



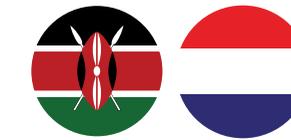
# From plant to plate

Ten years  
of cooperation  
between Kenya  
and the Netherlands  
in supporting  
the potato sector  
in Kenya





Kingdom of the Netherlands



# From plant to plate

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# Kenya and the Netherlands have a long history of collaboration towards sustainable trade and investment in agriculture

Harvesting potatoes

## Foreword



The proposed cooperation was confirmed during a meeting between the then Kenyan Minister of Agriculture Ms. Sally Koskei and her Dutch counterpart Minister of Agriculture Mr. Henk Bleker. The tie was then consolidated in a Bilateral Agreement between KEPHIS and NVWA signed in January 2012. Since then, we can speak of a true potato partnership between the two countries.

Kenya and the Netherlands have a long history of collaboration towards sustainable trade and investment in agriculture, and the partnership in the potato sector is no exception. Right from the onset, the role of the private sector became pivotal in strengthening the industry.

It is my pleasure to present this booklet documenting the tenth anniversary of cooperation between Kenya and the Netherlands aimed at strengthening the Kenyan potato sector. In 2011, the Agricultural Office in the Netherlands Embassy in Nairobi responded to requests for partnership in the potato sector by the Kenya Plant Health Inspectorate Service (KEPHIS) channelled through the Ministry of Agriculture.

This booklet presents ample evidence. Not only have the Dutch companies invested in the seed potato subsector but also in storage solutions, mechanisation, and the processing industries. Kenyan companies alike saw their chances in the growing agricultural economy of Kenya and invested heavily in potatoes from plant to plate.

The Kenya-Netherlands cooperation started by jointly improving the seed potato subsector. At the time, certified seed potatoes were hardly available. We now see investments and growth opportunities across the entire potato value chain. I am glad that this booklet is structured to show the progress the partnership has made in seed supply, seed distribution, storage solutions, potato production, processing, and sector development.

Developments across the value chain bring along many more partners than only the two Governments. Throughout the chapters, it is gratifying to read about stakeholders from the private and public sector, research institutes, and civil society joining together—albeit sometimes with differing approaches—to work for the same cause: contributing to Kenya’s food security by developing a productive, inclusive, and sustainable potato industry.

Agricultural development is always a “work in progress.” Notwithstanding the achievements over the recent years, there is still scope for more investments and room for ongoing discussions and knowledge sharing between our two countries. For this reason, in 2019, the Kenya and Netherlands Governments formed the Agricultural Working Group, providing a framework under which trade relations in sustainable agriculture are enhanced.

Finally, I would like to thank everybody who has contributed with their insights and time to the creation of this booklet: as you will read, there are many! And a special thank you goes to the team of the Kenya-Netherlands Seed Potato Support Programme, Ms. Emily Oseno, Mr. Nico Rozemeijer, and Dr. Siert Wiersema, for compiling this publication.

**Ingrid Korving**  
*Agricultural Counsellor for Kenya and Tanzania  
Embassy of the Kingdom of the Netherlands*



From plant to plate

**The potato value chain is one of the agricultural domains that holds promise for the envisioned growth**

*Growing mini-tubers in ADC greenhouse in Sirikwa*

## Foreword



The Ministry of Agriculture, Livestock, Fisheries, and Cooperatives envisions Kenya as a food-secure nation driven by an innovative, commercially oriented, and competitive agricultural sector. By doing so we will see the livelihood of Kenyans improving through increased production, value addition, and the concomitant creation of employment opportunities.

The potato value chain is one of the agricultural domains that holds promise for the envisioned growth. Kenya's population is rapidly growing, and the country is urbanising; lifestyles and food consumption patterns are changing; incomes are gradually increasing. This means that those who are not farmers themselves need nutritious food, and increasingly in processed forms. The "viazi" - meaning potato in Swahili - has the potential to meet this enormous demand. It is, therefore, one of the "Big Four" crops that warrants the policy and strategic support from the Kenyan administration. For instance, the recently adopted National Potato Strategy 2021-2025 serves as a good example.

I am therefore grateful to note that, over the past ten years, the Kingdom of the Netherlands has partnered with Kenya on our "viazi" through the Netherlands Embassy in Nairobi. It is interesting to read how many stakeholders from the private and public sector, academia, civil society, and farmers from both countries were engaged in this endeavour, from potato plant to a plate of "mukimo."

The potato partnership between Kenya and the Netherlands is not coincidental. For both countries, this tuber is an essential food crop. Both countries' per capita consumption is high, and both have great production potential and aspirations to further develop the sector. Kenya recognises the Netherlands as a forerunner in the development of seed potato varieties and seed production, since the country is the main exporter of seed potatoes globally.

This expertise prompted my Government to partner with the Netherlands in 2011 to address seed shortages that stifled the Kenyan potato industry. Ten years down the line, I can safely say that substantial progress has been made. In fact, the Kenyan potato sector is currently strongly developing through innovation, increased production, and investments in the processing industry. The shared knowledge and experience of the Dutch potato sector has been beneficial to the extent that sometimes I jokingly wonder if we should not rebaptize the Irish Potato into Dutch Potato.

Once again, I wish to thank the Netherlands Government in particular, as well as all stakeholders - both Dutch and Kenyan - who have contributed to strengthening the potato sector in Kenya with their unwavering support. This booklet shows what the Kenya-Netherlands partnership in potato has achieved. I trust we can jointly continue on this path for the next ten years!

**Hon. Peter Munya EGH**  
*Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries and Cooperatives*

# From plant to plate

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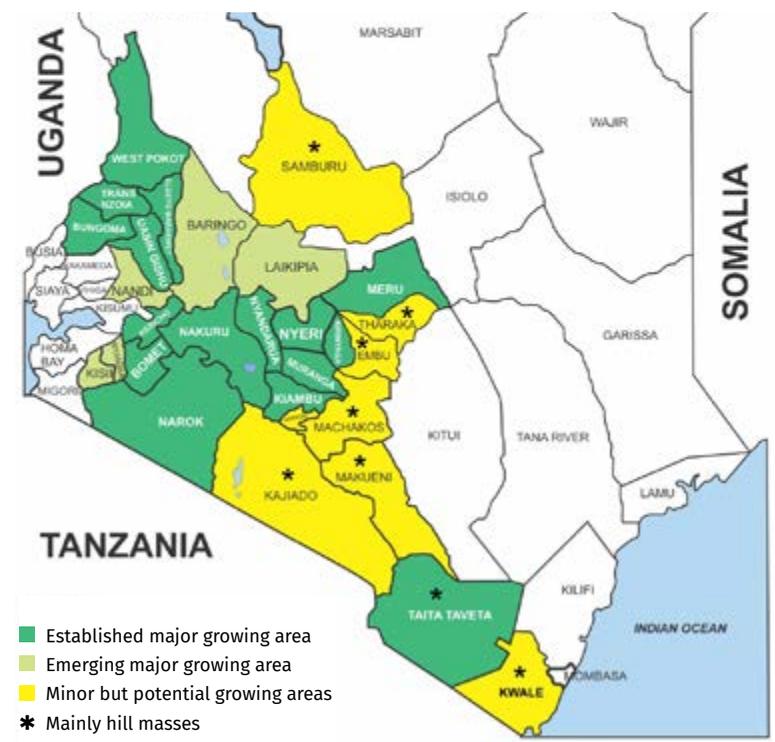
From plant to plate

**Opportunities for development based on common interests and common ideas**

Joint import inspection at Mombasa harbour

## 1 The potato sector in Kenya: opportunities for development through partnership

While potatoes are an essential crop in both Kenya and the Netherlands, there are clear differences between the two countries (see boxes 1 and 2). In the Netherlands, the potato farming sector is large-scale and market-oriented; in Kenya, instead, 98% of potato farmers are small-scale subsistence farmers. In the Netherlands, potato farmers mainly produce for the processing industry; in Kenya, farmers largely produce ware potatoes for the fresh market.



Source: National Potato Strategy (2016-2020)

### Basic facts on the potato sector

Box 1

**The Netherlands produced 7 million tons of potato in 2017, of which:**

- 2 million tons to produce starch.
- 1.5 million tons of seed potatoes (of which 823,000 tons were exported to 120 countries).
- 3.5 million tons of ware potatoes (by 7,000 farmers on 76,000 hectares of land) of which 800,000 tons were exported.

The Dutch potato product industry processed 4 million tons of potatoes - including imports - for crisps, chips, etc. The 2013-2017 average potato yield was 43 tonnes/hectare, while in 2010 the average potato acreage on farms was 16.9 hectares.

Source: [www.cbs.nl](http://www.cbs.nl), [www.vavi.nl](http://www.vavi.nl), [www.BO-akkerbouw.nl](http://www.BO-akkerbouw.nl), [www.opnv.nl](http://www.opnv.nl), [www.nakr.nl](http://www.nakr.nl), [www.nao.nl](http://www.nao.nl), <http://ec.europa.eu/eurostat>, [www.potatonl.com](http://www.potatonl.com)

Box 2

**Some facts on the Kenya potato sector:**

- Potato is the second important food crop after maize, and a major cash crop in 13 counties.
- In 2018, Kenya produced 1.87 million tons of potato on 217,000 hectares, corresponding to a yield of 8.6 tonnes/hectare. The volume is meant to expand to 2.5 million tons by 2025.
- The expected annual per capita consumption for 2022 is 41 kg.
- Potato production was worth between 40 and 50 billion KShs, giving employment to 3.3 million people along the value chain.
- High altitude areas of Central Kenya have good potato growing potential.
- Potato is produced by 500,000–800,000 farmers (98% of whom produce on less than ½ hectare (1.25 acre)).

Source: Technoserve, Kenya Potato ISP, 2018; FAOStat 2018

The potato sector in the Netherlands is for an important part export-driven, while Kenya imports potatoes and potato products. Nearly all potatoes in the Netherlands are grown on a contract basis with firm agreements on volumes and prices; in Kenya, instead, the market is mainly unstructured. Finally, in the Netherlands the potato sector is an engine for economic growth -especially concerning the processing industry as an important avenue for employment creation, investments, and innovation. On the contrary, the Kenyan potato sector is struggling, which is best illustrated by the trend of decreasing yields over time to 8.6 tons/ha in 2018 (FAOstat).

Despite the differences between the two countries, there was ample reason to collaborate towards strengthening Kenya's potato sector. To this effect, a Bilateral Agreement was signed in January 2012 reflecting shared interests and ideas.

The Bilateral Agreement between KEPHIS and the then Netherlands Ministry of Economic Affairs, Agriculture, and Innovation was prepared by the former, and only covered part of the emerging partnership between Kenya and the Netherlands. The agreement governed "the conditions for the importation of seed potato from the Netherlands to Kenya." It largely dealt with the phytosanitary requirements for the import of seed potato, variety registration, release requirements, and the Kenya Plant Health Inspectorate Service's (KEPHIS) capacity building

for handling seed potato imports and Pest Risk Analysis information. The signing was the start of a partnership that, over the years, went far beyond the seed potato sector, eventually covering the entire potato value chain.

Shared interests in investing in potatoes as an important food crop led to the adoption of a set of common principles that guided the sector's development for the following years. Three of these principles are highlighted here:

1. The involvement of the private sector is a driving force in the agreement. Both Kenya and the Netherlands see the private sector - from seed grower, to farmer, to processor - as a pivotal agent for change. Creating a conducive environment for Business to Business (B2B) development is seen as a priority.
2. Government to Government (G2G) dialogue is important for facilitating the above. Capacity building of sector stakeholders and investment in government facilities (for example in the KEPHIS laboratory) is part of the collaboration.
3. Sector development requires an integrated approach, and therefore the entire potato value chain needs to be strengthened for sustained growth.

Since 2012, both countries have invested heavily in developing the potato sector by embracing these principles.



### What were the main challenges of the Kenyan potato sector that prompted the partnership with the Netherlands?

As mentioned earlier, the Kenyan potato sector is predominantly a small-scale subsistence sector, and the implications for the entire potato value chain are the following<sup>1</sup>:

- 98% of potato farmers produce potatoes on less than 0.5 hectares. Investments in good agronomic practices (GAP) such as crop rotation, soil preparation, mechanization, disease, and pest control are often out of financial reach.
- In 2012 there was an insufficient supply of quality seed. Only 1% of the potato area was planted with certified seed. That means that 99% of the potato production was derived from informal sources - either farm-saved, purchased on the fresh potato market, or bought from a neighbour. The result has been an increasing disease pressure and decreasing yields.
- Registered seed varieties were few in 2012. The "2013 Potato Seed Catalogue Kenya" published by NPCK counts only 13 commercial varieties. Basic seed of those varieties were produced by the then Kenya Agricultural Research Institute (KARI) - now KALRO - in very small quantities, and then multiplied by seed growers in high altitude areas (especially by the Agricultural Development Corporation and Kisima farms).
- Certified seed prices were high, sometimes counting for 40 to 50% of the total input costs, which are prices a small-scale farmer can hardly afford.
- The few varieties registered were not suitable for the processing industry, if even available. The still poorly developed industry was in dire need of good crisping and chipping varieties of adequate size, shape, and dry matter content, which would result in low processing losses.
- Storage solutions for seed or ware potato were not widely used in 2012. The result was high post-harvest losses, little opportunity to store potatoes before marketing until prices were high, and no opportunity to ensure that stored seed retained their high quality.
- The potato marketing system in Kenya was poorly developed. Most farmers sold directly from the field. Seasonality of production made farmers prone to exploitation by traders and brokers resulting in widely fluctuating potato prices and high transaction costs, while contract farming hardly existed.

Since 2012, several initiatives under the Kenya/Netherlands partnership were developed to counteract the above challenges in the potato sector. These initiatives will be described in more detail in the following chapters.

<sup>1</sup> Janssens and Wiersema (2013). The value chain for seed and ware potatoes

### The partnership's early stages

From 2012, it was especially the KEPHIS and the Kenyan Ministry of Agriculture who partnered with the Netherlands Embassy in Nairobi and the Netherlands Food and Consumer Product Safety Authority (NVWA) that gave shape to the potato partnership between the countries.

The table below illustrates the emerging collaboration with selected examples of implemented activities:

Table 1

<p><b>Intervention domain</b> 2012-2015</p>	 <p>Creating a conducive environment for B2B</p>	 <p>G2G dialogue and capacity building</p>	 <p>Strengthening the potato value chain</p>
<p><b>Initiative</b></p>	<ul style="list-style-type: none"> <li>The Kenya border opens for seed potato import from the Netherlands upon signing of the Bilateral Agreement</li> <li>National Performance Trials (NPTs) start for registration of first Dutch varieties (6 NL companies ask for registration of 28 new varieties)</li> <li>Two trade missions of Dutch entrepreneurs are organised in Kenya for investment in the potato sector</li> <li>Four containers (88 tons) of Desiree arrive in 2012/13; inspection by KEPHIS</li> <li>Early 2014 the first 13 Dutch varieties are registered in Kenya</li> <li>The Eldoret Trade Fair in September 2014 showcases the potato sector, and draws 5,000 farmers to the stands</li> </ul>	<ul style="list-style-type: none"> <li>Exchanges of visits of KEPHIS/MoA and NVWA staff to the Netherlands and Kenya</li> <li>Various trainings of KEPHIS staff by NVWA on diagnostics for virus and bacterial diseases</li> <li>Joint NVWA/KEPHIS seed inspection at the port of entry</li> <li>Trade mission to the Netherlands in 2015 by Kenya potato sector actors</li> <li>Equipment with a value of 300,000 Euro is installed in KEPHIS laboratories.</li> </ul>	<ul style="list-style-type: none"> <li>12 demonstration plots across counties showing around 1,000 farmers the performance of newly registered varieties</li> <li>Studies conducted on the ware potato value chain</li> <li>Leading processing industries test prospective potato varieties</li> <li>Investment in a 1,000 MT Tolsma potato storage at Kisima; and an Omnivent store at Suera</li> </ul>

### Who were the early-stage partners?

Across the potato value chain, several stakeholders play a role in strengthening the potato sector in Kenya, contributing to the success of the Kenya-Netherlands partnership. In table 2 we highlight the agencies that kickstarted the process.

