to and use quality seed potatoes of those improved varieties. Small-scale potato

producers can make the leap in yield at once, provided they get the tailored assistance needed, gain access to the right technology, and apply advanced cultivation practices. In a country like for example Nigeria and Kenya (with quite a similar climate) they can easily double and usually even triple productivity, which would be highly remunerative in existing potato markets. However, there are few examples of where such achievements have been realized, because there is a lack of tailored support for small-scale potato producers to make the right compromise between investments in inputs and risk management. Intensive potato cultivation requires a relatively high amount of working capital for seed potatoes, fertilizers, crop protection products and labour; it is also a crop with relatively short-cycle with potentially rapid returns on investments in production. Despite the potential to cover investments quickly, small-scale producers with structural cash constraints struggle with purchasing the inputs required to make the potential leap. Appropriate financial products are critical for advancing the growth and professionalization of potato production among small-scale farmers; they should be made available to farmers together with improved technologies, since both the technical and entrepreneurial capacity of those farmers is critical for moving them forward¹⁶.

Besides the benefit for the farmers, also off-takers benefit from it. Off-takers normally have specific wishes and habits that determine their preferences for their customers or for processing the potatoes; the color of the potato skin and/or the color of the flesh and dry matter content are important. They use preferably familiar varieties. The potato chain will adopt a new variety easier due to better (specific) performance during processing, better internal or external quality.

Central coordination crucial

Doing trade with small holder farmers is very challenging. Exporters are set to trade in larger quantities, which usually involve larger investments. The standard grower is not able to make these investments independently. Cooperation's as a collective, also not. Only the few larger farmers are able to import larger quantities. Mainly for their own production. A central place for coordination for the import and making a general planning between the needs and availability is crucial. It can even guidance the selection and the trails for introducing new varieties. This can be an importer, been organized by the government or for example organizations like IFDC. If Public International Organizations like IFDC didn't put as much effort in the sector, the first trails of new varieties weren't been done and importing new varieties was even harder.

Importance of storage

A grower can achieve a good potato yield in 100 till 120 days. Most of the times potatoes prices are very low during the main harvest season due to market flooding. Figure 6 on page 4 shows the potato production calendar. In Kisoro and Mbarara potatoes are scarce in the months February/March and begin of April and from June, till November. In Mabale and Kapchorwa they fill the gap of June and July with their harvest, as well as November. So if a farmer or a farmers cooperative is able to store their products, to have potatoes available in February, March and from August till October, availability on the market is scarce. Storage will give added value: they can sell their potatoes in the period when less product is available.

Proper storage facilities will give the owner various advantages:

- ♣ constant supply of potatoes for the customer
- ♣ maintaining high quality for the market
- ♣ Improved bargaining power

For seed potatoes, storage is particularly relevant to allow the potato to control the germination time, to make sure seed potatoes are available in the period that farmers are planting their potatoes. For example to store the potatoes that are imported in a good way and let them sprout step-by-step.

The need for a specific type of storage depends on the night temperature. If the temperature of the nights in an area can go down to around 10 degrees, a good isolated storage location without cooling can be a good option. This type of storage facility is build on hills or on a higher area to allow sufficient wind circulation.

If night temperatures are usually higher than ca 10 degrees, additional cooling is needed to take good care of potatoes. A constant temperature is important to keep the potatoes in good shape. Of course, firstly they need to be dry and heal their wounds in a not too cold environment.

In Uganda, it's not necessary to store potatoes longer than 4 till 5 months, due to the different growing periods. Potatoes will decrease in value (less weight, bit softer, less fresh) after storage, but the price will be better due to scares on the market.

In most African countries a single farmer can't afford a storage location. Although storage is a very good opportunity for value addition for cooperatives. Besides storage, a proper planning for planting dates that is more divided during the season would be already a big advantage for the availability during the season.

Different impact mini tuber or seed potatoes

Two systems can be used for building up a healthy seed potato system: by mini tuber and by importing high quality seed potatoes. Building up a mini variety of tuber will cost a lot time: 1000 mini tubers will generate after 3 years only 1 hectare of potatoes. Within the process, a lot of challenge are there already, related to soil and diseases. The added value of seed potato will disappear very quickly if they are facing troubles in the first years building up a variety. Also, the potato chain in Uganda isn't organized like for example the Netherlands in their national inspection service.

If farmers would choose high-quality introduced seed potatoes, resistant to major diseases, they can easily increase their productivity. Multiplying those imported high quality seeds need to be done preferable at a bigger farms, so control and guidance can easily be done, and in most of the cases money is better available for a good fertilizer and crop protection program. If the potatoes are multiplied once or twice under strict conditions, the initial price of the imported seed potatoes would be reasonable lower and better affordable for small holder farmers.

Registration process

If you want to grow (or import and grow) a potato variety that's not on the National variety list of Uganda, there is a need for registration (even if it's a variety that haven't got the breeders protection in Europe any more). See chapter 'Analyses of laws and regulations' for more info. NIVAP a part of the NAO assisted in that process. Uganda is autonomously to decide whether varieties are suitable for the country. From experience there is importance to guide the process, to make sure varieties are tested in the right way. Besides that, the additional advice is to let a new variety be tested for 3 seasons, starting in the long season [planting in March- harvesting in July]. Although this process is reasonably well organized, a footnote should be placed within this process. Europe already stopped this process for testing the value for cultivation or use (VCU) of agricultural crops years ago. European Union countries check if the newly introduced variety is on the list of protection for varieties for breeder rights, if it isn't, you can introduce the variety. Seed potato companies spent enormous amounts of money in developing new varieties. They trust the market itself: a good variety will be adopted through the market. Government involvement is not necessary. Only for the protection of breeders. They believe that the market will never adopt a bad variety. A role for the Embassy can be too, together with for example the NAO, to constantly promote by governments that it is the market that need to adopt a variety. Seed potato companies don't invest millions of euro's to introduce a bad variety. They will always do trials before introduction, because that's also for their benefit. For now to help the Dutch companies to enter Uganda subsidization or cost share of the costs of the introduction period should be considered, whilst lobbying for a shorter testing phase.

Regulation on number of new varieties

It seems that governmental organizations look at the total number of new varieties to prevent a small holder farmer from being unable to choose from a large number of different varieties. In the view of seed potato companies of course a missed opportunity. New varieties for specific purposes can generate a major impact in the potato sector. The market itself will always choose which variety to adopt and which they shouldn't adopt. Once tested, should mean that the variety should be able to be introduced. It is the advice of the Dutch potato sector to leave it to the market instead of making a second selection through the government.

Education about potatoes

Even though small-scale potato producers often use poor agricultural practices, they value potatoes as a cash crop¹. Of course, a good, strong, healthy variety needs to be the basic, but education on how to grow the potato in a good way is another very important part, also the Dutch interviewed people mentioned. Besides training farmers, it's also very important to train the extension services. Most of the time, the impact can be to constantly bring this principle to the attention of the Ugandan government.

(Lobby for) quality research for diseases and soil

Soil is one of the most important parts to improve the yield of potatoes. If soil is not being analysed, you never know exactly what you need to add to your soil to grow a good yielding crop. Besides, if a soil related disease is prevalent, only specific less sensitive varieties can

raise the yield of potatoes. Good mapping of the soil health is very important. By knowing the healthiness of the soil targeted interventions can be done.

Adding value to the potato

If the actors can find ways to add value along the entire chain, the number of job opportunities will increase significantly. If the Ugandan potato chain can produce high quality products of potatoes, there will be a need for high quality inputs early in the chain. But if there is only the local market, there is no specific need for improvement. If all the actors in the complete chain cooperate for example in a potato platform, general challenges can be addressed and prioritizing can be done. Potato production by small-scale farmers can only become successful and profitable if embedded within a system, with well-functioning storage, processing, marketing, and seed potato multiplying program. A necessary and required step in the transformation of the potato sector due to most of the interviewed companies.

Promising first experience with variety on COMESA list

Some seed potato companies now have good first experience with getting an import permit due to the COMESA variety list. If a variety is registered in more than 2 COMESA countries, a company can apply by the Ugandan government for an import license for that variety. The first two varieties of HZPC (Taurus and Panamera) are successful.

Side effects of mechanization

Think of a machine in the potato chain and it will be there. the most effect can be generalized to small-scale farmers to introduce new, better-performing varieties. They still have a big challenge with earning money at their farm. Mechanization is then too far away to generate affordable effort. Also, the landscape of the South West and the Eastern highlands doesn't lend itself to mechanization at the farm level.

For example, potato cooperations can invest in the first small machinery, and rent it out by associated farmers. The most added value will be supporting mechanization. Mechanisation to prepare the soil, plant the potatoes, irrigation on dry land, a sprayer, and a small windrower will be the first steps into mechanisation. For processing a sorter, brusher and weighing machine (possibly supported by a sewing machine) are most useful in the chain.

Drone technology, robotisation, and GPS-controlled agriculture machinery is far too early to introduce in Uganda. Only on bigger farms that can be an added value. Also, these technologies will often not generate enough additional income to justify the effort. For example: with a drone you can detect an area very specifically for an intervention. But if the grower uses poor input (variety, inputs), or inputs are not sufficiently available, then analysing the lesser parts in the crop makes no sense. Normally this kind of intervention is costly and specific.

Concluding

The most important part of a sustainable potato value chain is to give farmers access to high quality inputs (in combination with finance), so they can produce high quality-potatoes for the market. Already some of the varieties show the need for improved seed to avoid degradation. Multiplication through the production of (mini tubers) is costly and brings multiple risks within the different multiplication steps (possible diseases, wrong selection, long progress to have

volume). Importing high quality certified seed potatoes from for example The Netherlands, or surrounding countries with programs of better performing varieties, will give the potato sector in Uganda a big opportunity to boost their results quickly. Results can be achieved already in season one when cultivation of high quality seed potatoes is combined with a good fertilizer and crop protection plan and good practical technical support in the field.

With a complicated system to register new varieties, difficult to meet import requirements and a complicated process, and without a good system to protect varieties, Dutch seed potato companies do not feel an urgent need to focus on the export of larger quantities of potatoes to Uganda. Unfortunately, because the market could potentially be profitable. An important role for the Dutch Embassy and interest groups would be to sensitize stakeholders and emphasize the opportunities to increase yields (important for the food security (available food), as well as for improving the livelihood for small holder farmers) and quality very quickly with high-quality certified seeds as input. For example, trying to put more pressure on getting import permits for varieties on the COMESA list, to speed up the process of registering a variety, and making it more easy to import seed potatoes will be a big aim. By setting up/strengthening a good working potato platform with all the stakeholders, the sector can work aligned on improvement.

The Netherlands can help the Ugandan potato value chain a lot with their (potato) knowledge. With help of the Dutch government we can help in the following areas:

- ♣ Setting up a professional quality system for certified seeds through the help of NAK AGRO
- ♣ Using the enormous knowledge in the sector to train the extension services, so the extension services can train the farmers about applying good agricultural practices
- ♣ (Lobby for) quality research for diseases and soil. Growing potatoes without crop rotation will give soil related diseases. The Netherlands can assist and train local people to set up a mapping of soils and their characteristics, so a plan for improvement of the soil can be made, including coordination of the areas to multiply seed potatoes
- ♣ Storage skills when storage locations are accessible.
- ♣ Strengthen and expand a professional potato chain and the market development with needs for high quality inputs for processors and assist in a plan to put added value to the potatoes, for example through cooperation's.