Table 2

<p><b>Partners</b></p>	<p>KEPHIS Kenya Plant Health Inspectorate Services</p> 	 <p>Netherlands Food and Consumer Product Safety Authority Ministry of Agriculture, Nature and Food Quality</p>		 <p>Kingdom of the Netherlands</p>		
<p><b>Mandate</b></p>	<p>KEPHIS is a government parastatal mandated to coordinate all matters related to quality control of agricultural inputs and produce. In undertaking this, KEPHIS oversees, among others, matters of pests and diseases control; administration of Plant Breeder's Rights; seed certification; regulation of importation of seeds, plants and plant material; and offers phytosanitary services.</p>	<p>NVWA, the Netherlands Food and Consumer Product Safety Authority is the Dutch National Plant Protection Organisation (NPPO) and as such partly equivalent to KEPHIS</p>	<p>The Ministry of Agriculture, Live-stock &amp; Fisheries, coordinates the implementation of agricultural policies, extension and training, land and crop development, agribusiness and marketing.</p>	<p>The Embassy of the Kingdom of the Netherlands in Nairobi represents the Netherlands Government, and coordinates policies and supports programmes</p>	<p>The NAK (Dutch agricultural inspection services) is an independent foundation responsible for inspection of seeds</p>	<p>The NAO represents the Dutch potato trade; and is a membership organisation of private sector actors.</p>
<p><b>Initial role in the Partnership</b></p>	<p>1) Facilitation of import of seed potatoes by removal of import barriers, and local registration of Dutch varieties; and (2) Inspection and certification of Dutch seed potatoes throughout commercial multiplication by selected seed growers in Kenya.</p>	<p>NVWA aims to strengthen the phytosanitary tasks of KEPHIS important for development of the potato sector, e.g by upgrading laboratory facilities and strengthening the diagnostic skills of KEPHIS staff.</p>	<p>The Ministry has prioritized potato as an important food security crop (the big 4 agenda), develops supportive potato policies and strategies and has allocated resources to support the sector.</p>	<p>The Embassy in Nairobi coordinates the G2G programmes in the potato sector, and financially supports potato projects across the value chain</p>	<p>The role of NAK is to build capacity among Kenyan actors, mainly KEPHIS, on aspects of inspecting seed and seed potato lots.</p>	<p>NAO supports the partnership as being the overall representative of Dutch companies such as Agrico, HZPC, Meijer, Europlant, Stet Holland, Danespo, and Den Hartigh, all interested in testing varieties and exporting seed to Kenya.</p>

### Key partnership between KEPHIS and Dutch institutions

The Kenya Plant Health Inspectorate Service (KEPHIS) is the Government parastatal whose responsibility is to assure the quality of agricultural inputs to prevent adverse impacts on the economy, the environment, and human health<sup>2</sup>.

The institution is one of the leading National Plant Protection Organisations (NPPO) in the region and is the Kenyan equivalent of the Dutch NVWA and NAK joined together. The main aim of the partnership is to upgrade potato inspection, certification knowledge, and the skills of KEPHIS staff, to better align the cooperation between the two NPPOs.

#### To that effect a series of capacity building activities was set up in 2012:

- NVWA-NAK, and later Wageningen University, designed potato crop inspection training programmes for KEPHIS field inspectors - e.g., enhancing capacity in recognizing potato pests and diseases.
- KEPHIS, together with NVWA-NAK, organised joint import inspections during the arrival of containers of seed potatoes in Mombasa, to agree on sampling protocols and the necessary quality of the inspection process and practices - e.g., hygiene, packaging, and transport of samples to the laboratory in Nairobi.
- KEPHIS and Wageningen University jointly designed a training programme on “seed potato production and certification”, which is annually delivered by KEPHIS’ staff to both prospective seed growers and newly arrived seed inspectors. This self-paying training programme draws an average of 25 (international) participants annually.
- KEPHIS and Wageningen University strengthened seed registration protocols.

#### Even though it is difficult to attribute changes in the sector to the evolving partnership, one can recognise positive impact through the following indicators:

- The volume of seed potatoes certified by KEPHIS constantly increased over the years<sup>3</sup>.
- The number of registered seed growers in Kenya grows consistently, with the 2021 Potato Variety Catalogue mentioning 25 registered seed growers<sup>4</sup>.
- Improved communication between KEPHIS and the sector resulted in decreased numbers of complaints.
- KEPHIS staff are invited to design and deliver training programmes to NPPOs in surrounding countries, indicating high competence levels.

2] www.kephis.org 3] KEPHIS annual reports from 2012 to 2020 show an increase from around 1000 tons to 3000 tons of seed certified per annum (<https://kephis.org/index.php/corporate-documents/annual-reports>). 4] It is not known if they all produce certified seed.

From plant to plate



Inspecting growth of potatoes



Training in seed potato production and certification

### Sustained cooperation between the NVWA and KEPHIS laboratories

The KEPHIS Plant Quarantine and Biosecurity Station in Muguga and the laboratory in the regional KEPHIS office of Nakuru play an important role in seed potato certification. The former is the port of call for the import of seed potatoes. The seed is subjected to laboratory quality tests upon arrival and must meet the gazetted minimum standards before local multiplication.

Both laboratories play their part during post-harvest by testing locally multiplied seed to ensure it is free of seed-borne potato diseases such as bacterial wilt, ring rot, and potato cyst nematodes.

Ten years ago, it took roughly five days to test samples of these diseases using ELISA techniques. During the early days of the partnership, the Netherlands Government and NVWA invested in modern laboratory equipment such as PCR technology, allowing KEPHIS laboratories to reduce the duration of testing to a few hours. The rationale that speeding up the testing process was necessary to cater for ever-increasing volumes of potato samples proved to be correct. The advent of laboratory equipment was accompanied by various capacity strengthening activities. KEPHIS technical staff visited the NVWA-NAK laboratories in the Netherlands to learn how to operate the new equipment, while NVWA-NAK teams visited Kenya to train KEPHIS staff, and jointly develop the necessary testing protocols. Training programmes included bacterial diagnostics, virus detection, and mycology.

#### Although it is difficult to attribute impacts to the said training programmes and investments, there is clearly a lot to be satisfied about:

- Ten years ago, the Muguga laboratory analysed around 200-300 samples per annum, while currently it handles 3000/annum (not only of potato).
- The laboratory today is a COMESA reference laboratory for plant health: KEPHIS staff now conduct training programmes for sister laboratories in the region.
- Working processes are more efficient, and the laboratories are ISO certified.
- Service delivery is of better quality, resulting in lesser complaints from the sector; and there is
- Sustained communication between staff of the PQBS in Muguga and NVWA when clarification and support on phytosanitary issues is required - and this goes beyond potatoes only.



KEPHIS Plant Quarantine and Biosecurity Station in Muguga



PCR equipment at Muguga laboratory

### Kenya Netherlands Agricultural Working Group

Kenya and the Netherlands have a long history of successful cooperation in agriculture. Both Kenya and the Netherlands heavily depend on the agricultural sector and international trade for economic growth. Considering their long-lasting cooperation and shared ambitions, the Governments of Kenya and the Netherlands formalized the Agricultural Working Group (AWG) on the 8th of July 2019<sup>5</sup>.

The formation of the Agriculture Working Group between Kenya and the Netherlands provides a framework under which trade relations in sustainable agriculture are enhanced. Both Governments work together in partnership sharing knowledge, expertise, and technologies throughout the sustainable agricultural

value chains. Potato is a priority crop for both countries, and is embedded in the domain of phytosanitary cooperation. Here matters of market access, food security and capacity building are discussed.

#### The adoption of a value chain approach

During the initial phase of the Kenya-Netherlands Partnership, the emphasis was put on securing access to sufficient volumes of marketable, high-quality seed to boost potato production. This was a logical choice, as the absence of certified seed was one of the main constraints faced by the sector. Logically, the adoption of an overarching value chain approach was the next step, being in line with the common ideas

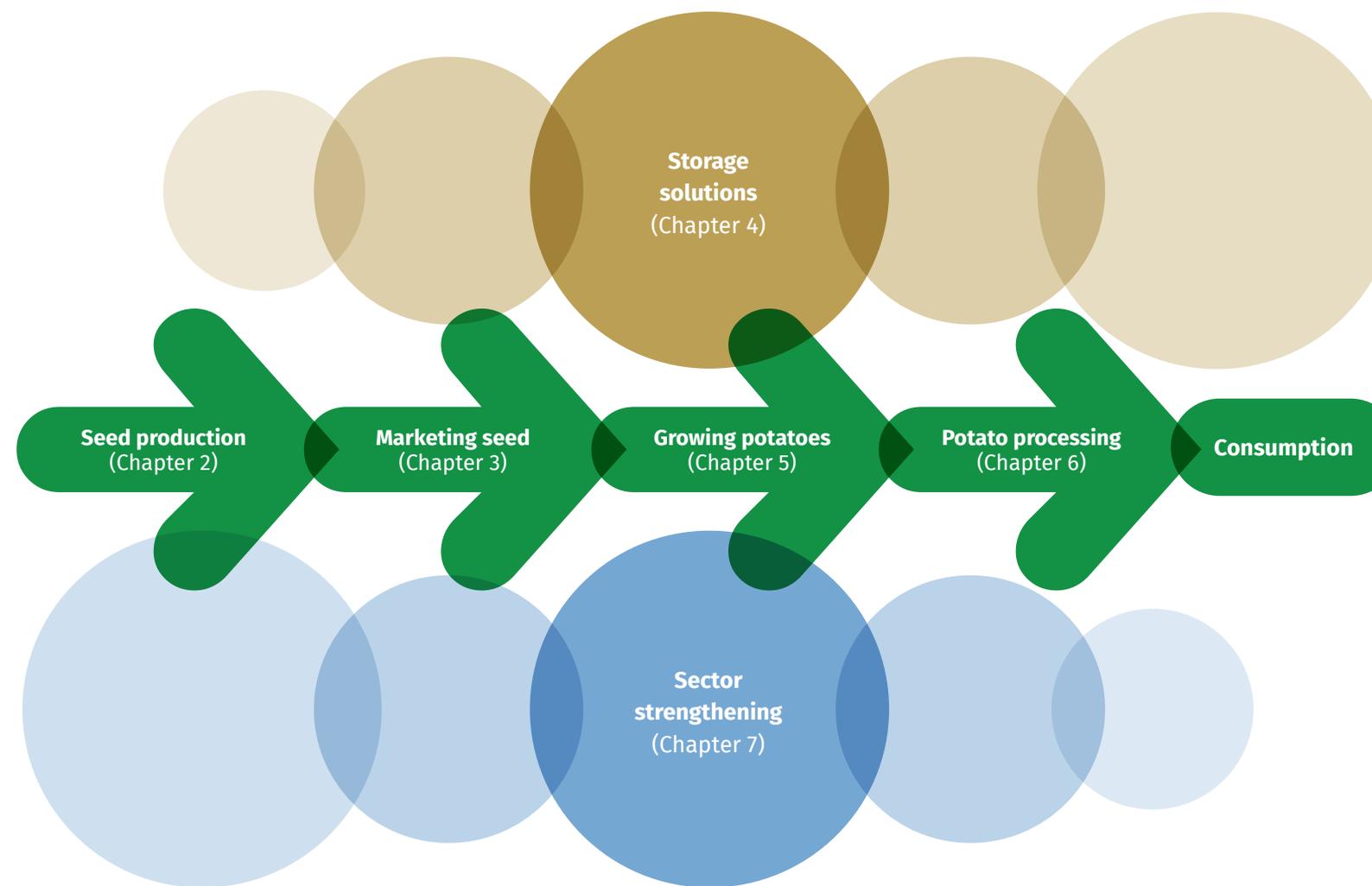
of market-led development. In essence, the consumer acts on the market of potato products, eventually deciding how the chain evolves. This requires an organised market with coordination and information exchange amongst chain actors, and it requires time. If fast food outlet clients want French fries of a certain taste, shape, and colour, it will take years before sufficient volumes of the right chipping varieties reach the market, and processors have adapted their operations. A value chain approach is key to make that happen.

Over the years it also became abundantly clear that storage of seed, ware, and processed potatoes was essential to a well-performing value chain. Potatoes are not an easy crop. They are bulky and perishable due to high water content and prone to a plethora of diseases. Effective storage - being also an aggregation and distribution node - is essential to retain quality, reduce transport costs, and regulate market prices and supplies. Investment in storage solutions for potato became an important part of the partnership.

The remainder of this document will describe the different initiatives that aimed to strengthen the performance of the potato value chain over the years, and the roles played by different partners. Figure 2 is a simplified version of this chain. It will be further used as a guiding structure for the chapters to follow.

<sup>5</sup> Kenya and the Netherlands strengthen trade relationship with launch of Agricultural Working Group | Kenia | Agroberichten Buitenland

Figure 2. Schematic potato value chain





From plant to plate

**Shortages of quality seed constrains the development of the potato sector**

*Simon Ndirangu,  
Tissue Culture  
Manager at  
Stockman Rozen*

## 2 Without seed, nothing grows: strengthening the seed potato sector in Kenya

Kenya has had a formal seed potato production system since 1958. The system is legally underpinned and administrated by KEPHIS, resulting in certified seed of good quality and free of diseases, as prescribed by the relevant Acts and Regulations. Currently, only a small percentage (2-5%) of seed potatoes planted in Kenya are certified, and therefore healthy and of good quality. On the other hand, 95-98% of the seed planted is produced informally.

This includes seed saved by farmers for their own use, purchased from neighbours or in markets in the form of small ware potatoes, or seed produced as “clean” seed by farmers who received basic training in seed production - but whose seed is not inspected or tested by the regulatory authority. Informally produced seed is not bad by definition. However, seed that is multiplied repeatedly degenerates rapidly and is increasingly infected by pests, fungi, viruses, and bacterial diseases, thus affecting the quality of the seed, resulting in low yields. Because informal seed is not tested and can be sold freely, there is an increased risk that diseases spread to other fields and regions. In summary,

the use of informal seed over a long period of time is the main cause of low yields and high disease pressure. The risk of spreading diseases is real and was recently shown in a “Potato Disease Surveillance” that reported the results of a survey in six potato-growing counties in Kenya<sup>6</sup>. The report prompted again the question that has been asked in the sector for years: how to increase the volume of formal, certified, and therefore healthy seed?

Prior to 2012, seed of all classes or generations were produced in Kenya mainly by public sector parties as can be seen in table 3 below<sup>7</sup>:

Table 3

Type of material	Seed class	Generation	Producer
<b>Breeding of new variety for a specific purpose<sup>8</sup></b>	Starter material		KALRO
<b>Healthy mother plants, in-vitro plants, mini-tubers</b>	Breeders seed	G0	KALRO
<b>Tubers</b>	Pre-basic	G1	KALRO and ADC
<b>Tubers</b>	Basic	G2	KALRO and ADC
<b>Tubers</b>	C(ertified)1	G3	ADC and others
<b>Tubers</b>	C2	G4	ADC and others
<b>Tubers</b>	C3	G5	Others

<sup>6</sup> Potato Disease Surveillance in Kenya (2021). The report from CABI/KEPHIS can be downloaded from: [https://www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/show-cdi/seed\\_potato\\_phase3.htm](https://www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/show-cdi/seed_potato_phase3.htm)

<sup>7</sup> Kenya Seed and plants variety Act of 2012.  
<sup>8</sup> The purpose of breeding a new variety - which takes years - can be the production of potatoes for table consumption, or processing into chips, crisps, or starch; the production of potatoes adapted to wetter or dryer areas; or for breeding in resistance against certain pests and diseases. Breeding strategies must find a balance between what is technologically possible and what the market demands.

It will be clear that the different cycles of multiplication increase seed volumes exponentially, hence lowering the costs of the lower-class seed. The C2 and C3 seed is then sold to farmers for ware potato production. As mentioned earlier, the system just did not produce enough certified seed to meet the ever-growing demand of the sector. Some of the reasons for this include<sup>9</sup>:

- The public agencies (KALRO and ADC) did not have the resources to produce enough breeder, pre-basic, and basic seed to boost certified seed volumes.
- Processing varieties demanded by the market were not available.
- An evenly spread seed production and distribution system over the potato growing areas in Kenya was missing, making it costly for farmers to purchase certified seed.

<sup>9</sup> Janssens and Wiersema (2013).

### A complementary formal seed supply system through import

Prior to 2012, seed potatoes in Kenya were propagated through tissue culture, which consists of multiplying genetic material in a laboratory. As of 2012, the import of seed potatoes was legally allowed through a bilateral agreement with the Netherlands. The two systems are currently being applied jointly. The latter is the fast track to rapidly increase supply of certified seed, but it carries risks related to import procedures and the infrastructure in the Mombasa Harbour.

Kenyan private sector seed growers import basic seed from the Netherlands to circumvent the shortages experienced in Kenya, to then multiply the seed once or twice commercially, and eventually find a ready market. The former system, instead, is based on tissue culture and is more time consuming since many multiplication cycles are required. It also requires more investments, but it avoids import related risks. Variety owning companies and their Kenyan partners decide on which system to follow based on their business model.

Allowing the import of seed potatoes was not meant to replace the existing Kenyan seed production system, but to fast-track seed production by skipping the time-consuming, expensive, and risky production of earlier generations, kickstarting production at a bigger scale using imported basic seed. To make this happen, since 2013 three additional steps have been taken:

1. KEPHIS designed a new method to test the suitability of new varieties proposed for registration in Kenya, the Intensive National Performance Trial (INPT).
2. New varieties were rapidly registered in Kenya to make import and multiplication possible.
3. Joint ventures were brokered between Dutch exporting variety owners and Kenyan seed growers to multiply and market imported varieties.

*The Netherlands is by far the biggest seed potato exporter in the world. Seed potatoes are produced by specialised farmers, and the quality is certified by the NAK.*



### Growing potatoes in a test tube

Box 3

One way of propagating seed potatoes in Kenya is the multiplication of original plant material. Stockman Rozen, a subsidiary of Oserian, is currently the biggest laboratory in Kenya providing this service. Seed producing companies - such as Kisima in Meru, Suera Farms in Nyahururu, but also ware producers such as New Holland Chips in Nanyuki - import test tubes containing plant material of the desired potato varieties from the Netherlands. The test tubes go through KEPHIS for import inspection and are then stored by Stockman Rozen. The laboratory staff multiplies

the material by cutting and placing it in a growth medium. The process is then repeated several times until enough plantlets are produced for dispatch to the client, who uses them to grow mini-tubers in aeroponic or hydroponic systems, or in special potting soil. Upon request, this cycle can start all over again if original plant material is available in the Stockman Rozen laboratory. Original material comes from Dutch variety owners such as HZPC, Meijer, and Danespo. Stockman Rozen sees a rapid increase of the number of Dutch varieties being propagated in Kenya.

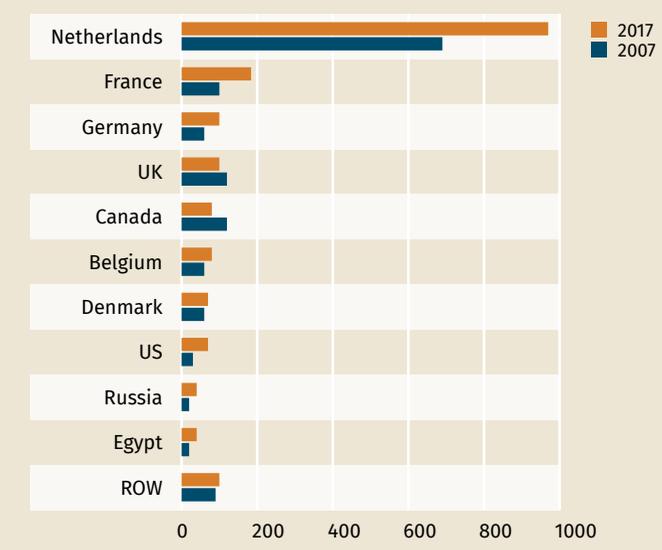
### Background on the Netherlands seed potato production sector

Box 4

The Netherlands is by far the biggest seed potato exporter in the world. Seed potatoes are produced by specialised farmers, and the quality is certified by the NAK. The development of new varieties is done by large-scale potato trading companies in collaboration with private sector research institutes. The sector is entirely market driven. Potato companies such as HZPC and Agrico are amongst the biggest companies of the world.

Thanks to the huge quantities produced due to large-scale production, technological innovations, and high yields, the price of basic seed can be controlled. Low prices make the transport of seed potatoes by ship for export across the globe affordable. Kenya started to import containers of seed potato in 2013.

Top 10 seed potato exporters, 2007 vs. 2017



Source: Rabobank-Potato-Map-2019\_DIGITAL

**INPTs next to NPTs**

From plant to plate

Before any new potato variety can be grown in Kenya it has to be registered in the “National Crop Variety List of Kenya,” and it must pass the National Performance Trial (NPT). Because the prospective Dutch varieties perform optimally under good management conditions, a new NPT protocol was developed by KEPHIS with assistance from Wageningen University in the Netherlands. Under the new protocol, the varieties are tested under intensive management - meaning under Good Agricultural Practices (GAP) - in addition to mechanised soil preparation, a fertilisation regime, and a spraying protocol. Only in this way the varieties can show their potential under Kenyan conditions.

Since 2014, Intensive National Performance Trials (INPTs) were organised by KEPHIS on commercial farms to test hundreds of prospective varieties, resulting in the number of registered varieties rising from 13 in 2013, to 63 in 2021.

**A boom of new potato varieties over ten years**

Since the opening of the borders and the implementation of the improved variety registration process, 50 more potato varieties were registered in Kenya (see box 5); 35 of these are of Dutch origin. Lately, some Irish and Indian varieties were registered too. Varieties registered include table, crisping, chipping, and multi-pur-

pose varieties. Their individual characteristics are described in the Kenyan Potato Variety Catalogue as published by NPCK, which is updated bi-annually.

The aim of variety introduction is not only to respond to market demands (e.g., processing) but also to the need to increase yields. Yields may increase using high-performance varieties provided of course that Good Agricultural Practices are applied. The varieties selected under the INPT protocol will particularly contribute to increasing average yields in Kenya as they outperform the “check varieties” under good management conditions.

Not all registered varieties are currently grown in Kenya. An estimated one-third of them is available on the market.

**Import and multiply**

Since 2013, roughly 2,200 tonnes of seed potatoes of different varieties from different companies - albeit mainly Agrico and Europlant - were imported by ship into Kenya (see figure 3). Shipments are inspected in Mombasa by KEPHIS, sometimes jointly with NAK-NVWA before releasing the containers for transport to the cold stores of the importer/seed grower. In case something is wrong with the shipment and phytosanitary regulations

of Kenya are contravened, KEPHIS orders destruction of the load or allows production of ware potatoes under quarantine conditions. Additionally, the first year of growing seed shall be done under quarantine conditions to minimise the risk of any forbidden organism entering Kenya.

Over time, several joint ventures were brokered between Dutch variety owners and Kenyan importing seed growing companies (see table 4):

1. Potato Services Africa in Nakuru imports Agrico varieties.
2. Until recently, Charvi Investments in Mau Narok imported Europlant varieties.

3. Suera farms in Ol Joro Orok has partnered with Meijer and first imported seed but now grows breeder seed from Meijer variety plant material through tissue culture.

4. Kisima farms in Meru never imported tubers but imports HZPC variety genetic material to produce its own breeder seed.

5. Similarly, New Holland Chips in Nanyuki imports Danespo and Den Hartigh variety plant material to produce its own breeder seed.

Agrico Potato Services Africa, Kisima Farms, and the Kenya Agricultural Development Corporation (ADC) are currently the biggest seed producers in Kenya (see boxes 6,7 and 8).

**Box 5**

*Increment of seed potato varieties from 2013 to 2021 (variety owner between brackets).*

**Registered varieties in 2013:**

1. Annet (KALRO)
2. Asante (KALRO)
3. Desiree (KALRO)
4. Dutch Robijn (KALRO)
5. Kenya Baraka (KALRO)
6. Kenya Karibu (KALRO)
7. Kenya Mavuno (KALRO)
8. Kenya Mpya (KALRO)
9. Kenya Sherekea (KALRO)
10. Kenya Sifa (KALRO)
11. Kerr's pink (KALRO)
12. Purple gold (KALRO)
13. Tigonini (KALRO)

**Additional registered varieties in 2021 (out of which 35 are of Dutch origin):**

14. Acoustic (Meijer)	31. Jelly (Europlant)	48. Rodeo (HZPC)
15. Arizona (Agrico)	32. Konjo (CIP)	49. Rock (Meijer)
16. Arnova (Agrico)	33. Kuroda (Agrico)	50. Royal (Danespo)
17. Cara (Irish Potato Marketing - IPM)	34. Lady Amarilla (Meijer)	51. Rumba (Europlant)
18. Carolus (Agrico)	35. Lady Balfour (James Hutton Ltd)	52. Rudolph (Agrico)
19. Caruso (Den Hartigh)	36. Lady Terra (Meijer)	53. Sagitta (HZPC)
20. Challenger (HZPC)	37. Laura (Europlant)	54. Sarpo Mira (Danespo)
21. Chulu (CIP)	38. Lenana (CIP)	55. Shang'i (KALRO)
22. Connect (Den Hartigh)	39. Manitou (Agrico)	56. Sifra (HZPC)
23. Derby (HZPC)	40. Markies (Agrico)	57. Sorrento (James Hutton Ltd)
24. Destiny (Agrico)	41. Mayan gold (KALRO)	58. Taurus (HZPC)
25. El Mundo (Stet)	42. Milva (Europlant)	59. Unica (CIP)
26. Evora (HZPC)	43. Musica (Meijer)	60. Voyager (HZPC)
27. Faluka (Agrico)	44. Nyota (CIP)	61. Wanjiku (CIP)
28. Farida (Agrico)	45. Panamera (HZPC)	62. Zafra (Agrico)
29. Gemson (James Hutton Ltd)	46. Ram (Narayani Ramnathan)	63. Zarina (HZPC)
30. Java (Kirinyaga seeds)	47. Reiver (James Hutton Ltd)	

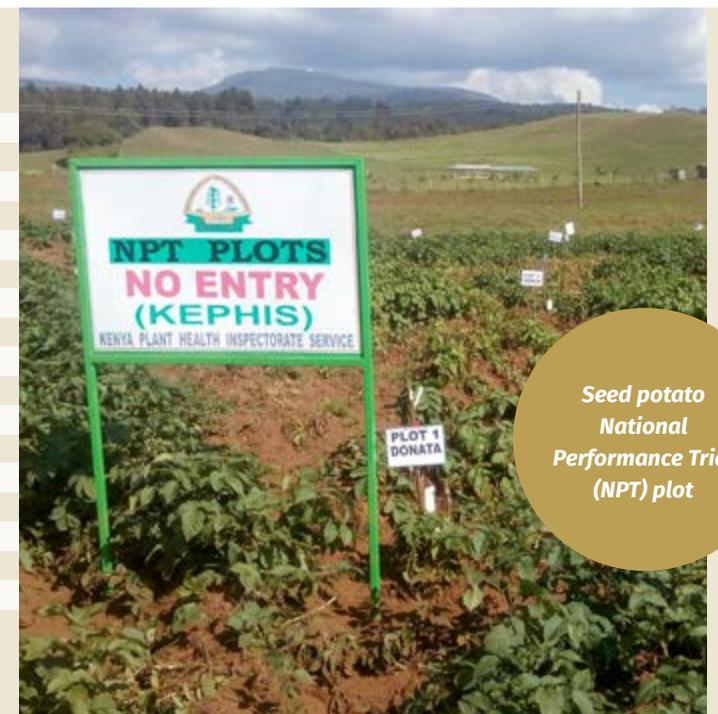
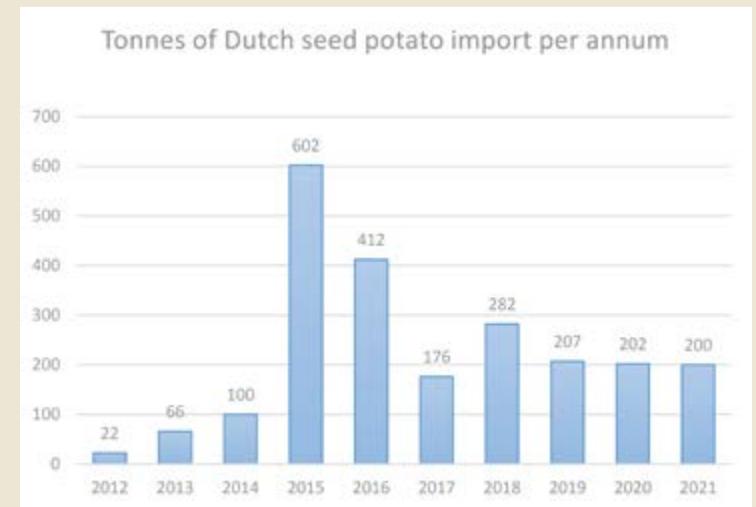


Figure 3. Dutch seed potato import per annum



Source: Potato seed catalogue Kenya, 2013 and Potato variety catalogue 2012, both published by NPCK; National Variety List, Kenya, 2020

Table 4. Investments in seed registration and multiplication in Kenya 2011 - 2021

Seed owner	Company logo	Varieties registered in Kenya	Seed grower in Kenya
<b>Agrico</b>		Arizona, Arnova, Destiny, Faluka, Manitou, Markies, Rudolph, Toluca, Carolus, Kuroda, Zafira	Potato Services Africa (Nakuru)
<b>Danespo</b>		Royal, Sarpo Mira	New Holland Chips (Nanyuki)
<b>Den Hartigh</b>		Connect, Caruso	New Holland Chips (Nanyuki)
<b>Europlant</b>		Jelly, Rumba, Milva, Laura	Charvi Farms (Mau Narok)
<b>HZPC</b>		Derby, Sagitta, Taurus, Challenger, Evora, Panamera, Rodeo, Sifra, Voyager, Farida	Kisima Farms (Timau)
<b>Meijer</b>		Musica, Lady Amarilla, Acoustic, Lady Terra, Rock	Suera Farm (Nyahururu)
<b>Stet Holland</b>		El Mundo	-

### Agricultural Development Cooperation

The Agricultural Development Corporation (ADC) is a governmental parastatal established in 1965. It promotes the production of agricultural inputs across the country. One of the necessary inputs for the development of the Kenya agricultural sector is seed potatoes.

Initially, ADC multiplied breeder seed produced by KALRO. More recently, instead, it has invested in laboratories and an aeroponic and hydroponic system for cultivating the first generation of seed potatoes. Genetic material from either KALRO or CIP varieties is grown into plantlets before being transplanted to any of the 17 greenhouses in Sirikwa farm to produce mini-tubers. An “aeroponic” cultivation system grows seeds on the root system of the plant on which nutrient-enriched water is sprayed without the use of soil. A hydroponic system, instead, involves growing mini-tubers in a substrate of - for example - cocopeat. In this way there is no contact between the tubers and soil pathogens, and soil-related diseases can be avoided. The greenhouses allow the control of climate for optimal growing conditions, assuring high yields and protection from disease transmitting insects.