The help of the Dutch government and the embassy is necessary. Most Dutch companies are not focusing on Uganda completely, due to many challenges. Setting up programs to stimulate Dutch involvement in the sector will be a stimulus for the Ugandan potato sector to develop and to see the results of that development quickly, as well as an incentive for Dutch potato companies to enter the Ugandan market and have the possibility to set-up a sustainable way of doing business without too many risks of big losses if processes still need to be improved.



Priority Interventions

An bottleneck analyses is made for the total potato sector in Uganda. In the categories seed potato production, ware potato production, ware potato processing and customer, the problems and solutions are mapped. Also an overview is made where the Dutch government can be of added value. The possible partners to and the possible program for working on the solution is mentioned.

The important topics for the Dutch Government in assisting with programs are: job creation, working on a sustainable future, resilience sector and strengthen other already existing projects. Those topics are ranked and the total impact is concluded.

	Problem	Solution	Support by Dutch government	Possible partners	Program	Jobs	Sustainability	Resilience sector	Strengthening other projects	Total impact	
Seed potato production	A1	Limited capacity to produce G2 basic seeds	Strengthen the chain with clean seed potatoes: - Setting up/expanding existing producing minituber - Import high quality certified seed potatoes	Capacity building existing producing of minitubers Availability of (new) high quality seed potatoes with good characteristics for cleaning soil/resistance	Seed potato companies NL <--> seed potato cooperatives, larger scale farmers UG	SDGP / Impact cluster / diplomatic help	++	+++	+++	+++	#1
	A2	No proper system of soil testing and central registration and coordination of clean soils	Centrally controlled soil testing and mapping of soil areas to create a plan for improvement	Sharing knowledge about soiltesting, assist in setting up a mapping system, setting up a laboratory	Soil testing companies / Netherlands Space Office (NSO) / NAK / MAAIF	Develop2Build / Diplomatic help	++	+++	+++	++	#2
	A3	Lack of cash	Setting up access to finance for small holder farmers for the first years of growing	Attract Dutch companies in microfinancing solutions / applications for applying a microfinance product	Microfinance companies, Loan Application Platforms	SDGP / Impact cluster / YEP	+	+++	+++	++	
	A4	Lack of knowledge and skills Good Agricultural Practices	Training extention workers / agronomists of the cooperative	Programs for capacity building, and adding capacity building as an important part of existing programs	Training facilitators, larger scal farmers (outgrowers scheme)	SDGP / impact cluster / Nuffic OKP program	+	+++	+++	++	#3
	A5	Absence of regulatory framework for seed potato certification	Setting up a proper framework for seed potato certification Creating a platform for actors in the potato value to improve the sector in cooperation with the sector.	Sharing experiences of NAK TUINBOUW and NWWA in setting up a proper system.	DCIC/NSCS <--> NAK Tuinbouw / NWWA <--> Seed potato cooperatives (e.g. UNSPPA)	Develop2Build / Diplomatic help	+	++	+	++	#4
	A6	No appropriate grading, labelling and packaging of quality seed									
	A7	No bigger private sector involvement in seed multiplication for scaling up the production	Attractive regulations for companies to multiply (new) seed potatoes	Link the seed potato companies to interested owners of suitable land	Bigger commercial farms	SDGP / Impact cluster / YEP / diplomatic help	-	++	+++	+	
Ware potato production	B1	Unavailability of quality/clean seed	(See limited capacity to produce G2 basic seeds)		Seed potato companies NL <--> seed potato cooperatives, larger scale famers UG					#1	
	B2	Lack of knowledge and skills Good Agricultural Practices	See A3 -> lack of knowledge and skills G.A.P.							#3	
	B3	Lack of cash	Setting up access to finance	Attract Dutch companies in microfinancing solutions / applications for applying a microfinance product	Microfinance companies, Loan Application Platforms	SDGP / Impact cluster / YEP	+	+++	+++	++	
	B4	Price instability	Setting up proper offtake from processors	Attract and assist processors from The Netherlands for knowledge sharing / investing	Processors (chips, crisps) Packers	SDGP / Impact cluster / diplomatic help	++	+++	++	+	
	B5	Lack of storage to adopt the periods of no product	Setting up storage	Sharing knowledge and setting up storage location	Storage companies NL <--> Potato cooperatives, processors, larger scale farmers (>15 hectare) UG	SDGP / Impact cluster / NUFFIC / diplomatic help	-	++	+	++	
	B6	High costs of inputs	Attractive regulations for input suppliers and support with access to finance for inputs (full package)	Investigate which bridge needs to be built in order to be able to meet the demand for good inputs in Uganda with the supply in the Netherlands	Input suppliers e.g. fertilizer, crop protection, MAAIF	Partners for International Business - PIB	+	+	++	+++	#5
	B7	Lack of packaging standards and materials	Easy possible to import packing material and knowledge building about pre-harvest	Knowledge sharing / linking with packing material companies	Packing material companies NL <--> Processors UG	Diplomatic help	-	+	+	-	
	B9	Lack of accurate and timely market information	Collective market information	Setting up a market information system	Software suppliers, agricultural news agencies, cooperatives UG	SDGP / Impact cluster / YEP / NUFFIC	-	+	+	-	
	B9	Unavailability of quality/clean seed	(See limited capacity to produce G2 basic seeds)		Seed potato companies NL <--> seed potato cooperatives, larger scale famers UG						#1
Ware potato processing	C1	Poor quality of potato supply	Training extention workers / agronomists of the cooperative Producing higher quality seed potatoes	Capacity building, training programs	Agricultural training providers NL Seed potato companies NL Cooperatives UG / outgrowers schemes larger scale farmers	SDGP / Impact cluster / NUFFIC	++	+++	+++	++	
	C2	Seasonality of supply and fluctuating prices	(See lack of storage to adopt the periods of no product)								
	C3	Relatively low (but growing) demand for processed potato	Setting up market structures for better quality potatoes	Capacity building in processing	Processors (chips, crisps) Packers	SDGP / Impact cluster / NUFFIC / YEP	++	+	++	++	#6
	C4	Unawareness of standards for chips processing									
	C5	Inadequate knowledge and skills									
C6	Lack of appropriate transport facilities for raw materials (potatoes)	Setting up a better working, effecient transport system	Knowledge sharing, investing in logistics		NUFFIC / SDGP / Impact Cluster	+	++	+	++		
Consumer	D1	Little information available on produce quality	When the value chain of potatoes is more structured and more producers are in place, the sales will be more and more structured (also to other ways than the local market). Producers will use good communication to sell their product	Communicate about the successes made							
	D2	Relatively low average quality of produce	If the value chain upfront is organised, better quality potatoes will come and the standards will rise.	Knowledge sharing, research on customer needs							

To create most impact in the chain, in a way that jobs will be created, the intervention is based on strengthen the sustainability and resilience of the sector and interventions that will strengthen other already running (or finished) programs we conclude that the following interventions are of a highest value:

1. **Strengthen the available high quality seed potatoes (A1, B1, C1, D2).** A better quality potato, that fits the needs of the customer and the farmer will solve a lot of issues in the sector. The start of improving the potato sector, will be enough high quality seed potatoes. The need is already there, only the volume not enough. Strengthen the available high quality seed potatoes, will generate a better yield, help cleaning the soil and will give the farmer an even more reliable crop on their farm. To strengthen more available high quality seed potatoes, people are needed to set-up production location, as well as trade is needed to be able to scale up quickly. Programs within RVO that can strengthen the available high quality seed potatoes are: SDGP and impact cluster for long term strengthening, assisting companies to start, work on capacity building in the chain and set-up a sustainable value chain with contains also after the intervention. Diplomatic help will be needed to work on import issues, and work on e.g. breeders rights, clear and consistent import restrictions.
2. **Assist and strengthen a system of proper soil testing and mapping (A2).** Soil testing will help improving the yield (use of fertilizers based on specific soil properties instead of years of experience), reduce inefficient use of fertilizers and indicate possible presence of soil related diseases. Setting up a mapping system will even give Uganda the opportunity to centrally work on cleaning the soil, or regulate the areas where potato growing is interesting. For the projects and for the seed potato companies, good soil testing (also on soil related diseases) is crucial for strengthen the potato chain in Uganda. Knowing the soil situation is an essential start point for intervention. Proper soil testing will generate work for people to carry out the tests and for people in the laboratory to get the results. Develop2Build of RVO is a program that can assist in creating a proper soil testing system. Diplomatic help will be needed to align governmental bodies in Uganda in the added value. In value chain strengthening programs like SDGP and impact cluster commercial companies for soil testing can be part. Possible SIB intervention can give commercial companies that want to expand their businesses outside the borders of the Kingdom of The Netherlands a change.
3. **Inadequate knowledge and skills (A3, B2).** Even if the quality of seeds is there, training of farmers keeps important to improve the potato sector in Uganda. There is still a lot to improve when it comes to good agricultural practices (farming, post-harvest losses, marketing etc.). RVO can assist in strengthen the knowledge and skills of the small holder farmers by the SDGP program and setting-up an impact cluster. Also the Nuffic Orange Knowledge Programme (OKP) can be of good added value to contribute to a society's sustainable and inclusive development.

4. **Absence of regulatory framework for seed potato certification and variety protection (A4).**

A certification system would strengthen the potato farmer in reliable seed potatoes. A good operation quality and certification system is the basic to ensure uniform quality throughout the country. Important in a system is an independent body assist the total market. It will generate work (inspectors), and contribute to a sustainable, resilience sector; reliable higher quality seed potatoes. A Develop2Build program can strengthen the current certification system of Uganda by invest in capacity building through the knowledge of the Dutch NAK tuinbouw and the NVWA.

One of the main reasons Dutch seed potato companies are reserved to invest in Uganda is the absence of a good working system for introducing new varieties (complex), protection of that varieties and strong and hard to manage import regulations. Strengthen the local farmers with high quality seed potatoes can be done by importing from surrounding countries or from The Netherlands, besides having a own program. The Embassy can promote the possible advantages and can assist in setting up/strengthen a potato platform where all the stakeholders of the value chain are part of. Discussing the faced problem and working together on solutions will strengthen the development of the sector. Further improvement of the Uganda potato sector with Dutch varieties create more value in the chain, new improved varieties that yield better, are more climate resistance, able to improve the quality of the soil, and at the end creates a stronger value chain.

To create most impact in the chain, related to the goals of the Dutch Government, above interventions have most priority. Besides these key interventions, we would also like to address other challenges and their respective solutions to further strengthen the potato sector in Uganda.

5. **Safe use of customized chemicals.**

There has been misuse of agro-chemicals such as fertilizers and pesticides which has resulted into land and environmental degradation. Therefore, there is a need for training and creation of awareness among farmers and agro-stockists on safe use and handling such chemicals for preservation of a healthy environment. New crop protection methods and chemicals can help farmers to be more effective, spray less or spray more specific for example on pests and diseases. Effective spraying will contribute to preserve the land and environment in general.

Counterfeit products on the market. Due to limited enforcement of government policies/regulations on agro-chemicals, agro dealers manipulate products hence adulterated products on the market whose efficacy is low, consequently low crop performance and high losses. Further to this, the effectiveness of cheap fertilizers and chemicals is also sub-standard. It would be helpful to attract bigger crop protection and fertilizer companies to enter the Ugandan market, with higher quality products. It good be good for the initiated programs to stimulate cooperation with companies who deliver reliable high quality crop protection products and fertilizers.

6. **Potato processing and value addition.**

With the population doubling every 25 years and urbanization continuing to grow by 13% in the next 10 years, feeding habits are rapidly changing in favour of easy-to-prepare foods

such as chips. This offers potential for the growth of the processing industry and also available market access for both fresh and frozen potato chips in the region. The recent establishments of medium-sized potato processing facilities in Kabale and Kampala, the increased level of processing potato crisps (chips at small-scale level), the new SDGP project to strengthen the potato chain by operationalising and setting up an extra crisps factory are all positive indicators of increased demand for ware potato. Potato processing and product transformation improve the shelf-life of potatoes as a perishable commodity and enhance price increase for the products, as well as increase participation in regional markets.

In Uganda, most of the potatoes are utilized and consumed in form of boiled tubers, processed into French fries/chips followed by potato crisps with the former being more demanded. The main chips processors are the makeshift, take-aways and restaurants while Psalms Foods Industries and small cottage processors are for crisps. Potato processing industry in Uganda has been constrained by lack of varieties with required processing qualities, Rwangume, Kachpot and Kinigi being the most varieties currently being used.

The number of imported potatoes from neighbouring countries to supply for example Cafe Java, Java House, Cafe Sere etc give a huge opportunity to be produced in Uganda especially if farmers or their unions supply high quality potatoes all year around presumably to set up professional mid-tech storage facilities.

Government involvement

There has been limited involvement of the government in the development of potato value chains compared to other crops, however, the Ugandan government through its Agriculture Development Strategy Investment Plan (DSIP), potatoes have been identified as one of the strategic commodities consequently with support for some value chains especially the seed value chain. The government through its institutions such as NARO, NAADS/OWC is promoting the potato sector through research and development for variety development and production of quality seed and is keen to support farmers with effective extension, advisory services, supportive agricultural regulatory and policies, as well focusing attention and direct resources to;

(i) increase potato production and productivity through the use of modern production technologies and techniques to satisfy the growing local demand, (ii) build the capacity of potato processors to increase quantity and quality of processed potato products, (iii) invest in developing potato varieties with suitable processing quality attributes and (iv) lastly, encourage local processors to apply for quality certification to build compliance with future export requirements.

Therefore, cooperation between the Dutch potato companies and the Ugandan government is paramount to further strengthen, enhance knowledge for sustained business and growth in the Potato sector here in Uganda. This collaboration can result into setting up an easy and quick system for registration and protection of new varieties, and easy steps can be stipulated to improve the quality of availability of high-quality seed potatoes. The Netherlands can share its expertise in strengthening the certification of pre-basic, basic, and certified seeds, intensive soil testing for improving the soil quality, and have a good overview of the quality of the soils in the country to benefit its counterparts.

A potato platform between the sector and governments can strengthen the complete chain. A platform will help to identify possible challenges where the different actors in the chain face quickly.

Infrastructure

a) Poor transport infrastructure particularly in production areas in the highlands leads to delays, yet potatoes are bulky and perishable. During the rainy seasons many access roads are hardly accessible. In the case of export to distant locations such as Juba in Southern Sudan, the quality of potato deteriorates when transported in polythene bags on open trucks for periods longer than a week.

b) Potatoes require good storage for longer shelf life. Farmers interviewed mentioned that they do not store ware potatoes as a technique to regulate supply for better prices. Instead, farmers delay the harvest of the crop especially in the dry season as a storage option, yet this exposes the mature tubers to insect attacks. Therefore there is need for improved post-harvest handling infrastructure such as storage technologies for enhanced quality seed and ware potatoes. This will further help address the issue of price fluctuations and seasonality at the marketing and processing levels. Farmers will be less vulnerable to fluctuating market prices when value addition processes become more widespread and the potato buyers shall be able to offer premium prices. The perishable nature of potatoes will no longer be a threat.

Youth involvement (Job and Income creation).

The youth are becoming more interested in farming, particularly in potato production. This interest enhances job and income creation, taking farming as a "Business". In addition, young people often adopt new things much more easily than older people. They are curious and are willing to try new things. Many support programs are also designed to strengthen youth's and especially women's ability to think smart hence programs could help the potato sector in the long run.

Collaboration between East African Union countries

Through regional integration, member countries of the East African Community (EAC), Uganda inclusive, would share available opportunities and challenges in the potato sub-sectors. In this view, member countries would also share or exchange technical expertise of the potato industry as well as potato germplasm or varieties with acceptable attributes that suit different geographical locations in respective countries.

Other benefits to member countries include, among others, a waive on restriction of movements and tax levies on potato related services and materials; as long as they fall under the harmonized East African Standards and protocols for movement of potato (seed and ware) and potato products among member countries such as those developed by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and the common market protocols. However, these standards are not yet implemented in most of the EAC countries, Uganda inclusive which is an impediment to the development of the potato sub-sector. Mediate the existing concerns especially about new varieties within the COMESA platform so as to quicken the introduction of new variety processes in another country having been tried and is successful somewhere else in Africa with a track record. It would be advisable to investigate how The Netherlands can position itself in a better implementation

and harmonization of the East African Standards and protocols for movement of potatoes within the EAC Countries.

Possible tools for intervention

The Dutch government can make a major contribution to the start-up and support the aforementioned 10 named Strategic Interventions in collaboration with its agricultural consulate and the Dutch Enterprise Agency. Below is an overview of the possible programs and the contribution they can make to strengthen the potato chain in Uganda.

Program	Intervention
Diplomatic help	<ul style="list-style-type: none"> Constantly promote by governments the will to help with sector development and the aim and possible help with using of high-quality seed potatoes, Good Agricultural Practices and good inputs. Bringing to attention that it is the market that need to adopt a variety. Seed potato companies don't invest millions of euros to introduce a bad variety The main goals of the government in Uganda do not seem to match with the NL focuses. But from the Dutch side, a lot of investments within programs are done. There are great opportunities to start that conversation, learn from each other, and look for the possible alignment of interests and understanding and see how the potato can contribute to the goals of Uganda even more.
NUFFIC OKP	<ul style="list-style-type: none"> To further professionalise potato cultivation (bus also other crops) training is necessary. Within training and for example, setting up demonstration fields within the training, it could be an added value to let the Dutch improved varieties be part. In that way a combination between Good Agricultural Practises, introduction of new varieties, and the effects of it on yield improvement is made. Linking the NUFFIC OKP programs with current programs in Uganda will strengthen and extra reinforce the projects to ensure success even more. Possible areas are: <ul style="list-style-type: none"> (monitoring) food safety in the chain, technical cultivation entrepreneurial skills, including production and simple business skills to strengthening younger (and/or) female growers.
Impact cluster	<ul style="list-style-type: none"> To help the Dutch enterprises to enter the Ugandan market, an impact cluster is a good instrument. Setting up a consortium with the important linkages in the potato chain like a seed potato company, storage company, a fertilizer and crop protection company and an implementation partner will give the possibility to train agronomists, cooperation's or (lead) farmers and guide them intensively and give them the possibility to enter the market more easily than doing it by themselves.

Dutch Good Growth Fund	<ul style="list-style-type: none"> Using this program can help Dutch entrepreneurs an extra aim to invest in Uganda and enter the market. Possible sectors: storage, smaller seed potato companies, suppliers of fertilizer or crop protection material and simple technology and machines for mechanized potato production and processing
Devolop2Build	<p>Research in the healthiness of the soil and mapping could be a big opportunity for Uganda. Using Devolop2Build to assist the Ugandan government with knowledge from the Dutch government for better map potato research and especially disease pressure (tuber and soil) by exchanging knowledge can be a big added value for both sides. Also for Dutch export companies, it's important to know the quality of the soil and the current diseases.</p>
YEP Program	<p>In Uganda, we believe there is a big need for practical information that can be used immediately. The YEP program can help with practical guidance for young people in Uganda by supporting young experts from NL who do not support becoming a 'grower' as standard but help by setting up related companies that provide added value for the chain. Small-scale cultivation is not the future. It is precisely by having youth start up a different, hopefully sector-related, new opportunity!</p>
Quick wins	<ul style="list-style-type: none"> Seminar by seed potato specialists NL for seed potato growers/the extension services in Uganda. Exchange program NL <-> OEG research potato diseases/soil related diseases and possible solutions. It is important to show Uganda that the quality standards of Dutch seed potatoes are very high, and that new varieties can help with a lot of issues (soil and disease-related). Diplomacy helps to simplify the import of seed potatoes to Uganda (governments are currently working against each other). Embassy can stimulate even more intensively that there are great opportunities with Dutch seed potatoes. Support and stimulation of demonstration fields of NL varieties and techniques Further intensify and support the potato platforms It is important for mutual coordination and for the embassy to ensure that projects connect with each other and work together towards a common goal. Training programs for farmers to increase their yield and become more sustainable for the longer term Providing and application of knowledge about soil and it's testing Acquire higher potato seed standards Improved fertilizers and crop protection (including training) Education on proper storage facilities, and creation of new locations

For more insights into a market relevant Curriculum, Suggestions on developing a robust infrastructure, Seed multiplication and starting materials, Access to quality to inputs, Process and Value addition can be found on Annex 3.



Recommendations and Conclusion for follow-up

Uganda has immense opportunities with its vast, redundant fertile land for potatoes farming to thrive as potatoes have the potential to become an important (cash) crop because there is a will in the sector.

The first processors are already in the country, so there are several off takers other than the local market which presents huge opportunities for Ugandan farmers. According to UN Data, The Ugandan population in 2020 was estimated at 45 million. With such high numbers of inhabitants, there is potential to supply this huge market. If only the potato value chain is more coordinated and cooperative to front high quality potatoes, to harness the knowledge, skills and experience eventually breeds an interesting environment for potato processing investments. The market is there already.

The Dutch companies bring on board a wealth of knowledge and products, supported by the Embassy in Kampala and RVO on several programs through introductions and lobbying within the sector to see it develop.

Dutch Engagement

Bulletheaded the possible ways to cooperate;

- ❖ Acquire higher potato seed standards and assist in train on Good Agricultural Practices. Importing high quality seed potatoes of new varieties to address yield improvement and different customer needs will help Ugandas' farmers to improve their yields and sales abroad. A robust distribution channel needs to be set up, because seed potato companies normally deal with commercial farmers. We recommend importing certified quality seeds so farmers have higher yields in the next season because unfortunately, setting up the chain with mini tuber production is too risky due to the pest and diseases. A quality certification system for seed multipliers can guide on best practices on the way forward.
- ❖ Providing and application of knowledge about soil and it's testing. Ground related diseases and nematodes will affect the growth of potatoes, and the soil for longevity hence this alliance would reverse the direct result, and also enable the country to grow (seed) potatoes on a piece of land for a longer term. NAK AGRO and Dutch organizations can share notes with NARO to identify loopholes and find soil solutions for local farmers.
- ❖ Improved fertilizers and crop protection to give better results in yield and cost price. The training and correct application can help reduce environmental friendly inputs to achieve a higher result.