ADC currently produces between 1 to 1.5 million mini-tubers on its Sirikwa farm in Molo. The same farm grows around 8 hectares of breeder seed per annum. Another 7 hectares of breeder seed is grown every year on the Enchili farm. The 15 hectares of breeder seed provides the input for around 50 hectares of pre-basic seed, which in turn provides the input for growing

around 270 hectares of basic seed produced on the Enchili, Ndambibi, and Lanet (Nakuru) farms. The average yield across the generations is between 8 and 10 tons per hectare. Most production of seed is around Molo, and the six satellite farms across the country reserved by ADC for additional seed potato production are currently not being utilised - except the ADC farm in Londiani, which is used for potato demonstration purposes.

Seed potato production has increased drastically over recent years after the investment in tractors, planters and harvesters from AVR; and a seed potato grader manufactured by Grimme.

ADC mostly sells basic seed and C1. The estimated basic seed production in 2021 was around 2,700 tons, of which 30% was oversized or otherwise disregarded. The anticipated 2021 sales of seed (basic and C1) will be around 1,500 tons (3,000 bags). One of the reasons that basic seed is sold is due to insufficient storage capacity. In fact, existing storage facilities are old and need replacement. Also land is becoming in short supply limiting an increase of C1 production.

Several ADC staff benefited from training programmes on seed production hosted by Wageningen University.

*Moreover, exposure visits of staff to the potato sector in the Netherlands proved valuable enhancing decision making over investments in mechanisation of the farming enterprise.*

Currently, ADC mainly sells the following popular varieties:

<b>Shangi</b>	<b>Sherekea</b>
<b>Dutch Robijn</b>	<b>Unica</b>



## Agrico Potato Services Africa Ltd.

After the Kenyan and Dutch Government formalised their potato sector development plan in a 2012 memorandum of understanding, the Dutch multinational seed potato company Agrico<sup>10</sup> established its Kenyan daughter company, Agrico East Africa. By doing so, Agrico was able to register its potato varieties in Kenya, gaining access to the Kenyan market. In 2015, the company entered a joint venture with Migotiyu Plantations Ltd., establishing Agrico Potato Services Africa Ltd (PSA). The partners received funding from the Netherlands Government, and launched a Public Private Partnership (PPP) between the Netherlands and Kenya Governments, the company, and IFDC. The PPP consisted of three pillars, namely

- 1) local production of certified seed potatoes and their sale across the potato producing Counties through farmer co-operatives and self-help groups;
- 2) generation and knowledge sharing throughout the value chain; and
- 3) creation of a sustainable potato enabling environment to contribute to Kenya's food security and "Big 4" agenda.

Large-scale investments were made in Nakuru County, where the company equipped a farm of around 600 hectares with a 3,500-ton storage facility from Tolsma and heavy duty De Wulf and Miedema potato machinery. Recently, an additional 150 hectares have been developed on the Kabarak estate. Here, a state-of-the-art solar power drip irrigation was installed. Therefore, PSA has become the first seed potato

producer in Kenya tackling the effects of climate change through irrigation, while producing seed potatoes all year round. With currently 130 hectares of seed planted over three seasons in a year, the company aims to bring 6,300 tons of seed to the Kenyan market<sup>11</sup>. Seed is also produced for the company's ware potato production. The rotation crop - composed mainly of wheat - is grown three seasons a year.

PSA is currently the only company in Kenya importing seed tubers from the Netherlands at an average of 200 tons per annum. This basic seed is multiplied at the PSA farms either once (C1) or twice, (C2) and is then sold to farmers. Seed production yields differ according to changing climatic conditions, but average yields of 35 tons/hectare are normal. Sale volumes and prices differ based on season, size, and variety. PSA is currently one of the biggest professional seed growers in Kenya, multiplying both table and processing varieties. The processing varieties find their ways to a range of crisps and French fries' processors in Kenya - examples are Tropical Heat and Sereni Fries. PSA collaborates with several NGOs such as SNV and IFDC, farmer associations, and Counties to boost local potato value chains by making seed available, assist NGOs in training farmers on good agricultural practices, and linking farmers to processing markets.

Box 7

*The company has designed its own farmer training approach in a bid to ensure that farmers make the best out of the quality seed and create loyal customers.*

Training by PSA staff is delivered either on the PSA Potato Centre of Excellence - located within Highland farm in Nakuru, on-site, or in a digital format through training videos and tutorials. In addition, the company uses social media to inform and build competences amongst farmers<sup>12</sup>.

While PSA has 13 varieties registered in Kenya, it currently grows five:

<b>Arizona:</b> multipurpose variety
<b>Destiny:</b> processing variety, especially crisps
<b>Markies:</b> processing variety, especially chips
<b>Manitou:</b> multipurpose variety
<b>Rudolph:</b> table variety

<sup>10</sup> <https://www.agrico.nl/en>

<sup>11</sup> <https://www.agrico.co.ke/agrico-psa>

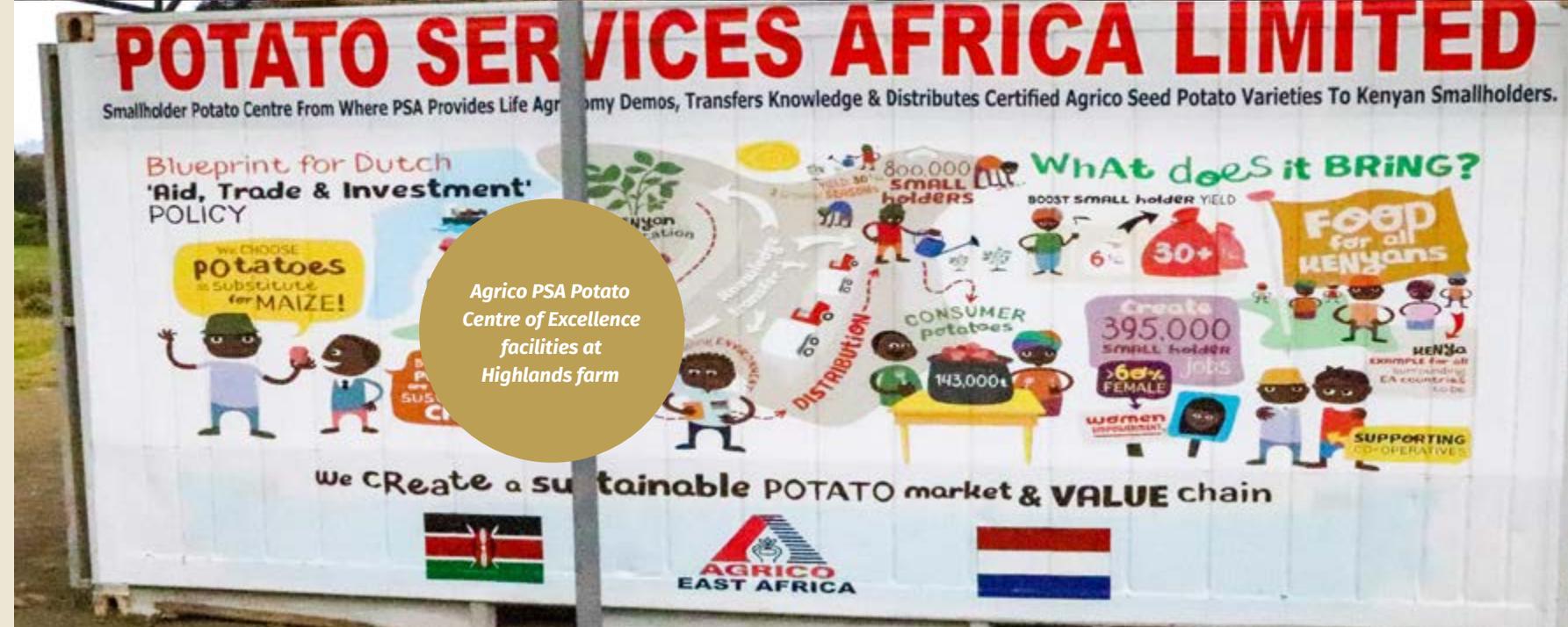
<sup>12</sup> <https://www.facebook.com/AgricoEA/>



Planting seed potatoes at the Agrico PSA farm



Grading seed potatoes at PSA Highlands Farm near Nakuru



Agrico PSA Potato Centre of Excellence facilities at Highlands farm

## Kisima farms Ltd.

Box 8

Kisima is an extensive farm in Timau, Meru County. Whilst arable crops and floriculture are the primary focus, Kisima also manages a successful forestry programme and seed potato production facility. In 2012, the latter was enhanced by starting a partnership with HZPC, a multinational seed potato producer from the Netherlands. The farm grows potatoes on around 200 hectares per annum and sells certified seed of both Dutch and Kenyan origin. The reason for investing in Dutch seed potatoes was the identified demand for processing varieties, since such varieties were not available in Kenya at the time.

Kisima's production cycle is different from Agrico PSA. In fact, the farm imports the genetic material of the 11 registered HZPC varieties from the Netherlands, and purchases genetic material from KALRO and CIP in Kenya. The genetic material is then grown in-vitro in the Stockman Rozen laboratories in Naivasha. The resulting plantlets are transported to the farm to grow mini-tubers under strictly controlled conditions. These are then grown into breeder seed under irrigation before in-field production of respectively pre-basic seed, basic seed, C1, C2, and C3. The latter two generations are sold to farmers as certified seed for ware potato production. The company consciously adopted the "in-vitro route" to seed production to emphasize that the seed comes from Kenyan soils, consciously offering a mix of Kenyan and Dutch varieties to test market demand and consumer acceptance. The concomitant

high investment costs in laboratories, greenhouses, machinery, and a 2,000 tons Tolsma cold storage cost millions of USD, part of which were financed through soft loans and a grant. The "in-vitro route" is a long path towards recuperating investment since early generations are produced in low volumes and at high costs. Kisima can afford the slow rate of return because the farm operations generate a diversity of incomes such as from timber production, wheat, and flowers.

Crop rotation is done with various grains, beans, canola, and rapeseed. The company aims to produce over 200,000 mini-tubers and over 3,000 tons of seed potatoes per annum<sup>13</sup> and supply more than 4,000 small-scale farmers in the region. The surrounding farming area represents the main market, and the seed's distribution is largely limited to direct sale at the farm gate. In the area potato is an important crop. Therefore, supplying neighbours with quality seed has become part of the company's social responsibility.

Seed sales have generally been increasing over the years from around 700 tons per year to a projected 2,000 tons in 2021. The latter figure is uncertain, as the Meru area suffered from drought, and farmers are still recovering from the ware potato sales slump caused by the COVID-19 crisis.

<sup>13</sup> <http://www.kisima.co.ke/>



Seed from  
Kisima farm and  
field of seed potatoes  
at Kisima farm

### Kisima currently grows the following varieties:

- Dutch robijn
- Shangi
- Unica
- Sherekea
- Panamera
- Sagitta
- Voyager
- Taurus
- Challenger

Kenya's varieties are most popular amongst Kisima's neighbouring farmers, with 76% of the varieties currently sold being of Kenyan origin, and mostly for table consumption.

So far, Kenya's experience shows that large-scale seed production is successful, concurring with the Netherlands' experience. For a variety of reasons, the commercial seed potato sector can only succeed at a large-scale and accompanied by serious investments. For example, farmers need large tracts of land to allow a rigorous crop rotation schedule; (pre)-basic seed is expensive, and to ensure successful multiplication mechanized agriculture is a must; balanced fertilisation and spraying protocols need to be flawless to ensure the production of healthy seed; and cold storage solutions for storing seed for further multiplication or distribution need to be in place.

In addition, the setting-up of a marketing and distribution system is expensive and not without risk.

*Large-scale commercial seed producers have a bigger impact on the sector than small-scale producers.*

## Suera farm: producing seed for on-farm potato production and marketing

Box 9

Unlike other seed potato growers, Suera farm runs a closed system of ware potato and seed production, multiplication, and marketing. The farm is situated in Ol Joro Orok, Nyandarua County. Suera is in a joint venture with Meijer, regulating the distribution of Meijer varieties through contract farming and contract marketing. Suera prides itself for having played a key role in the opening of Kenya's borders for the trade of seed potatoes with the Netherlands. Now, Meijer has five of its varieties registered in the Kenya National Crop Variety List (Musica, Lady Amarilla, Rock, Lady Terra, and Acoustic).

Over the past ten years Suera farm has invested in a 200-ton storage facility from Omnivent that stores both seed and ware potato. Additionally, it hosted one of the best INPT sites, and it assisted Meijer in the importation of seed for the Kenyan market. Managing Director Ms. Susan Mureithi has always been active in capacity building initiatives, trade missions, and networking sessions to assist in strengthening the seed and ware potato sector of Kenya.

Recently, Suera farm shifted from the import of tubers to the import of genetic material to bring even more of the seed production process to Kenya. This resulted into a stronger partnership with Meijer for sustainable seed potato production.



Suera Farms  
Managing Director  
Susan Mureithi  
showing Musica  
potatoes

## The search for more seed potato growers

In Kenya, the number of (large-scale) farms that produce certified seed is still limited. The necessary investments are a serious constraint and risk, given the fluctuating demands for seed resulting from unstructured ware potato markets. More seed growers are urgently needed in the country, not only to produce the required volumes of certified seed but also to cover as many potato growing areas as possible (see box 10). A strategic distribution of seed farms - provided the necessary seed growing conditions such as low disease pressure allow - would facilitate the accessibility of seed by farmers thanks to lowered transportation costs. A farmer needs a ton of seed potatoes for an acre of land, and

transport costs are often an impediment for purchasing certified seed.

To encourage Kenyan farmers to consider commercial seed growing, several events have been organised over time - especially between KEPHIS, the private sector, and Wageningen University:

1. A four-day training on seed potato storage took place from 19-22 March 2018 in Nakuru. The training was co-delivered by the representatives of Dutch storage companies, and was attended by 25 prospective (seed) potato growers, of whom five were female.

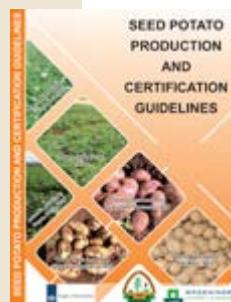
2. A four-day training on seed crop management and field inspection took place from 11-14 June 2018, again in Nakuru, with field experience on the surrounding (seed) potato farms. It was attended by 25 participants, of whom four were female.

3. A jointly developed one-week course organised by KEPHIS on seed production and certification; the training programme runs annually since 2015 drawing an average of 25 participants.

4. KEPHIS—jointly with KALRO, ADC, and Wageningen University—compiled the guidelines for the production and certification of seed potato (see picture). The booklet is meant to enhance the know-how of prospective seed growers, aiding them in becoming more professional and market oriented. More professionalism in the sector will hopefully trigger large-scale investments in the development of the seed sector.

5. In 2019, KEPHIS and Wageningen University delivered a training for 23 Ministry of Agriculture staff from potato growing Counties from 3-6 June in Nakuru. The course aimed to increase the capacity of County management and extension staff to advise seed growers

on how to improve seed potato production and storage and develop location-specific support and investment strategies. The course was an opportunity for the County staff to get to know the commercial certified seed growers and the providers of storage technology.



Box 10

Is there a need for more certified seed growers in Kenya?