- ♣ Education on proper storage facilities, and creation of storage locations to reduce post harvest loss. Normally farmers harvest around the same time and the lack of these facilities brings about waste and losses evident in other seasons, hence this intervention will enrich farmers and cooperation's so there is availability of products through the year to keep the wheels sector turning and earn money through the chain.
- ♣ Strengthen the potato value chain to link actors to each other by setting up/strengthening a potato platform. The platform can align all the actors within the chain, chaired by the Ministry of Agriculture Animal Industry and Fisheries (MAAIF). The platform will room give to discuss the general improvements and connect all the stakeholders to each other.
- ♣ The Dutch government through the Netherlands Enterprise Agency (RVO) runs programs to assist Dutch companies to enter a new market, as well as strengthen and work with the Ugandan government and companies. This presents an opportunity to set up a sustainable relationship. In addition, is the agricultural department of the Embassy in Uganda that fosters diplomacy within Uganda.

The Embassy and RVO Intervention

Consistently, the Embassy in Uganda aims at harnessing the insights of Dutch knowledge to tap into the several opportunities to strengthen the potato value chain. Ministries work on a number of projects in a given financial year hence the need to align with them to bridge gaps to strengthen the potato chain. The potato platform can be a good instrument to create a structure where Ugandan and Dutch partners in the chain speak together about the improvements that can be made starting with the Embassy to negotiate with MAAIF to have potatoes up on their priority ladder to improve the sector to see growth in the National GOP. There is already a Ugandan Potato Platform that can possibly be a good start position, although it seems to be not a platform initiated from MAAIF or the Embassy to give it a position for improvement through the whole sector including the policy makers.

Potato seed importation challenges. The Embassy would be of great help in setting up a robust system for example putting pressure on MAAIF to acquire import permits for varieties on the COMESA list, and also aim to speed up the registration process for varieties and many others, in which diplomatic help will no longer be needed at all. Assisting Dutch seed potato companies to introduce their new improved varieties helps the Dutch sector to strengthen their position in Uganda.

Exchange programs still works. Sharing insights on how the system works in the Netherlands to make improvements in the value chain. The quality of the Dutch seed potatoes, soil management, the synergy among the chain stakeholders with their knowledge on processing and best storage practices need to be the focus.

Apply theory through practice. Most people in Africa believe by seeing, the constant practical support, stimulation of demonstration fields and techniques are still lacking.

With a range of strong programs, RVO is in the best position to strengthen the potato value chain. By setting up an impact cluster, this will pave a future prosperous relationship between Ugandan and Dutch enterprises. It's a useful instrument to assist in setting up, train and introduce new products to guide that process. The Devolop2Build program can be a good instrument to assist MAAIF and its agencies to on knowledge to strengthen the seed potato

certification, protection of varieties and soil testing system to map disease pressures in the country to improve the action plan.

Worth noting, is the YEP program that assists Enterprises to employ young (local) people which gives them the opportunity to develop themselves in the potato sector.

Also, the NUFFIC OKP program professionalizes potato cultivation by training young lead farmers (with high reputation in the area) and agronomists/the extension service with the aim for them to be able to train other farmers in their areas on improved agricultural practices.

A more detailed description of the possible interventions are highlighted in the priority intervention.

Annex 1

Consulted Stakeholders:

Private Sector	(Semi) Public
KWESPA (Farmers Union)	NARO-KAZARDI
MIFA (Farmers Organisation)	IFDC
KASSPA	Embassy of the Netherlands
WOSWAPPA	RVO
Namakwaland	CIP
Cafe Javas	UNSPAA
Chili's Restaurants	Agriterra
Shoprite	Uganda Potato Platform
Agromax	Kisoro District Local Government
Psalms Food Industries	
Faith Agro Inputs	NSCS
OSHO Chemicals	MAAIF
Kisoro District Potato Growers Cooperative Union	NAK Tuinbouw
Kanaba Investment Co. Ltd (Ware Potato trading company)	NAO
Capital Shoppers	
Hanse Agrostore	
Various Dutch speed potato Companies	
Solynta	
MPODA (Pototo Traders)	
Dr. Clarke (Large scale potato farmer)	
Bodemliefde	



Annex 1

Annex 2

STRENGTHS

- 1.1 Potato is an important food and cash crop in the producing areas
- 1.1 Potato is commonly consumed
- 1.2 Two or three cropping seasons in Uganda
- 1.3 Potato is cheap and has a high nutritional quality
- 1.4 Capacity building and public breeding programs by ZARDIs
- 1.5 Good climate to grow potatoes, with very fertile soil
- 1.6 Existing presence of commercial farmers
- 1.7 Intensive input use by private seed multipliers
- 1.8 Improving on-farm seed quality management
- 1.9 Seed multipliers provide technical support to their customers
- 1.10 Access to range of improved varieties
- 1.11 Availability of various market outlets
- 1.12 Long-lasting business relationships between farmers and traders
- 1.13 UNSPPA promotes production and distribution of quality seed in Uganda
- 1.14 UNADA represents the Ugandan agro-input dealers
- 1.15 Farmers have a variety of information sources (public extension, private extension, farmer group, trader)
- 1.16 Farmers and traders are organized in groups/associations
- 1.17 Existence of product standards for processed potato products
- 1.18 Seed) potato production and processing is a lucrative professional activity
- 1.19 Innovation platforms enable multi-stakeholder exchange
- 1.20 Growing population

1.1 Potato is commonly consumed by all categories of household members

Potato being a major food in most households, all members consume potatoes in the different forms; boiled, roasted, mashed or processed into French fries or crisps. This offers opportunities for value addition and product transformation for increased incomes to chain actors.

1.2 Two or three cropping seasons in Uganda

As opposed to European countries, Uganda has the advantage of more than one cropping season. This offers opportunities to ensure consistent supply to the domestic market and processors.

1.3 Potato is cheap and has a high nutritional quality

Potato is nutritious, rich in carbohydrates, proteins, vitamins C and 86, fibre, potassium and other minerals required by human bodies. Therefore, the crop offers alternative source of such nutrients that some households would not afford, which increased its demand.

1.4 Capacity building and public breeding programs by ZARDIs

Kachwekano ZARDI of NARO, is mandated with potato research and development, potato technology development and dissemination (such as new varieties), production and multiplication of clean foundation planting materials (potato variety cleaning & multiplication). All these require resources and facilities in terms of infrastructure and manpower and expertise. Hence a need for capacity building in terms of infrastructure and training of staff of the ZARDIs mainly Kachwekano and Buginyanya ZARDIs and strengthen the breeding programs for enhanced development of new varieties and well as improving the quality of the existing varieties.

1.7 Intensive input use by private seed multipliers

To increase potato productivity, seed multipliers have adopted an integrated use of all quality inputs; seed, fertilizers, and crop protection products (insecticides, fungicides etc) with good management practices. This increased productivity contributed on reducing the seed availability gap.

1.8 Improving on-farm seed quality management

Despite the unavailability of clean seed potato, farmers have been trained by development partners such as CIP and IFDC and gained skills and knowledge of improving their home saved seed through techniques such as Small Seed Plot and Positive Selection for increased productivity.

1.9 Seed multipliers provide technical support to their customers

Seed multipliers offer support services to their seed buyers/customers in form of technical advice on use and handling of seed, fertilizers and agro-inputs as well as good agronomic practices for increased productivity and profitability of the enterprise. This customer service attracts more seed buyers.

1.10 Access to range of improved varieties

There is a wide range of potato varieties developed by the national potato program, which farmers have access to and can grow depending on variety attributes and market preferences/demand. Such varieties include: Rutuku (Uganda 11), NAKPOT series 1-5, Kachpot1, NAROPOT1, NAROPOT2, NAROPOT3, NAROPOT4 (Rwangume), Kinigi and others.

1.11 Availability of various market outlets

In Uganda, there are various markets for potatoes; restaurants, schools, hospitals, take a ways/fast-food kiosks, makeshift points, and local hotels/eating places. All these offer great opportunities for potato to be easily sold hence an important quick income generating crop to farmers.

1.12 Long-lasting business relationships between farmers and traders

Farmers have developed strong business relationships with traders where by the transactions may be in form of credit which the latter buy potatoes on credit and pay after selling and vice versa the former may be advanced money by the trader and payback in form of potatoes after harvesting which may be through mutual understanding between the two due to the established relationship.

1.13 UNSPPA promotes production and distribution of quality seed in Uganda

UNSSPA which is a seed production association based in Southwestern region, procures basic seed of different varieties from NARO-KAZARDI which it further multiplies into certified/ Quality Declared Seed (ODS) and distributes to farmers within their locality and other in the country for production of ware potatoes. Therefore, UNSPPA, contributed to increasing availability of clean seed potato to farmers for increased productivity and profitability of the enterprise.

1.14 UNADA represents the Ugandan agro-input dealers

The Uganda National Agro-Dealers' Association is an umbrella that brings together all agro dealers in Uganda. The association trains, registers and together with MAAIF, monitors members for quality assurance and compliance hence reducing the escalation of counterfeit products on the market, which would otherwise negatively impact on farmers through poor crop performance and loss.

1.15 Farmers have a variety of information sources

Farmers access information on farming practices, marketing and business linkages through different sources mainly; public extension (MAAIF and District Local Government extension staff), Private extension (NGOs such as IFDC, CIP, Self Help Africa, ISSD, and private companies), farmer groups/fellow farmers and traders.

1.16 Farmers and traders are organized in groups/associations

Most potato farmers and traders are organized in groups which enable them to lobby for support from government and development partners. Such developed institutional capacity facilitates actors' advocacy for enabling policies as well as collective action in potato businesses.

1.17 Existence of product standards for processed potato products

In Uganda, there are developed standards for processed potato products (French fries, crisps) by Uganda National Bureau of Standards (UNBS) which processors should comply with. Products compliant with specified standards, which would increase import substitution and have chances of penetrating the export markets outside Uganda with increased foreign exchange to the country for the development of the potato sector.

1.18 (Seed) potato production and processing is a lucrative professional activity

Clean seed potato production and marketing has higher returns to investment due to associated high price compared to ware potatoes. Therefore, farmers engaged

in production of clean seed have benefited higher incomes and have taken "Farming as a Business" not a hobby, which has greatly improved their livelihoods.

1.19 Innovation platforms enable multi-stakeholder exchange information

Potato value chain actors and stakeholders formed an innovation platform, Uganda Potato Platform with regional platforms for sharing knowledge and information related to potato. The platforms which bring together the actors and stakeholders increase their lobbying and advocacy capacities for support services and enabling policies by government respectively as well as enhancing collective action among members.

1.20 Growing population

In Uganda, there are over 200,000 households whose subsistence depends on potato for livelihood. Additionally, the growing population and urbanization in will result into increased demand for potato¹⁴, hence increased incomes and livelihoods for farmers and other actors.