Let's look at some figures:

- The Kenya Big 4 agenda targets a potato production of 2.5 million tons per annum in 2025.
- This would require 500,000 tons of (certified) seed, assuming that a huge majority of the producers are small-scale producing low yields with an average of 12.5 tons/ha. This is a very optimistic figure.
- Most subsistence farmers will not have the means or motivation to purchase certified seed. It is assumed that throughout the next decade only 10% of all the planted seed will be certified. This accounts for a projected annual demand of 50,000 tons. This percentage will undoubtedly grow once the sector becomes more market-oriented rather than a subsistence activity.
- In 2021, an estimated 5,000 tons of certified seed was marketed (mainly produced by three large-scale seed growers). This leaves a gap of 45,000 tons of certified seed per annum (covering both the long rains and the short rains season). A Technoserve study of 2018 estimated the seed gap at 23,000 T/annum.
- With a possible yield of 25 tons of marketable seed per hectare, Kenya urgently needs another 1,800 hectares of seed production per annum. This amount is roughly 4 times the current hectareage under commercial seed production.

## A gradually increasing supply of certified seed potatoes

The supply of certified seed is still less than the demand, even though this statement is difficult to fully qualify:

1. The demand for processing varieties is higher than the supply, but this applies less to table varieties.
2. Some varieties are in short supply, while others are not.
3. In some potato growing areas of Kenya, the demand is high. Yet, due to inhibitive transport costs access is limited while seed is available elsewhere.
4. Sudden disasters (e.g., floods, COVID-19) have a huge seasonal impact on the sector. These result in an undersupply or oversupply due to transport restrictions and lockdowns among other things.

The availability of certified seed in Kenya has been growing gradually over time from less than a thousand tons in 2012 to an estimated five thousand tons in 2021<sup>14</sup> (see figure 4).



<sup>14</sup> Data collected from KEPHIS Annual report over the years 2012 – 2020 (from June to June). The volume of seed marketed from June 2020 – June 2021 is an estimate by the Kenya/Netherlands Seed Potato Support Programme.

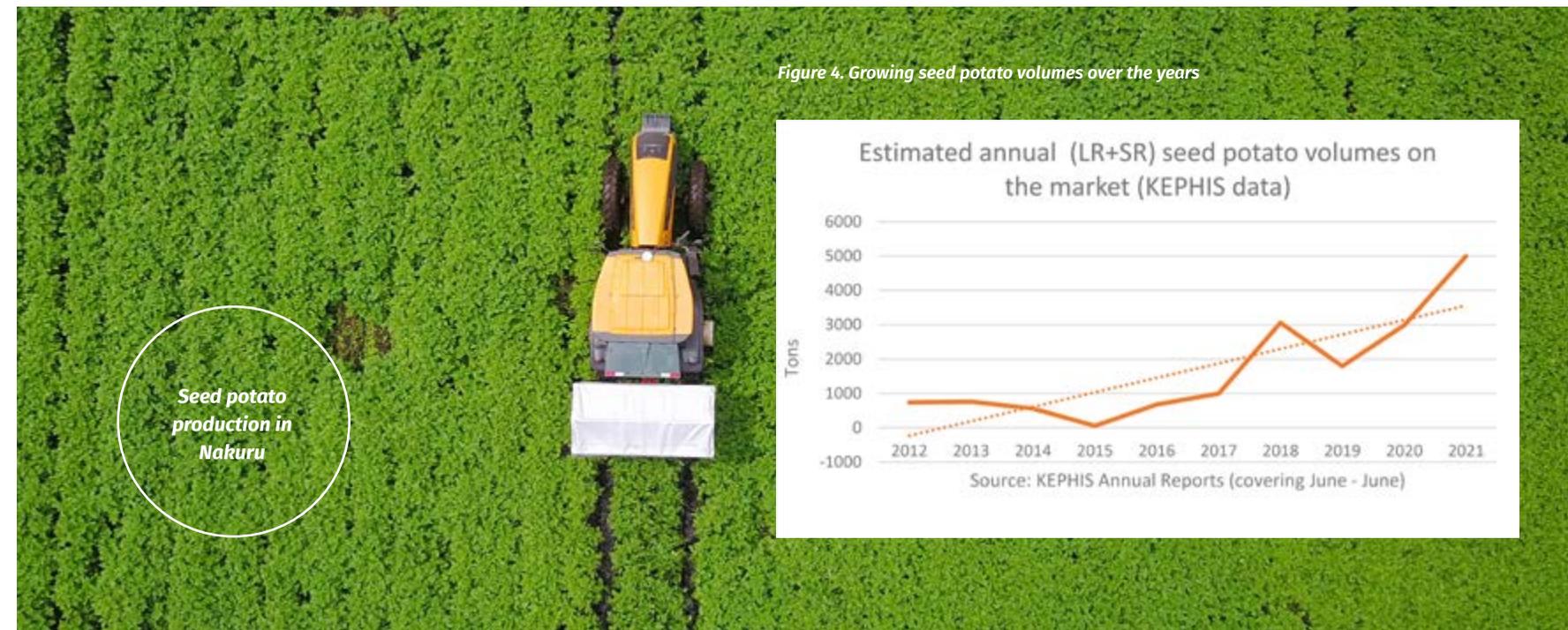


Figure 4. Growing seed potato volumes over the years

## Hybrid True Potato Seeds: a promising innovation

Traditionally, potatoes have been grown using bulky, perishable, and potentially disease-carrying seed-tubers, rather than using clean and disease-free “true seeds” like most other crops. New hybrid breeding technology and the use of true seed will help solve these and other issues in growing potatoes. The Hybrid True Potato Seeds (HTPS) innovation is being worked on by several Dutch companies. Solynta and Bejo are widely accepted as the early developers in this field, and both companies have varieties in INPTs in Kenya. Other Dutch companies such as HZPC and Aardevo are also working with the technology.

Instead of moving tons of seed tubers, farmers only require a small box of HTPS that can be shipped via normal post. Once the seed arrives, it can be stored for years without the need for climate-controlled warehouses. Both benefits can drastically reduce the industries’ impact on the environment, adding stability to the supply of starting material in local markets. Finally, this ease of transportation means that new genetics can be quickly distributed to small farmers in remote locations of Kenya, allowing growers to benefit from clean, disease-free seed, as well as advanced varieties.

Unlike traditional seed tubers, HTPS allows the rapid scale up of new varieties. Using the traditional process, and starting with tissue culture, it would take more than six years to bulk enough seed tubers for a pre-commercial launch. With each year of regeneration, the risk

of disease increases. This, in turn, could reduce farmer yields and potentially spread seed tuber and soil-borne diseases. On the other hand, after a regional introduction, HTPS can go directly to the user (farmer or seed merchant). This allows the value chain to benefit more quickly from breeding innovations while minimizing the risk of spreading diseases.

Using hybrid breeding, beneficial traits from one variety can be used and transferred to another one more rapidly than with conventional breeding. This means that varieties with better taste, better processing characteristics, higher nutritional value, or better climate resilience can be introduced relatively quickly. Additionally, new varieties that maximize the naturally existing resistance against pests and diseases can be created.

Hybrid  
True Potato  
Seed



## Next step: proof of concept in the field

The promises of HTPS are many. With varieties in the INPT in Kenya, the next step is to test the agronomy in the field and the economic viability of the production process. This could mean comparing direct planting of seed in the field, the production of seedlings in greenhouses before planting, or the use of HTPS for the production of mini-tubers to bulk seed potatoes after many multiplications. Each system will have its pros and cons for different categories of farmers and seed producers, and each system will show a different cost-benefit analysis. That HTPS is living up to its promises can only be argued after testing in the field with different Kenyan stakeholders.

**Solynta**  
hybrid potato breeding



Training on seed  
crop management  
with field visit at PSA  
Highlands Farm in  
Nakuru

### 3 The distribution and marketing of certified seed

With certified seed becoming gradually more available in Kenya another bottleneck needs to be addressed: how to get the seed to the farmer? Currently, Kenya's certified seed producers are not many, and the three largest seed producers are concentrated in the areas with the best conditions for seed production - meaning suitable climatic conditions and low disease pressure.

Since these large-scale producers are concentrated in two counties, the distance between them and their potential clients is generally long. For small-scale farmers to purchase a few bags of seed, they would have to incur major transport costs. Seed potatoes need to be stored under cool temperatures, adding to the distribution problem as agro-dealers are widely spread throughout Kenya, but usually lack the capacity and facilities to store the seed. Lastly, seed potatoes are bulky. Growing one hectare of potatoes requires approximately 2.5 tons of seed potatoes - which is equivalent to 50 bags of 50kg. The sheer volumes are a costly transport problem especially for small-scale farmers.

Over the past few years, different models evolved to facilitate the effective marketing and distribution of seed, making it easier for potato farmers to access their inputs. Four of these models are elaborated below:

1. Kisima Farms sells its seed to neighbouring farmers from a refrigerated container along the main Nanyuki-Isiolo road, close to the farm gate. Marketing is largely done through word of mouth.
2. The National Potato Council of Kenya launched "Viazisoko," a digital marketing platform that links seed producers with their clients. The engagement of a private aggregation and transport company, "Viasi Kings," deals with distribution and other logistics.
3. ADC sells its seed directly from their storage in Molo.
4. Agrico Potato Services Africa has set up a network of "connected farmers" all over the main potato growing counties who collect orders from farmers and function as seed distribution points. Social media plays a big marketing role.

#### Selling seed from a refrigerated shop along the road

Kisima Farms is one of the major seed growers in Kenya, aiming to produce 3,000 tons of seed potatoes per annum. With Meru being an important smallholder potato growing area, the company can sell most of its seed to neighbouring farmers residing relatively close. Kisima partly regards its seed potato venture as a service to its small-scale neighbours. The company has built a refrigerated seed store along the road close to the farm from which farmers can order, pick up, and pay their seed per bag. Large quantities of seed are picked up by customers with trucks at the farm or are delivered by Kisima to the site. With the supply of Kisima seed gradually meeting local demand, the company is considering investing in cold storage containers as seed distribution nodes in strategic potato producing Counties.

## How to get the seed to the farmer?

Refrigerated store along the main road close to Kisima farms in Timau

### Seed sales go digital

The NPCK Viazisoko Digital Platform<sup>15</sup> is a web-based portal, mobile app, and communication platform developed by the National Potato Council of Kenya (NPCK) for the online marketing of potato products and related services, and information dissemination. The platform provides an efficient way of accessing agricultural inputs such as certified seed, fertilizers, agrochemicals, soil testing, and mechanization services. It is also used to link farmers to market outlets.

Through the platform, farmers can query and receive an instant response on seed availability and other inputs. The portal and mobile App enable farmers to place seed orders, receive the latest weather forecast and pest and disease advice, in addition to other services geared towards improving potato productivity and profitability (see screenshots).

To access the portal's services, farmers and other service providers must register first. The platform provides an efficient way of accessing quality farm inputs and services by allowing farmers to book seed for the subsequent growing seasons, which can then be delivered to their selected dropping points on agreed dates. Large seed multipliers such as Agrico PSA and Kisima Farms, for example, sell certified seed potatoes through the platform.

The platform also helps with trading ware potato. To that effect, the private company Viazi Kings has partnered with NPCK to provide aggregation and transport services. The company's main business includes buying, sorting, packing, and distributing ware potatoes from rural to urban areas. Additionally, it is using its logistical network to transport seed from the companies to the farmers.

#### Box 11

##### The Viazisoko platform in numbers

Since Viazisoko was launched in 2017, **101,000** farmers have registered. Currently, around **3,000** farmers are actively using the platform. In 2021, around **3,500** bags of seed (175 tons) were traded through the platform.

VARIETY AVAILABLE	SEED SIZE TYPE	PACK IN LBS	SEED COMPANY	CONTACT	LOCATION
Shangi	Star 1 & Star 2	66kg & 50kg 70kg & 50kg	AGRIC	0799121648	Nyambarua-Ofjororok, Narok-Mulicho wa hani.
Dutch Robijn	Star 1 & Star 2	66kg & 50kg	Fresh Crop Limited	0714984706	Nyambarua - Ofjororok, Narok-Mulicho wa hani
Wapakia, Choko, Utaia	Star 1 & Star 2	70kg & 50kg			
Shangi, Nyeroka	Star 1 & Star 2	66kg	Kisima Farm	0714984706	Moro-Timon
Panorama	Star 1 & Star 2	66kg			
Markin, Swaya, Kumbuk, Maitwa	Star 1 & Star 2	66kg & 50kg	Agrico E.A	0742844101	Nakuru-Kohorok
U-tawa	Star 1 & Star 2	66kg & 44kg			
Shangi	Star 1 & Star 2	66kg, 55kg & 66kg	ADC-Molo	0721282368	Nakuru-Molo
Shangi	Star 1 & Star 2	66kg	Utapien	0718924491	Nyambarua -Rivoni
Shangi, Wapakia	Maintainers	25kg/box	Stockman Room	0724484488	Nakuru-Narokian
Shangi	Apical Cuttings	11kg/box			
Shangi, Wapakia	Star 1 & Star 2	66kg	Kinangi Farm	0726187722	Nyambarua, Nakuru, Molo
Shangi	Star 1 & Star 2	70kg & 50kg	Agrico	0724775209	Nakuru-Molo
Shangi	Star 1 & Star 2	66kg	Savannah Fresh Hort.	0788347989	Moro,Nyambarua, Samburu
Wapakia	Star 1 & Star 2	55kg			Moro,Nyambarua
Shangi, U-tawa	Star 1 & Star 2	66kg	Juaria	0743337468	Kisumu-Akipkelan
Shangi	Star 1 & Star 2	66kg & 50kg 54kg & 50kg	Egerton University Seed Hub	0721482987	Nakuru-Njoro
Wapakia	Star 1 & Star 2	66kg & 50kg			
Shangi	Star 1 & Star 2	66kg & 50kg	Chakum Investment	0718487938	Nakuru, Moro, Narok
Dutch Robijn, Shangi	Star 1 & Star 2	55kg	Kiririga Seeds	0791834699	Moro
Shangi	Star 1 & Star 2	66kg	Banabani Kenya Ltd	0799992902	Nyambarua
Shangi	Star 1 & Star 2	55kg & 50kg	Charvi Investment	0724797979	Nakuru-Moro Narok
Shangi	Star 1 & Star 2	55kg & 50kg	Starlight Coop. Society	0721931809	Nakuru-Molo

Screenshots NPCK website: Seed potato availability, and Viazisoko portal, November 2021

### Selling seed directly from the store

In 2021, ADC sold around 1,500 tons of seed. The seed is graded, temporarily stored in Molo, and sold directly to predominantly small-scale farmers across Kenya. This applies especially to the varieties with a short dormancy such as Shangi, the most popular variety for sale at ADC. Farmers normally arrange for their own transport either as individuals or as groups. ADC organises transport to deliver on site only in the case of very large quantities.

Dormancy is an important property of seed potatoes. Normally, it is spontaneously and naturally broken after the tuber's maturation period, resulting in the growth of new sprouts, and therefore being ready for planting. Some varieties have a short dormancy - e.g., for Shangi this is a few weeks. Some varieties, instead, have a long dormancy of up to four months. This property of seed has implications for marketing and distribution. Farmers purchase the seed just before planting, so the dormancy needs to be broken. This means that varieties with a long dormancy are often not ready for planting in the next season and need to be kept in a cold storage for the following one, thus skipping the first planting season after harvest. Proper storage management - and particularly regarding temperature - prepares the seed for sale at the right moment before sprouting. The added advantage of cold storage is that the sale of seed potatoes has some flexibility - i.e., when the rains are late, or sales are slow or very fast.

ADC certified seed potatoes ready for collection at Molo. Note: the wide-meshed bags, allowing adequate ventilation, are particularly suitable for marketing seed potatoes



15] <https://npckviazisoko.com/>

#### 4 Potato storage solutions as key components of a well-performing value chain

The collaboration between Kenya and the Netherlands initially started as a seed potato project due to an overwhelming shortage of certified seed. Over the years, it became abundantly clear that storage of seed, ware, and processed potatoes was of key importance in a well-performing value chain.