Weaknesses

- 2.1 Absence of regulatory framework for seed potato certification
- 2.2 Limited capacity to produce G2 basic seed
- 2.3 Almost No large private sector involvement in seed multiplication
- 2.4 No appropriate grading, labelling, and packaging of quality seed
- 2.5 High prices of clean seed
- 2.6 Limited awareness on and use of the available technologies improving on-farm seed quality management by potato farmers
- 2.7 Farmers offer recycle seed
- 2.8 Limited value adding to home-saved seed sold at the market
- 2.9 No or less crop rotation by potato farmers
- 2.10 Applied seed rate lower than recommended seed rate
- 2.11 Farmers lack knowledge on proper use of chemicals and are generally unaware of the health risks posed by its use
- 2.12 Most farmers know little about pest characteristics and their natural enemies
- 2.13 Lack of adequate storage facilities leading to fluctuating prices
- 2.14 Farmers are generally price takers because of their inability to negotiate effectively
- 2.15 Weak market linkages (Lack of trust between value chain stakeholders)
- 2.16 Informal marketing chain with high transaction costs
- 2.17 Most of the cash is used to meet family needs, little is re-invested into potato production
- 2.18 Limited participation of women in potato marketing and decision making
- 2.19 Men underreport value of potato selling
- 2.20 Limited access to market information
- 2.21 Lack of packaging and processing standards
- 2.22 Limited value addition on fresh ware potato
- 2.23 Limited range of locally processed potato products
- 2.24 Varieties preferred by potato processors are not grown widely
- 2.25 Weak enforcement of quality related standards on potato processing
- 2.26 Small number of agro-dealers compared to the number of Ugandan farmers
- 2.27 Lack of accessible and affordable agro-inputs
- 2.28 The Ugandan extension system lacks funding and qualified professionals
- 2.29 Insufficient technical coaching of the Ugandan potato farmer
- 2.30 Farmer organizations play a minor role in agricultural extension and ware potato marketing
- 2.31 Lack of organization of value chain stakeholders

2.1 Absence of regulatory framework for seed potato certification

Despite efforts invested in seed inspection by farmers and MAAIF, certification of vegetative propagated crops is not yet in place unlike for other grain and pulse crops. This has resulted into marketing of poor and diseased potato tubers as seed, since there is no distinguishing features that would differentiate clean and poor quality seed. This scenario presents a disincentive and competition to quality seed producers since there is no price differentiation between the two types of seed.

2.2 Limited capacity to produce G2 basic seed

Limited capacity to produce G2 and G3 (pre-basic seed and basic seed respectively) There is limited production of foundation seed potato; pre-basic (G2) and basic (G3) seed by the public potato research institute, Kachwekano ZARDI due to limited resource. Subsequently, seed potato producers who source basic seed for multiplication into Quality Declared Seed or certified seed do not access adequate quantities of clean planting materials which in turn affects the whole value chain.

2.3 Almost No large private sector involvement in seed multiplication

There is almost no large private sector player involved in seed multiplication apart from the farmer producers' associations like UNSPPA, KASPPA, MIFA whose production capacity is small. Participation of large private sector players would enormously increase availability of adequate clean seed at affordable prices, attracting more investments in other value chains. However, there are some companies that have pioneered in investment of tissue culture facilities for production of foundation planting materials; Clean plantlets and minitubers for multiplication into G2.

2.4 No appropriate grading, labelling, and packaging of quality seed

Due to lack of certification of seed, there are no labels for clean seed. Even other value addition services seed is marketed ungraded in different poor packaging materials (jute bags) that enhance rotting and more post-harvest losses. There are no standardized measures for seed, which brings a lot of mistrust in the seed market.

2.5 High prices of clean seed

Clean seed potato is expensive due to associated high price. This deters smallholder farmers from use of quality seed and compels them to buy cheap low-quality seed subsequently leading into low yields.

2.6 Limited awareness of farming practices and farm management

Despite interventions by some development partners in capacity building trainings for farmers, there are still many farmers who have limited knowledge and skills in farming practices and crop management hence achieve low yields. Therefore, a key intervention would be to ensure availability of additional trainings or access to information for such farmers to improve their management practices for higher yields.

2.7 Farmers over recycle seed

Due to unavailability of adequate quality seed, most farmers use their home-saved tubers from ware potato harvests that has been grown over several seasons/recycled. This results into accumulation of potato diseases and pests that result into seed degeneration with subsequent production of low quality and diseased tubers, and low yields which in turn negatively affects other value chains like processing.

2.9 No or limited crop rotation by potato farmers

Due to limited land and land fragmentation resulting from population pressure in potato production areas, there is limited implementation of effective crop rotations of at least four seasons with no potato on a piece of land. This enhances disease and pest transmission as well as nutrient depletion consequently low yields and low-quality potatoes. This in turn indirectly affect other value chain levels.

2.10 Applied seed rate lower than recommended seed rate

Some farmers do apply less than the recommended seed rate (800-1,000 kg/acre) due to lack of knowledge on recommended spacings; 60-70 x 30 cm and 75 x 30 cm, ware and seed respectively. This results into less yield than expected and such farmers need more capacity building.

2.11 Farmers lack knowledge on proper use of chemicals

Most farmers lack knowledge and skills on proper use and handling of agro-chemicals such as fertilizers and pesticides; underdose or overuse and poor disposal of such products result into environmental degradation and health hazards or not the desired results in terms of pest and disease management.

2.12 Most farmers know little about pest characteristics and their natural enemies

Due to limited farmer trainings, most farmers have little knowledge on pest identification and management which results into crop failure and sometimes total loss.

2.13 Lack of adequate storage facilities leading to fluctuating prices

There is a lack of adequate and appropriate storage facilities, farmers are compelled to sell at very low prices during peak harvesting period to avoid post-harvest losses attributed to the perishability nature of the crop. Storage facilities would improve the shelf-life of potatoes and facilitate farmers to sell when prices improve during scarcity.

2.14 Farmers are generally price takers because of their inability to negotiate effectively

Most farmers are not organized in groups, hence have no collective action, and less bargaining power in marketing their farm produce. Such farmers are cheated by brokers or buyers and take any price offered for their commodities.

2.15 Weak market linkages

Low/lack of coordination and communication among the value chain actors, each one operating individually in isolation. This makes it difficult for the actors to establish linkages for effective markets. There is a lack of trust and organization between value chain actors. Most of the chain actors at different levels are not organised hence operate independently with

no organ/structure that brings them together for collective action and arbitration in case need arises. In such a case, it becomes difficult for the chain actors to build trust among themselves.

2.16 Informal marketing chain with high transaction costs

In potato value chains, marketing is informal were transactions are made with no contacts but on mutual trust between parties. Even with exports, produce is smuggled through indirect routes or porous borders with no trade documents.

2.17 Most of the cash is used to meet family needs, little is re-invested into potato production

Most farmers use potato proceeds for family needs without reserving some for re-investment in potato production activities such as purchase of quality agro-inputs. This compromises the farming business and compel them to use low quality agro-inputs hence poor/low outputs.

2.18 Limited participation of women in potato marketing and decision making

Most of potato production activities are done by women. However, they are less involved in marketing and decision making for the use of proceeds, which is a disincentive to production. Their involvement in decision making, they would be motivated to produce more and enhance the development of the sector.

2.19 Men underreport value of potato selling

Coupled with less involvement women in potato marketing and decision making, men underreport the value of potato sales, in bid for women not to know. This habit leads to the under development of such households.

2.20 Limited access to market information

Due to less coordination among the value chains, there is limited access to vital market information and knowledge about where to access quality produce, of which variety and actual demand. Development of market information technology applications and actor/stakeholder platforms would enhance availability and sharing of market information by the different actors.

2.21 Lack of packaging and processing standards

Lack of developed packaging and processing standards is a major challenge to marketing of potatoes and potato products. Nonetheless, there some standards established by UNBS but are not enforced which has resulted into poor standard processed products in the market which cannot penetrate the regional markets for generation of foreign exchange.

2.22 Limited value addition on fresh ware potato

Farmers are still reluctant to improve the quality of their produce through value addition practices like sorting and grading, packaging which would increase on prices of their products. Such products cannot penetrate regional markets where quality is a priority.

2.23 Limited range of locally processed potato products

In Uganda, potato processing is still in its infant stages, only focusing on two products: French fries/chips and crisps. There are other potato products which are not yet ventured into such as flour, starch and adhesive materials. These are other opportunity areas for investment.

2.24 Varieties preferred by potato processors are not grown widely

Most of the potato varieties grown in Uganda do not have processing qualities/attributes that conform to processing requirements. Those that have such attributes such as some Dutch varieties recently released for commercial production are not easily available for farmers to grow. This now becomes another opportunity area for investment in local multiplication of such varieties to serve the processing market.

2.25 Weak enforcement of quality related standards on potato processing

In relation to lack of and implementation of processing standards by processors, there is weak enforcement of such standards developed by UNBS, which has resulted into poor quality products on the market, which may pose health hazards to consumers.

2.26 Small number of agro-dealers compared to the number of Ugandan farmers

2.27 Lack of accessible and affordable agro-inputs

Agro-inputs; seed, fertilizers and crop protection products are very expensive for smallholder farmers. This makes farmers to do away with such inputs which results into low yields and returns despite the efforts and other resources invested in production. If there were some interventions in form of subsidies on such inputs, such farmers would also invest and realize increased yields and returns.

2.28 The Ugandan extension system lacks funding and qualified professionals

Due to limited funding and resources, the extension system is less effective in delivery of extension services such as farmer trainings and technology dissemination. Extension staff are not well facilitated to conduct such activities in addition to being offered capacity building in terms of staff refresher training programs for enhancement of their knowledge and skills. This in turn affects farmers in knowledge gap for crop management and accessibility to improved technologies for increased productivity.

Opportunities

- 3.1 BugiZARDI multiplication rate of basic seed is 11 t/h, the average multiplication rate of private seed multipliers is 5.8 t/h
- 3.2 The Uganda Hotel Owners Association is becoming more organized and has communicated a keen interest to start buying potatoes collectively.
- 3.3 6 private minituber seed producers
- 3.4 Big potential national demand for clean seed
- 3.5 Adding value to home-saved seed and ware potato increases the selling prices at the market
- 3.6 Majority of potato farming households have farming as main economic activity
- 3.7 An important factor influencing varieties chosen for cultivation is market demand
- 3.8 Potato production generates rural labour opportunities
- 3.9 Ware potato prices vary by variety
- 3.10 Being a member of a farmer group positively influences the volumes of potato sold
- 3.11 Development of standards and grades around different market segments
- 3.12 Farmer organizations can facilitate access to market information and group selling
- 3.13 Existence of women's potato clubs to promote collective action by women improving their ability to engage in potato marketing:
- 3.14 Ugandan consumers prefer the taste of fresh chips
- 3.15 Increasing demand of processed potato products due to increasing urbanization and rejuvenation
- 3.16 Large East African Community market for potato
- 3.17 Draft of the new National Seed Policy provides for recognition and regulation of Quality Declared Seed (ODS)
- 3.18 Emerging potato processing industries
- 3.19 Enhanced communication and access to finance
- 3.20 Promotion of locally produced products by government e.g Buy Uganda Build Uganda (BABU)
- 3.21 Improved quality potatoes varieties for processing
- 3.22 Seed potato production and processing is a lucrative professional activity
- 3.23 Innovation platforms enable multi-stakeholder exchange

3.1 BugiZARDI multiplication rate of basic seed is 11 tons a hectare, the average multiplication rate of private seed multipliers is 5.8 ton a hectare (t/h)

There is yield potential for potato. The on-station (BugiZARDI) multiplication rate using basic seed is 11 t/h while the on-farm multiplication rate is 5.8 t/h. With improved management practices, it is possible for farmers to achieve the potential yield.