Potatoes are perishable due to their high water content and are prone to many diseases. This results in more complex storage solutions compared to cereals. Effective storage - which is also an aggregation and distribution node - is essential to retain quality, reduce transport costs, and regulate prices and market supplies. Storage also provides an opportunity to benefit from the increase in prices following the main harvesting periods, when prices are low due to gluts. Gradually, investments in seed and ware potato storage solutions became an important part of the partnership, with the commercial support of five different technology providers from

the Netherlands (Tolsma, Geerlofs, Omnivent, Beemsterboer Cold storage & Logistics, and Hanse Staalbouw).

Initially the storage of potatoes was limited to seed, and mostly informal seed. Because of two planting seasons, the storage of ware potatoes was insignificant despite very low market prices at harvest time. Seed was stored by mainly small-scale farmers in so called Diffused Light Stores (DLS) to keep it for the following season. In a DLS, depending on the variety and altitude, seed is stored up to a few months at ambient temperatures in shallow layers so that all tubers are exposed to light. This keeps sprouts short and vigorous. This type of storage was introduced by CIP and proves to be an effective, low-cost solution for small-scale farmers. With increasing volumes of seed being produced by large-scale professional seed growers, larger refrigerated stores - further referred to as cold stores - were needed for more precise temperature and humidity control, and to ensure optimum seed quality - particularly sprouting and vigour - at the time of planting and minimum storage losses. Cold stores allow seed to be stored for longer periods, e.g., when skipping one planting season, and are especially needed when the variety has a long dormancy period, which makes planting harvested tubers seasonally, almost impossible. Over the years, a total of five cold stores have been built or contracted for seed storage, with a total capacity of 8,300 tons (see Table 5). This is sufficient to plant some 3,000 ha of potatoes.

Table 5. Commercial potato storage constructed over the past ten years (except DLS).

Type of store	Number of stores	Type of potatoes	Store capacity (range in tons)	Total storage capacity (tons)
Diffused light store (DLS)	NA	Seed	1-50	NA
Cold store	5 *	Seed	500-3500	8300
Cold store	3	Ware potatoes for Processing	500	1500
Cold/cool storage complex	1	Processed products (a.o. potato products)	4000	4000
Cool store with forced draft ventilation	1	Seed	200	200
Cool store with natural ventilation (NVS)	2 *	Seed/Ware	50-80	130

\* Including one store recently contracted

#### Seed distribution through a network of "connected farmers"

Agrico Potato Services Africa has set up an extensive network of farmer groups all over Kenya - there were around 160 in November 2021. Members of these groups got to know the company through projects, potato demonstrations, and training programmes.

Generally, the more entrepreneurial farmers are eager to be better connected with what is happening in the potato sector in Kenya, hence forming a group of "connected farmers." Some of them have received training from the company's extension staff on potato production, and all are linked to the company through social media. Its Facebook page, for example, currently has more than 20,000 followers<sup>16</sup>. The farmer groups function as collection points for taking orders for seed, liaising with the company, arranging the payment, receiving the seed, and organising distribution amongst group members<sup>17</sup>. Transport is arranged between the company and the groups, and only with full truck loads. Supported by an effective use of social media, this approach is efficient in getting seed to farmers all over Kenya.

In addition to the "connected farmer" network, the company sells seed through support organisations in a variety of projects, and to multiple Counties and input suppliers. Seed is also available at the farm gate



Agrico PSA seed waiting for collection



Seed loaded at the Agrico PSA farm

16] [www.facebook.com/AgricoEA](https://www.facebook.com/AgricoEA)  
 17] <https://www.agrico.co.ke/where-to-buy>

Cold stores can be implemented anywhere and irrespective of temperatures. In cool, high altitude areas, an alternative to cold stores is a store equipped with forced draft ventilation using cool night air (cool store). A 200 tons capacity example of the latter was built as a pilot at Suera Farm in Nyahururu.

Since temperature and humidity can be fully controlled, cold stores can be either used for seed or ware potatoes. Processing companies are showing increasing interest to invest in cold stores to ensure a year-round supply of

ware potatoes. The supply from the two major harvesting periods is not sufficient to achieve a regular flow of ware potatoes to their processing plants. So far, a total of three cold stores for potatoes destined to be processed have been built, with a total capacity of 1,500 tons.

The annual cycle of gluts at harvest and the following high prices due to shortage has prompted small-scale farmers to express interest in low-cost, small-capacity stores. For this type of farmer, a cool store of 50-80 tons was introduced based on natural ventilation

(NVS). Such a store is particularly suited for high altitudes with night temperatures below 10°C, and can be used for both seed and ware. Since NVS storage is in darkness, potatoes can only be stored until the end of the dormancy period to prevent long sprouts making the tubers unmarketable. So far, one prototype of NVS has been built in Ainabkoi (see box 12) and a second one has been contracted. The financial results of storing ware potatoes for short periods in NVS proved to be extremely profitable, since market prices increased by 100 to 300% during the first 2-4 months after harvest.

Table 6. Investments in storage solutions in the Kenya potato sector

Company logo	Website	Dutch storage solution providers	Kenyan investors in potato storage
	<a href="http://www.bcskenya.co.ke">www.bcskenya.co.ke</a>	<b>BCS Kenya Ltd Coldstore &amp; Logistics</b> , Kuguru Industrial Park, Industrial Area, Enterprise Road, Nairobi	BCS Kenya Ltd Coldstore & Logistics
	<a href="http://www.geerlofs.com">www.geerlofs.com</a>	<b>Geerlofs Kenya Ltd.</b> , P.O. Box 20903-00202, Nairobi	Sereni Fries
	<a href="http://www.omnivent.nl">www.omnivent.nl</a>	<b>Omnivent</b> , P.O. box 1232, 3899 BA Zeewolde, The Netherlands	Suera Farms
	<a href="http://www.hanseagrostore.com">www.hanseagrostore.com</a>	<b>Hanse AgroStore International/ Hanse AgroStore Africa</b> , De Weel 13, 4306 NV Nieuwerkerk The Netherlands	Ainabkoi Farmers' Cooperative Society Ltd
	<a href="http://www.tolsma.com">www.tolsma.com</a>	<b>Tolsma Technology</b> , P.O. Box 1010, 8300 BA, Emmeloord, The Netherlands	Potato Service Africa; Kisima Farms; IPM; Charvi Farms

## The storage of potatoes pays off in Ainabkoi

Around 800 farmers in and around Ainabkoi village in Uasin-Gishu County have organised themselves in the Ainabkoi Farmers' Cooperative Society Ltd. Apart from being involved in dairy farming, most small-scale farmers also produce potatoes. All farmers have experienced that selling ware potatoes immediately after harvest is fetching low prices. On the contrary, prices are considerably higher a few months later, but this requires a storage system that maintains quality. In 2017, a Hanse AgroStore Africa store of 50 tons was put up in collaboration with the Uasin-Gishu County Government as an experiment to see whether such investment pays off.

Initially only three farmers made use of the store. Currently, around 15 farmers are making use of the store at different times to keep their ware potato for up to four months, depending on the variety. The farmer grades his ware potato and packs it into wooden crates before storage. They pay three KES/kg to cover storage costs, store maintenance, the repair of crates<sup>18</sup>, and management - which consists of the opening and closing of doors during the night. It is the individual farmer who is responsible for deciding when and to whom to sell, and for the maintenance of the quality of their potatoes. At one point in time, the maximum the store held was 27 tons.

<sup>18</sup> The Cooperative has learned that wooden crates are not suitable for storing potatoes. Owning around 2,000 relatively cheap pine timber crates, they noticed that the wood gets wet and rots. The crates are difficult to clean and represent a significant risk of degeneration for the produce. The Coop is looking for finance to invest in more durable plastic crates.

For now, the economics for the individual farmers are positive:

- In 2018, the price of Shangi was KES 12 KES/kg at harvesting, and was sold at 25 KES/kg after 2.5 months.
- In 2019, the price increased from KES 10 KES/kg at harvesting to 45 and 50 KES/kg for Rudolph and Unica after 4.5 months.
- In 2020, there has been no storage due to Covid and bad rains, so all harvested potatoes were sold at the farm gate.
- In 2021, two farmers put Shangi and Unica in storage, expecting to receive KES 45 after three months, rather than KES 10 immediately after harvest.

The number of farmers making use of the store is still limited. In fact, most users are small-scale farmers, who prefer taking the visiting brokers' money quickly, rather than waiting for months and speculate on higher prices.

The introduction of the Natural Ventilation Store (NVS) has offered better market opportunities and triggered the cooperative in thinking more commercially about potato production. Recently, the cooperative signed a contract with "Viaziking" - a wholesaler and trading company - through NPCKs Viazi Soko App, to supply at least ten tons of Markies. The crop is being produced by six farmers.



Ainabkoi board members in front of the potato storage

Cold storage facility

Prospects for different types of storage solutions

Appropriate storage solutions depend on the purpose - such as seed or ware potatoes - volumes, altitude, and the resulting temperatures. Based on previous experience, the potential for the different types of storage is schematically shown in Table 7. For large volumes, cold stores have a high potential at any altitude. With the expansion of seed production and the growing processing industry, more cold stores are expected to be contracted. The growing demand for good quality table potatoes is another strong business case for cold stores, since they could supply table potatoes to retail outlets such as fresh markets and supermarkets.

At high altitudes, cool storage based on forced draft ventilation with cool night air has potential for large-scale potato growing. For small-scale growers, this type of store is not economical. Cool storage with natural ventilation is particularly suitable for small-scale famers at high altitudes with night temperatures below 10C, as investment is relatively low, and no electricity is required. For large-scale production, the NVS is riskier and more difficult to manage. Obviously, the higher temperatures of low altitudes offer no potential for cool stores. DLS, however, continues to have a high potential for seed storage for small-scale growers both at high and low altitudes.

The storage of ware potatoes to take advantage of the post-harvest price increase may improve the livelihood of small-scale farmers and therefore merits further support.

The implementation of ware potato storage in small-scale farming is however hampered by a range of issues, including a lack of initial capital, the need for immediate cash at harvest time, risk avoidance, and dependence on traders. Storage in large cooperative stores may overcome some of these constraints. However, experience has shown that the performance of such stores is poor due to the different quality of batches harvested from individual farmers, resulting in high storage losses. A better option for small-scale growers would seem to be investing in small NVS of 50-100 tons, which can be utilised and managed by a limited number of farmers.

Table 7. Potential for different types of storage at low and high altitudes for small- and large-scale potato growers.

Type of storage	High altitude ❄️ Small *	High altitude ❄️ Large **	Low altitude Small	Low altitude Large
Cold store	❌	✅	❌	✅
Cool store with forced draft ventilation	❌	✅	❌	❌
Cool store + Natural Ventilation (NVS)	✅	❌	❌	❌
Diffused Light Store (DLS)	✅	❌	✅	❌

❌ Low potential; ✅ High potential; ❄️ Night temperatures -10°C; \* 50 - 100 tons or <<< in the case of DLS; \*\* 500 tons or >>>

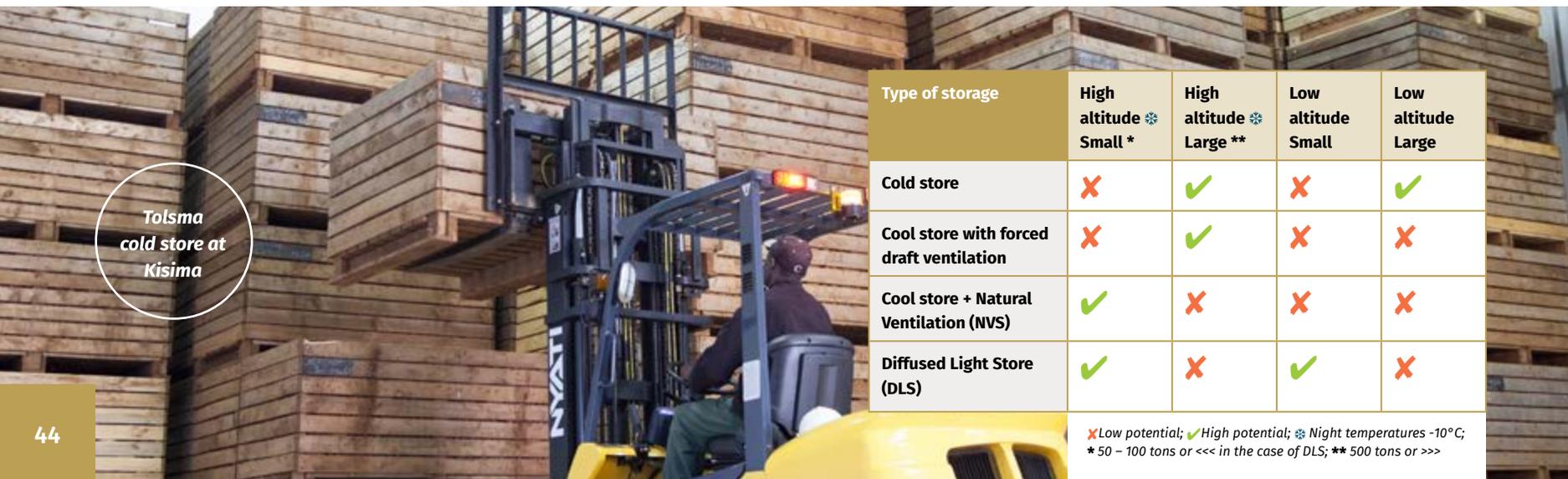
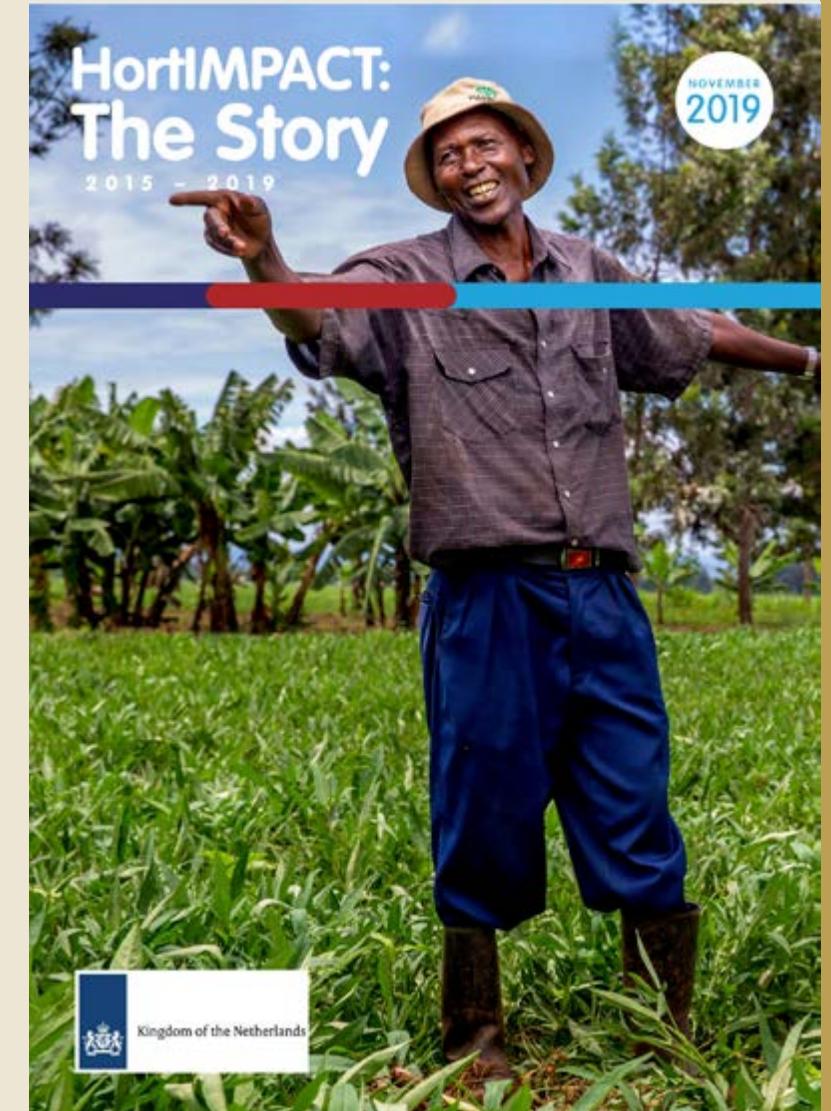
Storage better links farmers to markets

The Hortimpact Project (2015-2019), funded by the Netherlands and implemented by the SNV Netherlands Development Organisation and partners, supported the business case of Sereni Fries, a crisps and French fries processing company in Nairobi. The purpose was to link potato producer groups in Nyandarua to the processor by investing in a cold storage facility that functioned as an aggregation point. The 500 tons cold storage was provided by Geerlofs and installed in Naivasha. SNV assisted the processor with the development of the business plan and the setting up of an extension service for the company to liaise with its supplying farmers. The company then assisted farmers with acquiring the right inputs and preferred potato processing varieties, such as the Agrico PSA Destiny and Markies varieties. The company further played a role in linking farmers and an agricultural mechanisation service offering tilling services leading to higher yields.