3.3 6 private minituber seed producers

There are six (6) private screen house owners in Southwestern Uganda, producing minitubers (G1 seed) for multiplication into pre-basic and basic seed. These complement on foundation seed produced by NARO-KAZARDI to enhance availability of quality/clean seed to farmers.

Therefore, interventions in on-farm production of foundation seed will be key in increasing seed availability to farmers at affordable price.

3.4 Big potential national demand for clean seed

The demand exceeds supply for clean seed. The main supply is less than 5% of the national demand, the main clean seed potato producers; KAZARDI, Screen House Owners and farmers association produce inadequate quantities to satisfy the national demand, which presents more opportunities for investment in clean seed potato production.

3.5 Adding value to ware potato increases the selling prices at the market

Value addition in terms of sorting, grading, and packaging attract buyers and increase prices of ware potato. Therefore, so long as farmers adopt value addition to their farmer produce, they will get good prices, which will promote the potato business.

3.6 Majority of potato farming households have farming as main economic activity

Potato is a highly paying crop with high returns on investment. Potato farmers in the production areas majorly depend on the crop for both income and food. The crop serves as the main cash crop compared to traditional cash crops; coffee, tea etc in the non-potato growing areas.

3.7 An important factor influencing varieties chosen for cultivation is market demand

Farmers' choice of varieties grown is dependent on market needs in terms of attributes like processing, ware or table and even tuber color for example red skinned potato tubers are preferred by the market than white skinned tubers. Farmers grow market preferred varieties which are easily taken up by buyers, therefore, availability and investment in production of varieties with good attributes for processing will promote and develop the potato sector.

3.8 Potato production generates rural labour opportunities

Many farmers are increasingly becoming interested in potato production. This will create more job opportunities for the youth and women who will be employed at different value chain levels; production; planting, crop management, harvesting and post-harvest management and marketing activities. The sector employs many actors; farmers, traders, brokers and transporters which contributes to the growth of the national economy.

3.9 Ware potato prices vary by variety

In potato markets, prices vary by variety. Some varieties are more preferred than others depending on the attributes such as processing qualities, taste, and tuber skin colour. For example, Kinigi is the most preferred variety for its good qualities for french fries/chip followed by Rwangume (NAROPOT4) and Victoria the being the least.

3.10 Being a member of a farmer group positively influences the volumes of potato sold

Farmer associations or groups enhance collective action in terms of marketing of farm produce. Individual members bring together their farm produce at collection centers which increases volumes for sale and increasing farmers' bargaining power for good prices. Therefore, institutional development for farmer groups plays a big role for group cohesion and sustainability.

3.11 Development of standards and grades around different market segments

Potato standards and grades are developed for different potato types and products, which is not yet established in Uganda. Therefore, there forms a gap that can be exploited and invested into to improve quality of such products.

3.12 Farmer organizations can facilitate access to market information and group selling

Through farmer organizations, farmers can exchange and share market information on buyers, prices etc. Members of such organized groups are more coherent and can-do collective action in selling their farm produce.

3.13 Existence of women's potato clubs to promote collective action by women

There are organized potato women groups involved in potato value chains and do collective action in marketing their potatoes.

3.14 Ugandan consumers prefer the taste of fresh chips

Ugandan consumers prefer the taste of fresh chips to frozen chips which sometimes may have taken long with reduced quality and change in taste. This implies a need for establishment of chips processing industries in the country, which is an opportunity to farmers to produce more potatoes as well as source of employments/jobs.

3.15 Increasing demand of processed potato products due to increasing urbanization and rejuvenation

In Uganda, there is an increasing demand for potato processed products mainly crisps and chips with the latter having the highest demand. This is attributed to changing consumer habits especially for the youth and need for fast cooking foods by most people. This gives more opportunities for the different value chain actors in the potato industry.

3.16 Large East African Community (EAC) market for potato

Uganda has highest comparative advantage for potato production in the East African market, in terms of quality potatoes and volumes. Some of the countries in EA import ware and seed potatoes from Uganda for example Rwanda, Southern Sudan, which is a blessing to potato producers in Uganda.

3.17 Draft of the new National Seed Policy provides for recognition and regulation of Quality Declared Seed (QDS)

The unavailability of adequate clean seed potato coupled with lack of certification services required alternative strategies and measures to avail farmers with relatively clean planting materials, such as Quality Declared Seed produced from basic seed under decentralized inspection services by District Agriculture Officers. The draft National Seed Policy recognizes ODS produced and to be distributed within the respective communities to create of increasing availability and access to seed potato by farmers.

3.18 Emerging potato processing industries

Recent establishments of medium-sized potato processing facilities in Kabale and Kampala such as the potato processing incubation center and Psalms Foods Industries respectively

as well as increased level of processing potato crisps and chips at small-scale level are all positive indicators of increased demand for ware potato. Additionally, such activities enhance employment opportunities to the growing population.

3.19 Enhanced communication and access to finance

Through improved communication and technology such as e-banking, mobile money services, value chain actors can easily access finance or credit to facilitate their transactions with no physical cash.

3.20 Promotion of locally produced products by government e.g Buy Uganda Build Uganda (BUBU)

Through the BUBU program by government of Uganda, there will be reduced importation and consumers of potato processed products will be compelled to buy crisps and chips produced in Uganda. This will attract more production of ware potatoes as well as promoting the potato sector.

3.21 Improved quality potatoes varieties for processing

With the introduction of new potato varieties with processing qualities such as Dutch varieties in Uganda, the quality is improving. This will subsequently attract more potato processing industries in the country.

3.22 Seed potato production and processing is a lucrative professional activity

Seed potato production and processing are businesses with high returns to investment and offer employment opportunities to the youth and other people engaged in their related activities. Some people have resorted to working in these chains and earn more than in formal employments.

3.23 Innovation platforms enable multi-stakeholder exchange

The formation of innovation platforms enables stakeholders to share and exchange information. Example is the recently formed Uganda Potato Platform with its regional platforms which bring together all stakeholders for sharing and exchanging knowledge and information on markets, enabling policies and challenges and opportunities within the potato sector. Such structures in support in terms of finance, capacity building trainings for them to take-off as they mobilize themselves for sustainability.

Threats

- 4.1 Increasing fragmentation of farmland due to increasing population density
- 4.2 Farmers may have developed perceptions and attitudes difficult to influence
- 4.3 Women have limited ownership of capital assets
- 4.4 Group leadership dominated by men
- 4.5 Decreasing soil fertility
- 4.6 Government support is selectively
- 4.7 Safe handling of chemicals is low
- 4.8 Unpredictable weather and climate change
- 4.9 Possible unequal participation of women in the process of selling potato and price bargaining
- 4.10 Collusion among value chain stakeholders
- 4.11 Increased competition with imported potatoes due to increased productivity in neighboring countries
- 4.12 Hard to register and release new potato varieties
- 4.13 No official protection new potato varieties (no breeder rights)
- 4.14 Emerging potato diseases and pests

4.1 Increasing fragmentation of farmland due to increasing population density

Land fragmentation and lack of adequate land for expansion of farmland is a common problem in the potato production areas mainly the highland regions of Uganda which are densely populated. As a result, the available land has been sub-divided into small fragmented plots which becomes difficult to implement planned production.

4.2 Farmers may have developed perceptions and attitudes difficult to influence

Some farmers who are so conservative and have negative perceptions and attitudes towards potato farming, as an enterprise that requires a lot of cash investment especially in seed and agro-chemicals such as fertilizers. This poses a threat to the industry as it may result into low production of potatoes for the increasing population.

4.3 Women have limited ownership of capital assets

Most women have limited ownership of capital assets such as land and yet they the ones involved in potato production activities. Ownership of such assets would enhance women empowerment and be an incentive to production. This demoralizes their efforts towards production which may result into low potato production and a set-back to the development of the sector

4.4 Group leadership dominated by men

In farmer organized groups, most leadership positions are dominated by men. Such discriminative attitudes and culture leave women in a marginalized state where they do not contribute in decision making such as collective action in production and marketing of potatoes. Despite women being less involved in decision making positions, they are the ones heavily involved in day-to-day production activities and this may subsequently negatively impact on production levels.

4.5 Decreasing soil fertility

Lack of adequate land for cultivation in the potato production areas especially highlands of Uganda has led to overuse and hence exhaustion of fertility. Land fallow as a technique for soil fertility regeneration is hardly practiced. A reasonable number of farmers in Kigezi and Elgon regions growing potato as a commercial crop use inorganic fertilizers to increase production.

4.6 Government support is selective

Government programs such as the National Agriculture Advisory Services (NAADS) that support farmers in form of agro-inputs and advisory services are selective to some specific farmers and groups who may not necessarily be the best to put such support to use, leave potential farmers that would effectively utilize the resources for increased production and productivity.

4.7 Safe handling of chemicals is low

In potato production areas, most farmers do handle and use agrochemicals injudiciously. There is excessive use of fertilizers and pesticides as well as unsafe disposal of products and their packages which consequently will result into land and environmental degradation and health hazards to the population subsequently negatively impacting on health of labour force, potato production and productivity.

4.8 Unpredictable weather and climate change

In the recent years, the pattern of rainfall has been erratic. When rainfall is much, it favours late blight disease development that requires heavy use of fungicides to contain. On the other hand, potato yield is highly affected by inadequate rainfall. Pre-harvest potato losses are mainly caused by rainfall shortage, crop diseases and pests.

4.9 Possible unequal participation of women in the process of selling and collecting money

Women are the main actors in potato production but less involved in decision making for marketing of the produce. Potato proceeds are controlled by men who decide what to be given to women after potato marketing. This demotivates women and becomes a disincentive to production of more potatoes.

4.10 Collusion among value chain stakeholders

Due to less communication among the potato value chain actors, some do not cooperate and work together instead form intrigue against others for example, traders and brokers conspire and decide to determine low prices offered to producers.

4.11 Increased competition with imported potatoes

During some seasons, traders prefer to import potatoes from the neighboring countries mainly Kenya, which are at lower prices. Such imported potatoes lower prices of potatoes produced in Uganda mainly those from the Elgon region in the period of July-September which subsequently demotivate farmers for increased production.

4.14 Emerging potato diseases and pests

There are new pests and diseases that have emerged of recent in potato production areas such as millipedes, centipedes and leaf miners, and bacterial disease that attack potatoes and result into total crop failure and loss.

Annex 3

For more insights into a market relevant Curriculum, Suggestions on developing a robust infrastructure, Seed multiplication and starting materials, Access to quality to inputs, Process and Value addition can be found below.

Curriculum development for training providers.

Expected results	Through trainings, farmers will gain more knowledge and skills in GAP, business skills and financial management, Post-harvest handling and value addition.
Field	Farmers, extension service providers
Relevant stakeholders	Development organizations (IFDC, CIP etc), Research (NARO-KAZARDI), District Local Government/Production department, MAAIF
Dutch Support	Financial, knowledge
Outcome	Increased productivity, reduced post-harvest losses, improved marketing and product diversification.
Indicators	yield per unit area, amount of post-harvest losses, volumes of potatoes marketed/incomes, types of potato products
Identified trade linkages	

Improvement of Infrastructure.