As a result, the company contracted 126 farmers to supply potatoes at a favourable price for both parties. The farmers were assured of their market, while the company assured a regular supply of potatoes. The direct relationship between the company and the farmers, and the support from SNV, allowed for an increase of quality of the delivered potatoes. As a result, post-harvest losses decreased substantially: farmers could sell all their potatoes, while the processor acquired the variety of potatoes with minimal processing waste. The total investment was 280,000 euro, of which 50% was by SNV and 50% by the company.

The storage solution proved to be an important catalyst for a well-functioning value chain and provides an example of how the potato sector in Kenya can be strengthened<sup>19</sup>.

19] SNV/Kenya. Hortimpact: the story 2015 - 2019 (November 2019)





From plants to plate

**Potato production in Kenya is mainly the domain of small-scale producers**

*The Kirimara Cooperative*

## 5 Potato production

Potato cultivation is concentrated in the highland areas of Kenya, between 1200 and 3000 meters above sea level. At such altitude, potatoes grow faster than maize and produce more energy and protein per hectare daily. Additionally, potato disease pressure is lower at high altitudes due to lower temperatures.

Potato production in Kenya is mainly the domain of small-scale producers. An estimated 98% of the 500,000-800,000 potato farmers grow the crop on less than one acre (0.4 hectare). FAO data from 2019 indicate that Kenya produced two million tons of potato on 212,976 hectares, resulting in an average yield of 9.3 tons per hectare<sup>20</sup>.

Most smallholders grow potatoes as part of a broad mix of agricultural activities, including horticulture, livestock-keeping, cultivation of cereals, etc. The household economy is partly one of subsistence, and partly market oriented. Markets are relatively informal, and partially organised through brokers and traders who bring the potatoes to the market. Potato prices are very volatile, and smallholders market their potatoes upon harvest resulting in low prices being offered by the market. During the off-season prices are high due to a lack of storage facilities.

The number of medium scale ware potato producers (between 0.4 and ten hectares) is small but growing. They increasingly produce for an organised market, and sometimes through contracts. The number of large-scale ware potato producers in Kenya, instead, is still very limited.

The implications of the above are largely negative for the development of a sustainable and viable potato sector. Indicative is the falling yield over the years from 21.2 tons per hectare in 2008 to 8.6 t/ha in 2018 (and 9.3 t/ha in 2019)<sup>21</sup>:

1. Land fragmentation in the densely populated highlands prevents crop rotation, and potato disease pressures are building up leading to low yields.
2. Smallholders have limited resources to invest in soil preparation, fertilisation, and disease control, therefore production volumes are low.
3. The use of informal seed is the norm rather than the exception, resulting in low yields and increased disease pressure.
4. Markets are poorly developed, and returns are limited, which jeopardizes further investment in the sector.

However, a host of demonstration projects by various support organisations has shown that potato production in Kenya does have the potential to be viable, provided several conditions are met—i.e., the use of certified seed, good agronomic practices, quality inputs, and sufficient market understanding<sup>22</sup>. See also figure 5<sup>23</sup>.

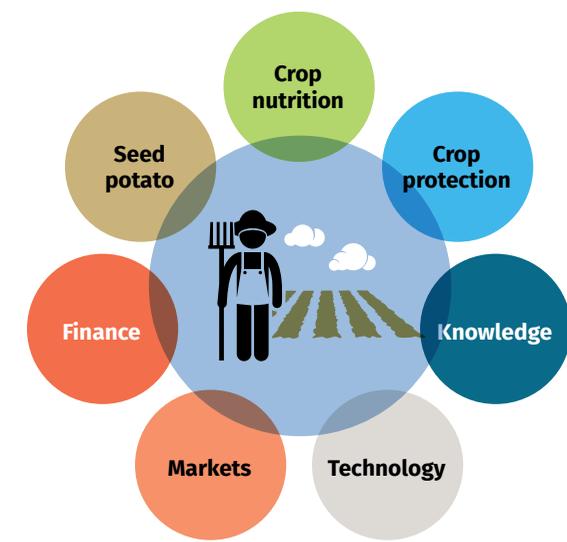


Figure 5. What do you need for viable potato production?

20] Data are derived from Janssens et al (2013). The value chain for seed and ware potatoes in Kenya – opportunities for development; FAOSTAT 2019; Technoserve, 2018. Kenya Potato ISP report.  
21] FAOSTAT. 22] Technoserve, 2018. Kenya Potato ISP report.  
23] Source: Agrico PSA

One of the initiatives aimed at demonstrating the potential of potatoes as a commercially interesting crop was organised by Bayer East Africa in partnership with County extension staff, and with Yara (fertilizers), Agrico Potato Services Africa (certified seed), Siraji Sacco (micro-finance), Tinga (mechanisation), and Carrefour (retail)<sup>24</sup>.

For this demonstration, three farmer groups were selected, consisting of a total of 90 farmers divided in three categories (see table 8):

1. Basic farmers: no support, no innovation, use of farm-saved seed (Shangi);
2. Advanced farmers: agronomy training, coaching and partial innovation in crop protection and use of fertilizer, use of farm saved seed (Shangi); and
3. Connected farmers: agronomy training, full access to innovation in crop protection, fertilizer, mechanisation, certified seed (Manitou), and access to retail markets (Carrefour).

The differences between the three business models proved to be enormous:

In terms of net income - inclusive of the connection with Carrefour supermarkets - the differences between the categories were equally big: the net income of the “connected” farmer was six times higher than that of the “basic” farmer.

The demonstration showed a gain in food production and environmental safety (increased productivity per hectare, optimized use of crop protection and fertiliser input according to GAP, and improved food safety); enhanced marketability (improved marketable yield, reduction of losses, improved farmer income); and sustainability (improved income of all value chain partners, reduced business risks in a solid food production system).

24] Bayer East Africa Small Holder Farming Initiative on potato in Kenya (2019)

Table 8. Demo results

Basic farmer	Advanced farmer	Connected farmer
Low yields due to poor quality farm saved seeds; high losses due to soil diseases (nematodes)	Improved yield because through improved fertilizer use, and adoption of innovative crop protection	Strong yield increase, full adoption of innovations (certified seed, fertilizer, mechanisation, crop protection)
<b>Yield: 6 ton/hectare</b>	<b>Yield: 17 ton/hectare</b>	<b>Yield: 33 ton/hectare</b>
Sale of Shangi with 10% defects at 16 KES/kg	Sale of Shangi with 10% defects at 16 KES/kg	Sale of Manitou with 5% defects at 25 KES/kg; the gross income of the connected farmer was 8.8 times higher than that of the basic farmer



### Training of smallholder potato farmers

Decreasing potato yields over time has been a concern, triggering a variety of interventions by both (County) Governments and organisations such as the International Fertilizer Development Centre (IFDC), the German Corporation for International Cooperation (GIZ), the Netherlands Development Organisation (SNV), the National Potato Council of Kenya (NPCK), the International Potato Centre (CIP), the United States Agency for International Development (USAID), and Syngenta foundation. Investments included subsidizing fertilisers, supporting seed distribution, providing access to mechanisation services and credit, and training farmers in Good Agricultural Practices (GAP).

In some cases, training in “good” potato production is also provided by the private sector. An example is Agrico Potato Services Africa (PSA). The company has developed its own tailor-made training approach in a bid to ensure that farmers make the best out of the high-quality seed potatoes. Training by PSA staff is provided in four different ways: in the PSA Potato Centre of Excellence (located at Highland’s farm in Nakuru), on-site in farmers’ fields, with demonstrations during potato field days and trade fairs, and in digital form through training videos and tutorials. Everything is free of charge, and farmers are encouraged to copy and distribute all training materials as much as possible. Additionally, the company uses social media to inform and build competences amongst farmers<sup>25</sup>.

25] <https://www.facebook.com/AgricoEA/>

### Farming Dutch varieties for the processing industry

Box 14

5

Boniface Gachanja grows potatoes in the Enabelbel area in Narok County on ten hectares of land. Climatic conditions allow him to grow potatoes the whole year round. Currently, he grows three varieties: Shangi, Manitou, and Markies. He clearly prefers the latter two Agrico varieties, even though Shangi requires less disease control, and is therefore cheaper to produce.

The farmer has a long-term relationship with a wholesaler and processors to whom he directly delivers his processing potatoes. The Shangi, instead, is sold on the open market and usually fetches very low prices due to market saturation upon harvest.

1. The yields of Dutch varieties are much higher (see box).
2. The Dutch varieties are processing varieties, which are continuously in high demand, and prices are two times higher per kilo than Shangi.
3. The price of Shangi fluctuates wildly, while the price for processing varieties is steady.
4. Contrary to Shangi - a variety with short dormancy - one can store the Dutch varieties more easily.

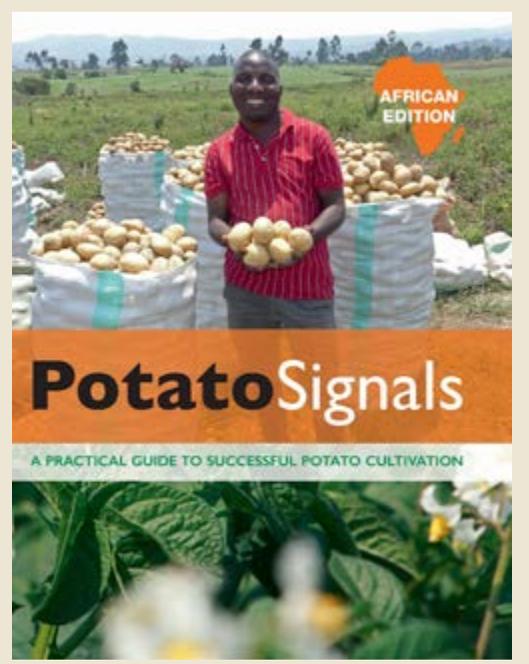
Average yield in tons per hectare
Shangi: <b>17</b>
Manitou: <b>37</b>
Markies: <b>25</b>



Potato Signals African Edition Box 17

**A practical guide to successful potato production**

Developed in 2020 by a team of potato experts - and borrowing heavily from the Dutch potato sector - the "Potato Signals" practical guide highlights sustainable best practices in potato production. The book guides the reader to knowledge and practice in a learning journey towards optimising potato production in different climates and regions. Both the English and Swahili editions of the document are available from Roodbont Publishers<sup>26</sup>.



26] www.roodbont.nl/en/product/100-512\_Potato-Signals-African-Edition

Box 16

Growing Dutch potato varieties for a niche market

There are potatoes and potatoes. Warmolt Tonckens of Molly Farms is a ware potato grower in Tigoni who developed a specific niche market for large, cleaned, smooth-skinned potatoes sold in 5kg packages to big supermarkets in Kenya. Amongst his clients are Carrefour, Zucchini, Naivas, Chandarana, and Artcafe. This market niche is relatively new. Before, people were not used to purchase pre-packed fresh potatoes in retail outlets. Molly Farms sells Manitou, an Agrico table variety, as well as Markies and Destiny, Agrico's chipping varieties. All varieties are produced in high yields of up to 40 tons per hectare. The high-end market of Molly Farms is gradually increasing as purchasing power in rapidly urbanising Kenya is growing.

The growth of this market was such that production had to be increased, and Molly Farms recently turned into part-time extension agent and trader. Through a partnership with Bayer, Yara, and Agrico, selected groups of small-scale farmers are assisted in growing potatoes more effectively using all necessary implements and under good agricultural practice. With access to financing, they purchase the certified seed required by the market and produce ware potatoes. With Molly Farms as the potatoes marketing channel, all actors receive a good return on investment.



*Molly Farms' owner Warmolt Tonckens*

Box 15

Kirimara: an example of a potato producer cooperative going commercial

Kirimara - the name refers to Mount Kenya in the local Meru language - is a cooperative of around 50 potato farmers that has been very proactive in getting support from different agencies such as the Meru County, IFDC, and SNV. The cooperative exists since 2014, and is currently chaired by Ms. Florence Kinoti, a former schoolteacher. Their business model is such that inputs like certified seed and fertilizer are sourced collectively, while ware production is done individually, and the marketing of potatoes in collective. The Siraji SACCO plays a pivotal role in financing some of the groups' activities.

As a result, average yields of some members have increased from 7.5 to 20 tons per hectare. A recent contract with Sereni Fries has increased regular incomes of the membership and aims at providing a steady supply of Agrico's processing variety Markies.

The cooperative has even moved beyond primary production, Ms. Kinoti explains: "we purchase potatoes from surrounding smallholder farmers outside the membership, aggregate, store and sell; we are exploring investment in basic crisp-making machinery to sell our processed potatoes in the local market, and we are training the youth in potato production."

Positive developments go along with setbacks. "On this side of Mount Kenya," the changing climatic conditions - changing rainfall patterns and the occasional drought spells - are causing production problems. With the support of the "Climate Resilience Agribusiness for Tomorrow" (CRAFT) programme - which is facilitated by SNV - the cooperative will counter these uncertainties by investing in water harvesting technologies and drip irrigation through a cost-sharing arrangement.



*Growing potatoes with drip irrigation*



During a meeting in November 2021, the cooperative's members listed the progress made in potato farming over the years:

- Training programmes by the various organisations enhanced skills in terms of soil samples extraction and analysis, as well as understanding and applying spraying protocols.
- The reasoning of using certified seed is well understood and applied.
- The importance of market-driven production and the importance of contracting arrangements forms the basis of doing business.
- The importance of attending demos and field days is appreciated.
- Data recording and financial literacy amongst the membership has greatly increased.



## 6 Potato processing

The bulk of potatoes produced in Kenya are marketed and sold as ware potatoes directly to consumers (see figure 6)<sup>27</sup>.

The processed potatoes are mostly sold as fresh cuts, pre-cooked French fries (chips), and crisps. Deep-frozen, pre-fried French fries and other frozen potato products are hardly processed in Kenya and are mostly imported from the Netherlands, South Africa, and Egypt. Larger hotel, restaurant, and supermarket chains are the main importers of frozen potato products<sup>28</sup>.

The potato processing value chains are gradually expanding due to the increasing demand caused by population growth, urbanisation, and changing lifestyles, in addition to a growing middle class, and investments in the hospitality industry. Still, Kenya's potato processing industry is limited in scale compared to other countries.

Both fresh-cut and crisps processors can be differentiated between medium-scale companies<sup>29</sup> such as Norda, Tropical heat (Deepa Industries), Gaea, Sereni Fries; and small-scale (cottage) processors. The former dominate the national market and supply wholesale and retail outlets. The latter produce for local markets, and their investments in fresh-cuts and crisps are minimal.