In Uganda, roads that facilitate access to and between transporters, farmers and the market are often in poor condition. During rains several roads become impassable, creating significant delays and post-harvest losses. UNRA has identified a number of 'priority roads' that urgently need improvement.

Dutch companies like Road Rapid can offer valuable support to such improvements, either hired by UNRA or directly or supported by instruments like DRIVE and D2B.

Expected results	An improved access to farmlands, reduces transport time, improved quality of potatoes that reach the market and/or processors, more involvement from Dutch private sector because of an improved business climate, reduced post-harvest losses.
Field	Farmers, Transporters and Processors.
Relevant stakeholders	UNRA/Ministry of Transport and Communication, MOFPED
Dutch Support	
Outcome	Improved business climate
Indicators	Average yield, average prices for potatoes, post-harvest losses, rejection rate at market and processors.
Identified trade linkages	

Seed multiplication and availability of clean starting material.

The unavailability of clean starting materials/seed is a major constraint to potato production in Uganda. There is a mix of formal and informal seed system, the former supplying less than

5% of the national demand. The rest is from the informal system through recycling of home saved seed, which results into increased diseases and pests consequently degeneration of seed and low yields. KAZARDI, the zonal public research organization in the main potato area is the sole source of quality starter seed. Seed is sold to informal seed multipliers who supply farmers in their immediate vicinity. Seed producer associations have been formed and provides a steady but limited supply of high-quality seed in the country, which needs **intervention**.

Expected results	Increased availability of clean seed potato to farmers reduced diseases and pests subsequently productivity, production and quality improved.
Field	Seed and Ware potato farmers, Research, agro-input dealers
Relevant stakeholders	NARO-KAZARDI, Screen House Owners (SHOs), Seed potato producers Associations (UNSPPA, KWESPA, MIFA, KASSPA e.t.c), MAAIF
Dutch Support	Introduction of clean seed of improved varieties.
Outcome	Volumes of quality ware potatoes marketed and supplied to processors, increased incomes and livelihood.
Indicators	Average yield, emergence of processing factories.
Identified trade linkages	

Access to quality inputs

In Uganda, there are a few agro-input suppliers such as Balton, Crop Care Uganda which supply fertilizers and agro-chemicals (Crop protection products; fungicides, insecticides and herbicides) to rural agro-stockists. These are Inspected and regulated by MAAIF through District Agriculture Offices (DAOs). However, there are several counterfeit products on the market, which are ineffective and lead to farmer loss of the crop

Expected results	Availability, access and use of quality agro-inputs by farmers increased, increased productivity
Field	Farmers, Agro-input dealers
Relevant stakeholders	Agro-input suppliers (Balton, Osha Chemicals, Crop Care-Uganda), MAAIF, UNADA
Dutch Support	Capacity building/ training of Inspectors of MAAIF Agro-input companies like Syngenta, Movento, Bayer can also assist with introduction of improved inputs
Outcome	Increased productivity, Improved livelihoods
Indicators	Amount and type of quality available, yield per unit area

Identified trade linkages	Supply of quality agro-inputs to Ugandan markets
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Processing and value addition

The largest crisp processor of Uganda is Psalms Food Industries Ltd. It is an enterprise under development that currently processes up to 10 tonnes of potatoes per week.

Expected results	Ware potato quality improved, product transformation and diversification enhanced
Field	Farmers, Processors, Development partners (IFDC, CIP etc)
Relevant stakeholders	Farmers, MAAIF. Processors (Psalms Food Processors, KPPIIL), Uganda Industrial Research Institute (UIRI)
Dutch Support	Value addition technologies
Outcome	Increased market linkages between ware potato producers and processors hence improved livelihoods through increased incomes.
Indicators	Number of farmers linked to processors and Quantities/ number of products developed.
Identified trade linkages	Introduction of processing and value addition technologies

Annex 4

An overview of the interventions of the Dutch Government, can be found below

RVO

Potato trials guidance

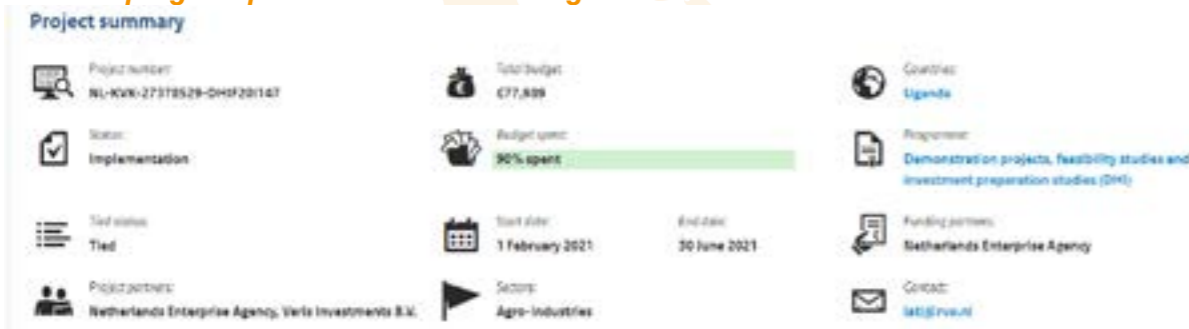
Under this project the Netherlands potato organisation NAO will continue with the technical and operational support of Ugandan authorities to execute national performance trials of new potato varieties in a solid professional way.



SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-MAK18UG01/](https://projects.rvo.nl/project/NL-KVK-27378529-MAK18UG01/)

SECTOR: DHI

1. Developing the potato value chain in Uganda



SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-DHIF20147/](https://projects.rvo.nl/project/NL-KVK-27378529-DHIF20147/)

2. Potato processing in Kisoro

The southwest corner of Uganda, more in particular Kabale and Kisoro district, is the largest production area for potatoes in the country. Due to its conducive climate, up to three harvests can be reached each year. Although the production levels are increasing annually, the marketing of potatoes is still a problem, leaving many farmers with low prices for their products. The partners, Mugenga Holdings in Kenya and Maina Speedy in Uganda, established a new joint venture for the processing of locally grown potatoes into French fries for the Uganda and Rwanda market.

As neither Mugenga Holdings Ltd., nor Maina Speedy Uganda Ltd. is experienced in food processing or production of potatoes in general, the project hired the services of a food processing expert and from potato processing and storage experts. Furthermore, the partners teamed up with already existing initiatives by local research institutes and NGOs, that focus on farmer associations and the related agronomic training, in order to make full use of the knowledge and expertise already available within the product chain.

The project contributes to the professionalization of the potato chain in Uganda. By introducing locally produced French fries, the chips comes within reach for a larger consumer group which in turn will assure a more steady and stable market outlet for farmers.



SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-PSI11UG24](https://projects.rvo.nl/project/NL-KVK-27378529-PSI11UG24)

3. SDGP Potato Value Chain

The goal of this Sustainable Development Goals Partnerships project is to establish a viable seed and ware potato value chain, including 8,855 farmers and processing industry.

1. Increased availability of high quality seed potatoes

Increased availability of traceable high quality of seed potato through hydroponic multiplication of varieties with market demand, increased warehouse capacity and reduced disappearance of certified seeds into the informal chain. Clean inputs by Dutch companies HZPC, Solynta and Agrico.

Outcomes: higher yields, higher revenues of small holder potato farmers, cleaner soil ready to produce higher yields, increased value chain efficiency.

2. Innovative value addition

Complementary potato processing facilities established in Kisoro (fries) and Kampala (crisps) that will connect in total 8,855 smallholder potato growers to the market for quality fresh potatoes and processed potato products, next to the regular market of ware potatoes.

Outcomes: higher prices for quality potatoes for smallholder farmers, increased value chain efficiency.

Project summary

Project number: NL-KVK-27378529-SDGP2362UG	Total budget: €2,295,134	Country: Uganda
Status: Implementation	Budget spent: 3.27% spent	Programme: SDG Partnership Facility (SDGF)
Tied status: Partially tied	Start date: 1 July 2019	End date: 30 October 2024
Funding partners: Netherlands Enterprise Agency	Sector: Food crop production	Contact: is@rvo.nl
Project partners: Netherlands Enterprise Agency, BARD, Hollandia, Fair Foods Uganda Ltd., Potato Producers Association Ltd., Kiwara Potato Processing Industries Ltd., Stichting Agrihana, Delphy B.V.		

SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-SDGP2362UG](https://projects.rvo.nl/project/nl-kvk-27378529-sdgp2362ug)

4. Plant variety protection

Analysis on the state of play of plant variety protection in Rwanda, Uganda and Burundi in order to be able to assess the possibilities for Dutch support in this area and the demand & commitment for such support in these countries. This will be done through a study and stakeholder meetings.

Project summary

Project number: NL-KVK-27378529-MAK18RW01	Total budget: €25,507	Country: Burundi, Rwanda, Uganda
Status: Finalisation	Budget spent: 100% spent	Programme: PSD Toolkit
Tied status: Untied	Start date: 1 November 2018	End date: 24 October 2019
Funding partners: Netherlands Enterprise Agency	Sector: Agricultural development	Contact: is@rvo.nl
Project partners: Netherlands Enterprise Agency, Stichting Nederlandse Algemene Kwaliteitsdienst Tuinbouw		

SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-MAK18RW01/](https://projects.rvo.nl/project/nl-kvk-27378529-mak18rw01/)

SECTOR: AGRI – DEV'T

5. Feasibility study of Ecosystem Kickstarter

Small Business Innovation Research in Developing Markets Food Security Sub-Sahara Africa Phase 1

Project summary

Project number: NL-KVK-27378529-SB1SH18025	Total budget: €40,500	Country: Uganda
Status: Finalisation	Budget spent: 100% spent	Programme: SBIR in Developing Markets
Tied status: Untied	Start date: 15 May 2018	End date: 25 January 2019
Funding partners: Netherlands Enterprise Agency	Sector: Agricultural development, Agricultural research	Contact: is@rvo.nl
Project partners: Carvois/L, Netherlands Enterprise Agency		

SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-SB1SH18025/](https://projects.rvo.nl/project/nl-kvk-27378529-sb1sh18025/)

SECTOR: AGRI – DEV'T

6. Outgoing mission Harvest Money Expo

Through this project, Dutch participation at the coming three Harvest Money Expo fairs (2020-2022) will be supported. Transfer of Dutch technology, skills and knowledge will be key in this project. This should be achieved by setting up good workshops, seminars and demonstrations at the fairs and by aligning well with other initiatives supported by EKN and RVO. There will be a big Holland village at the well attended fair with Dutch companies from the Netherlands, Dutch companies from the EAC and Ugandan farmers that participate and have participated in the Best Farmer competition.

Project summary

Project number: NL-KVK-27378529-MAP19UG01	Total budget: €77,942	Country: Uganda
Status: Finalisation	Budget spent: 100% spent	Programme: PSD Toolkit
Tied status: Untied	Start date: 1 October 2019	End date: 11 September 2020
Funding partners: Netherlands Enterprise Agency	Sector: Agricultural development	Contact: is@rvo.nl
Project partners: Netherlands Enterprise Agency, NEC B.V.		

SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-MAP19UG01/](https://projects.rvo.nl/project/nl-kvk-27378529-map19ug01/)

SECTOR: AGRI – DEV'T

7. Orange Agriculture Landing Site

The purpose of this project is to validate the potential of an Orange Agribusiness Landing Site (OALS), an agricultural knowledge and innovation hub in Uganda, specifically focusing on boosting horticulture business by providing 'landing' services to international companies, technical research support, and business development support.

Project summary

Project number: NL-KVK-27378529-PST20UG01	Total budget: €30,226	Country: Uganda
Status: Finalisation	Budget spent: 100% spent	Programme: PSD Toolkit – Phase 2
Tied status: Untied	Start date: 1 November 2020	End date: 25 July 2021
Funding partners: Netherlands Enterprise Agency	Sector: Agricultural development, Food crop production	Contact: is@rvo.nl
Project partners: Netherlands Enterprise Agency, Eye OpenerWorks		

SOURCE: [HTTPS://PROJECTS.RVO.NL/PROJECT/NL-KVK-27378529-PST20UG01/](https://projects.rvo.nl/project/nl-kvk-27378529-pst20ug01/)

SECTOR: AGRI – DEV'T

IFDC PROJECTS

1. Promotion of Nutrition-Sensitive Potato Value Chains in East Africa (PNSP)

PNSP-Uganda is designed to increase smallholder potato productivity and strengthen potato sector coordination while improving household-level nutrition through dietary diversification.

The project will intervene in the highlands of Eastern Uganda, where potato production, marketing, and processing form a major source of income for smallholder farmers, traders, and processors. Additionally, the project will encourage diversified diets, particularly for pregnant and breastfeeding women through the integration of nutrition and potato productivity at the farmer field business school (FFBS) and community levels.

The objectives:

- ♣ Increase productivity of small-scale potato producers through capacity building in good agricultural practices (GAPs) and increased accessibility to quality seed potatoes.
- ♣ Strengthen coordination of the potato value chain through stronger public-private collaboration and national and regional platforms that guide sector governance and innovation.
- ♣ Improve the dietary diversity of vulnerable groups in Eastern Uganda.

The 2020 results

- ♣ Potato yields have improved from 12.5 mt/ha at baseline to 14.4 mt/ha in 2020.
- ♣ To address shortages of quality seed in the Mount Elgon highlands, four farmer-based seed producer associations were supported in their establishment of screenhouses to produce early generation seed, and 34 seed producers have been trained to produce quality declared potato seed.
- ♣ Through hands-on training in the establishment of home kitchen gardens, cooking demonstrations, community dialogues and radio messaging, knowledge of and practices around nutrition have improved, with the Individual Dietary Diversity Score increasing from 3.1 (out of 9) food groups at baseline to over 5 in 2020.

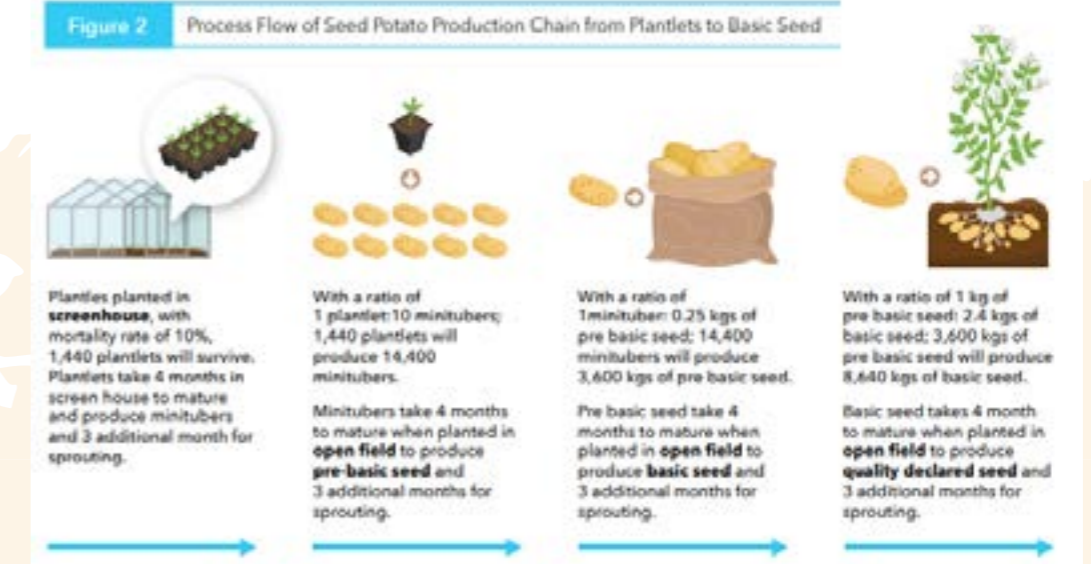
Source: <https://ifdc.org/projects/promotion-of-nutrition-sensitive-potato-value-chains-in-east-africa-pnsp/>

2. “Markets in Potato and Rice Changing.”

This project worked with partners to change markets in rice and potato through new technologies and seed varieties, increased access to finance and agro inputs, intensified farmer trainings and mindset change for farmers on demand driven farming - produce for the market vs taking produce to the market.

Key Strategic Outputs in Potato:

- ♣ A first-of-its-kind, fully commercial seed potato (multiplication) supply chain has been established, from the in-vitro plantlet laboratory (which uses germplasm to produce plantlets) to Integrated Seed Businesses (ISBs) which can multiply plantlets in screenhouses into minitubers, then pre-basic seed and basic seed and Local Seed Businesses (LSBs) which can multiply pre-basic seed into Quality Declared Seed (QDS) suitable for retailing to farmers.



- ♣ A first-of-its kind, fully commercial seed potato (multiplication) supply chain for commercial Dutch potato varieties has been established.
- ♣ Irrigation works were completed, and more initiated, to provide controlled, year-round access to water in support of seed potato production.
- ♣ 11,312 potato farmers (from 885 Farmer Groups) have been trained in FaaB and CSA
- ♣ Over 52 kilometers of road was rehabilitated to link potato production to markets.

SOURCE: <https://ifdc.org/wp-content/uploads/2020/03/Markets-Are-Changing-in-Potato-and-Rice-in-Uganda-Web-.pdf>

Nuffic – orange development program

1. Putting a resilient community food system on the map

The TMT will help to develop understanding about FNS from a food system perspective, theoretically and on the ground. This course should add new knowledge that is relevant for Uganda and Kumi District. By inviting participants from different departments of the university, local government, civil society, private sector and other relevant parties, it can create a joint understanding of the food system as a multi-disciplinary issue. Using the living lab approach will enable participants to apply this knowledge in reality through joint problem solving in practice. The joint analysis of the system will then translate into solution oriented and innovative recommendations. A course that delivers practical and tangible results is preferred since this will create commitment among the living lab stakeholders. The multi-stakeholder platform as outcome of the training will set a basis for continuous co-creation of / research on new knowledge to address, among others, the impact of climate change on FNS. It is envisaged that the trained lecturers will pass on the knowledge to students.

SOURCE: <https://nuffic.akvoapp.org/en/project/9439/>

2. Strengthening (teacher) training programmes for tertiary education in agriculture in Uganda

This project is composed by a consortium made up of the National Instructors College Abilonino (NICA), the Hanze University of Applied Sciences (HUAS) and Ecopolis Europe in response to the Nuffic OKP tender OKP-UGA-10015 on Food and Nutrition Security. The consortium aims to restructure the agricultural education offered in Uganda, which is currently unable to relate to practices encountered in reality, at private agro-enterprises in particular. The country needs graduates at all levels (Informal, Certificate, Diploma and Degree) that are able to work effectively at commercial farms as out-growers or start up their own farms. This project will establish, in close collaboration with private sector partners, a TVET learning line and interlinked teacher-training programme in agro-enterprise, based on the needs of the labour market and aiming for inclusiveness. The new study programmes in agro-enterprise, taught by (re)-trained teachers and instructors, will produce graduates with a strong entrepreneurial mindset and the passion, knowledge and skills to start their own farms. Reciprocity is key in the cooperation between the consortium partners. Individuals will learn from each other, have a unique opportunity to share their knowledge and skills, and stay connected after project completion

SOURCE: [HTTPS://NUFFIC.AKVOAPP.ORG/EN/PROJECT/7854/](https://nuffic.akvoapp.org/en/project/7854/)

3. Strengthening skills and training capacity in the horticulture sector in Uganda

This NUFFIC OKP projects aims at strengthening the skills to improve the horticultural situation in Uganda. This is mainly achieved via strengthening the educational situation at A-TVET level. The project will focus on three main output areas: curriculum review and development, institutional capacity development at Kyambogo University (KYU) and Bukalasa Agricultural College (BAC) and the establishment of a triple helix horticulture innovation platform. Main activities of the project will be curriculum development, module development, training of teachers in activating didactics, strengthening linkages with the horticultural practise, and stimulating horticultural entrepreneurship. The project will be implemented in close cooperation between horticultural stakeholders in Uganda like educational institutes and representatives of the horticultural sector and a Dutch consortium that is representing A-TVET horticultural education as well as higher education and the Dutch horticultural business sector

SOURCE: [HTTPS://NUFFIC.AKVOAPP.ORG/EN/PROJECT/7989/](https://nuffic.akvoapp.org/en/project/7989/)

4. Older programs that are already finalized

Partner organisation: **FACOM**
 Project name: **Strengthening climate resilience and profitability of the horticultural sector in Uganda**
 Instrument: **Tailor-Made Training**
 Year: **2018**

Partner organisation: **Kyambogo University (KYU)**
 Project name: **Improve quality of and access to professional education and vocational training relevant for the development of horticulture value chains in Uganda in strong collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

Partner organisation: **Bukalasa Agricultural College (BAC) (ATVET)**
 Project name: **Improve quality of and access to professional education and vocational training relevant for the development of horticulture value chains in Uganda in strong collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

Partner organisation: **Holland Greentech**
 Project name: **Improve quality of and access to professional education and vocational training relevant for the development of horticulture value chains in Uganda in strong collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

Partner organisation: **Mountains of the Moon University**
 Project name: **Improve quality of and access to professional education and vocational training relevant for the development of horticulture value chains in Uganda in strong collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

Partner organisation: **National Instructors College Abilonino (NICA)**
 Project name: **Strengthening agricultural teacher training programmes to improve and upgrade the provision of Technical and Vocational Training and Education for agriculture related occupations in collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

Partner organisation: **Muni University**
 Project name: **Improve quality of and access to professional education and vocational training relevant for the development of horticulture value chains in Uganda in strong collaboration with the private sector.**
 Instrument: **Institutional Collaboration Project**
 Year: **2018**

SOURCE: [NUFFIC.NL/EN/SUBJECTS/ORANGE-KNOWLEDGE-PROGRAMME/RESULTS-ORANGE-KNOWLEDGE-PROGRAMME](https://nuffic.nl/en/subjects/orange-knowledge-programme/results-orange-knowledge-programme)

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16. Position paper 'Contributing to food and nutrition security and stimulating employment and entrepreneurship through productive and sustainable climate-smart small-scale agriculture'

This is a publication of
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This publication was commissioned by the ministry of Foreign Affairs.

© Netherlands Enterprise Agency | November 2021

Publication number: RVO-212-2021/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs and Climate Policy that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs and Climate Policy.