The production of pre-fried French fries - blanched, dried, and packaged - requires more investments and is mainly the domain of medium-scale companies such as Sereni Fries and New Holland Chips.

The Kenyan potato processing industry is still relatively underdeveloped because of the following reasons:

- The supply of good quality potato processing varieties - including uniformity of shape, shallow eyes, no bruises, high dry-matter content for French fries, low sugar content for crisps, and appropriate size - is still a constraint even though the number of registered processing varieties is gradually increasing.
- Market linkages and market information between potato producers and potato processors are still areas of concern, and their absence hampers steady supplies. Production contracts in which quantity, quality, and prices are specified between farmers and processors are still exceptions to the rule. Such contracts, if transparent and with clear obligations for both parties, can be beneficial for both producers and processors. Currently, some processors seem to be forced to invest in their own potato production to secure their supply, although it is not always the most efficient way of strengthening the value chain's performance.



Figure 6. Potato markets in Kenya at a glance

27] GIZ, 2016. *Modernization Options for the Potato Value Chain in Kenya and Nigeria*.

28] AADSS, 2017. *A regional market assessment for specialized processing potatoes in East African Countries*.

29] Processors are regarded as medium-scale if they process around 10 tons of potato per day.

The availability of processing varieties in Kenya is improving. These are currently good processing varieties on the market (see table 9).

Table 9. Processing varieties

Popular processing varieties	Produced by registered seed growers
Markies and Destiny	Agrico Potato Services Africa
Taurus	Kisima Farms
Dutch Robijn	ADC
Royal and Sarpo Mira	New Holland Chips



## Four cases illustrating the state of the potato processing industry in Kenya

### 1. Sereni Fries in Nairobi, Humphrey Mburu: “Sourcing the right potatoes for chips and crisps”

Sereni fries is located at Athi Business Park, off Old Mombasa Road in Nairobi and is one of the potato processors who benefited from the introduction of Dutch processing varieties. “The biggest advantage,” says Humphrey Mburu, the owner, “is the minimized processing waste and minimized labour costs.” Whereas a Shangi variety results in 30% of waste or more because of its awkward shapes and deep eyes, Markies’ waste is less than 15%. This variety hardly requires manual labour after mechanised peeling, while Shangi requires a lot.

“The market wants the Dutch varieties. Restaurants and retail outlets are demanding good quality French fries. The problem, however, is that potatoes of the Dutch processing varieties are not readily available as farmers are used to grow Shangi. I am therefore forced to use Shangi, or even temporarily stop processing”. The preferred chipping varieties are Markies (Agrico), Voyager and Challenger (HZPC varieties of which the seed is grown by Kisima Farms), and Unica (CIP). For crisping Sereni uses Destiny (Agrico) and Dutch Robijn.

The potatoes are grown by different farmers. Sereni buys ware potatoes from the Agrico Highlands Farm or contracts farmer groups to produce the desired varieties in the necessary quantities. The company is actively developing its own value chain in collaboration with Agrico

for seed, financial organisations, and small-scale growers. To make the most of the value chain, the company invested in a 500 MT Geerlofs cold store in Naivasha as a collection and holding point to ensure a steady supply of ware potatoes to the processing facilities in Nairobi.

Because the production of French fries is sometimes affected by a limited supply of potatoes, Sereni recently ventured into crisp production. Every day, the company processes 300 kg of crisps in 30 grams packages in three flavours. Additionally, production is due to increase with the arrival of an automated packaging machine.

The French fries processing capacity is of 150 tons of ware potatoes per month, but this quantity is never met because potatoes of the preferred variety are not sufficiently available. “The market is there; the right potatoes are missing”, says Humphrey.



### 2. Chemoi, farmer and restaurant owner in Narok: “Growing Dutch potatoes for the restaurant”

Chichibart Chemoi is a farmer and entrepreneur in Narok. He owns farms in Mau Narok and Nakuru in which he grows potatoes, which he started producing to supply his fast-food restaurants in Narok.

Chemoi “the farmer” knows that the potatoes he needs should be high-yielding, should have good storage qualities, should be good to process, and should have a high dry matter content for producing crispy French fries. Although he had initially identified Markies as the most suitable variety, in the absence of seed he chose Manitou, recognizing it as suitable for his purpose. These Agrico varieties are high yielding, and in 2019 he produced 44 tons of Manitou per hectare. Additionally, he can store the bags of potatoes in a dry and dark shed on his premises for three months without a problem.

Chemoi “the restaurant chef”, has learned that his clients prefer the Dutch varieties because of the yellow colour, the firmness of the fries, and their sweet taste, with Markies coming out of his consumer tests as “the best.” He processes 35 tons of potatoes every month. Blanching and frying are easy without the French fries taking up too much oil. Compared to most Kenyan varieties, processing waste is limited because of Markies’ oval shape.

With his third restaurant in Narok opening soon, Chemoi is anxious to access more land and certified seed to grow more potatoes.



### 3. Gaea Foods Ltd, Nairobi: towards a circular economy

Roseanne Wanjiku is one of the directors of Gaea Foods Ltd, a small company processing potatoes in fresh cuts since 1999. The company is in Nairobi and processes between six and ten tons of potatoes daily. "With a ready market it is important to secure a steady supply of ware potatoes of good quality," which has been a problem over the years. So 2019, the company decided to invest in developing a potato farm in Naivasha to produce its own supply, which is currently growing the Manitou and Jelly varieties. The choice for these varieties was informed by high yields, good tuber size for mechanical processing, the absence of deep eyes, and excellent frying quality.

That same year, the company also decided to invest in using the processed waste. The peels and rejected potatoes are fed to Black Soldier Flies, whose larvae are high quality animal feed. These are then fed to pigs and chickens, and the residue becomes high-quality manure that helps crops grow. This way, the circle is complete.

The company is planning to move its processing facilities closer to the farm to reduce transport costs and is exploring other process lines such as pre-fried frozen French fries. A cold store in Nairobi would then be sufficient as a distribution point for the company's products.



Roseanne Wanjiku assesses the growth of Black Soldier Flies larvae at her farm

### 4. New Holland Chips: "Dutch" fries from Laikipia

New Holland Chips (NHC)<sup>30</sup> was established in Nanyuki, Laikipia County, in 2016, and the investment was supported by the Netherlands Government through a 50% grant. The processing factory and cold store operate under strict KEBS quality regulations, and the company currently produces mostly fresh, pre-fried French fries. NHC products are delivered to hotels, restaurants, tourism camps around Nanyuki, and major supermarkets across Kenya. Given the short shelf life of the product - around one week - and related logistical limitations, the company is considering an investment in a French fries deep-freezing processing line. In preparation of this move, the company has co-invested in a 4,000-ton cold/cool store facility in Nairobi to boost its nationwide distribution network of frozen potato products.

New Holland Chips' potato products are made of potatoes of the Royal variety, one of the Dutch processing varieties from Danespo. These are very suitable for frying because of their high dry matter content and low oil absorption quality.

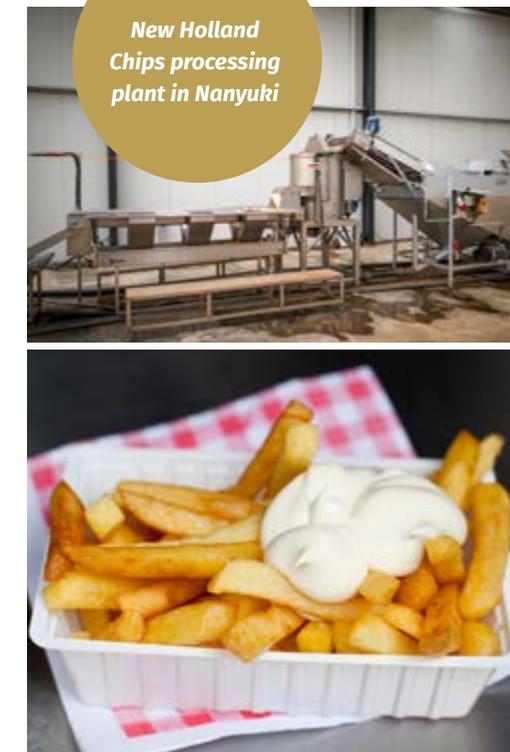
The company has invested heavily in securing its ware potato production to be able to control steady supply and the quality of the input by:

1. Importing the genetic material of four processing varieties from the Netherlands: Caruso and Connect from the company Den Hartigh, and Royal and Sarpo Mira from Danespo. The farming operation part of the company grows all early generations on-farm from tissue culture to mini-tubers until C2.
2. Building a network of around 200 smallholder out-growers who produce ware potatoes for the processing unit. Contracts stipulate growing conditions and price arrangements, and NHC's extension staff train farmers in good agricultural practices.
3. Registering as a seed merchant. Excess seed - a future projected few hundred tons - is sold on the market to increase the volumes of the high-demand processing varieties.

The company's pre-fried French fries find their way all over Kenya, and the recently opened Beemsterboer Cold Store (BCS Kenya) in Nairobi<sup>31</sup> functions as a distribution point. From there, the products are transported to customers through refrigerated courier services countrywide.



<sup>30</sup>] <https://www.newhollandchips.com/>  
<sup>31</sup>] <https://bcskkenya.co.ke/>



New Holland Chips processing plant in Nanyuki



**Potato sector development is the result of a joint endeavour of the industry, government, civil society and knowledge institutes**

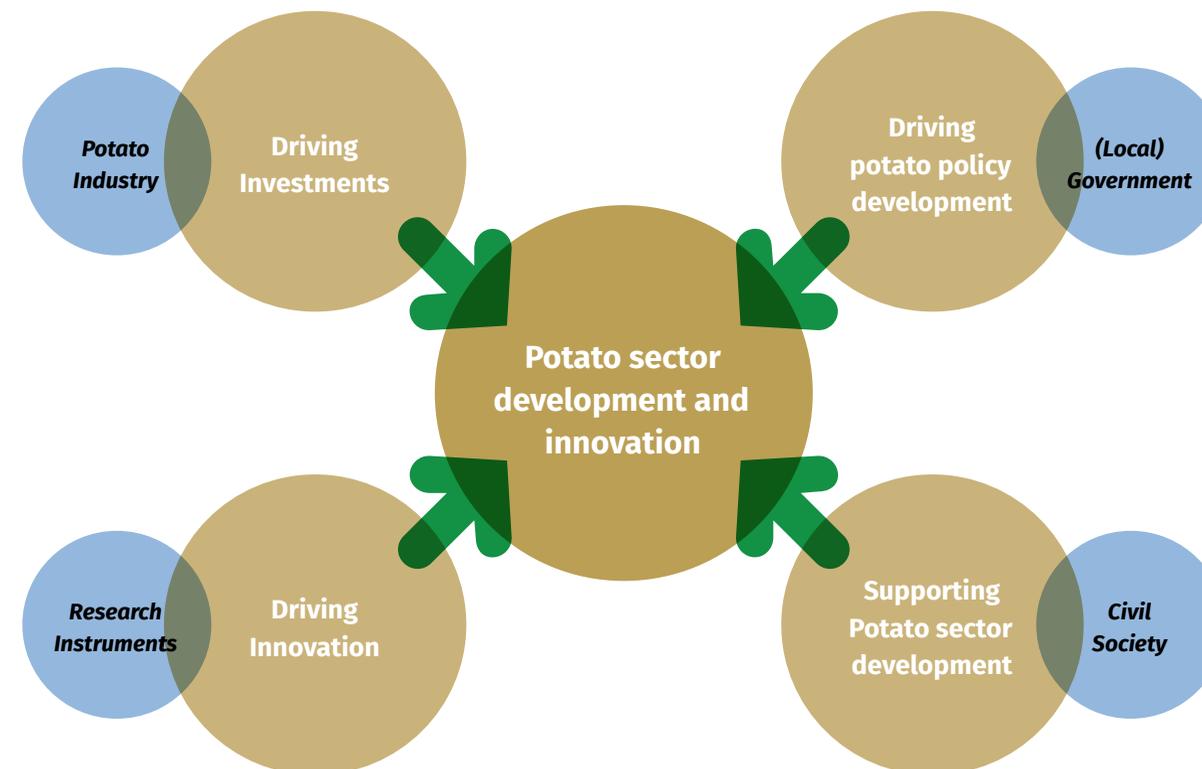
*Mechanized potato harvesting demonstration at the 2017 Eldoret Trade Fair*

## 7 Potato sector development and innovation

The Kenyan potato production sector is still in an emerging state, if compared to its potential - as seen in more developed countries around the world. At the same time, however, Kenya is becoming a middle-income country with an increasingly urban population of around 50%, triggering a fast and growing market demand for potatoes.

To meet such a demand, the performance of the potato sector needs to improve, requiring innovation, a conducive policy environment, an enabling investment climate, and structured market development. With this in place, a positive long-term impact on poverty alleviation, employment, entrepreneurship, and food and nutrition security can be predicted.

Developing the potato sector is not solely the prerogative of the State anymore. In fact, it has become a joint endeavour of the industry, different government agencies, civil society, and knowledge institutes. Over the past ten years, the interplay between these four stakeholder categories has been shaping the Kenyan potato sector.

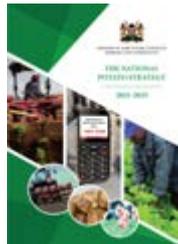


*Figure 7. Innovation and development of the potato sector*

**The Government of Kenya: driving potato policy development**

The central Government of Kenya has been active in formulating policies and strategies strengthening the potato sector through a series of initiatives. These include the Agricultural Sector Transformation and Growth Strategy (2019-2029) - in which potato features prominently - the Roots and Tubers Crops strategy (2019-2022), the Crops (Irish Potato) Regulations 2019, the National Food and Nutrition Policy of 2011, and the National Potato Strategies (2016-2020; 2020-2024).

From plant to plate



At a County level, local governments combine policy development, local investments, and the implementation of sector programmes to achieve the following:

- Coordination and monitoring of government policies and strategy implementation.
- Investments in:
  - **Farmer mobilisation** to guide capacity building initiatives and extension services for improved farmer knowledge and skills on good agronomic practices (GAPs);
  - **Field days, trials, trade fairs**, and farmer to farmer exchange programmes;
  - **Bulk procurement** of certified seed potato, investments in machinery (e.g., tractors, planters, and harvesters), storage solutions and marketing;
  - **Infrastructure development** such as roads, water catchment dams and pans, irrigation schemes, and market development geared towards the improvement of potato productivity and profitability.
- Implementation of major support programmes. Find a selection in Table 10.

Table 10. Selection of potato support projects at County level and summary of activities

Projects	Summary of activities
<b>National Agricultural Rural Inclusive and Growth Project (NARIGP)</b>	Operating in 21 Counties with Meru, Nakuru, Narok, Nandi, and Kiambu having selected potato as one of the value chains. Development objectives include: <ul style="list-style-type: none"> <li>• Increasing potato production and productivity;</li> <li>• Investments at the farmer group level, e.g., construction of DLSSs, equipping aggregation centres with sorting, grading, and packaging equipment, cool/cold stores, and access to certified seed;</li> <li>• Strengthening producer organizations to become profitable, business-oriented entities by building capacity and financing enterprise development;</li> <li>• Technical advisory services (e.g., public extension services) and the creation of an enabling environment for the private sector and public-private partnerships (PPP).</li> </ul>
<b>Kenya Climate Smart Agriculture Project (KCSAP)</b>	Development objectives include increasing agricultural productivity and enhancing resilience and coping mechanisms in the face of climate change in the targeted smallholder farming and pastoral communities in Kenya by: <ul style="list-style-type: none"> <li>• Up-scaling Climate Smart Agricultural (CSA) practices;</li> <li>• Strengthening Climate-Smart Agricultural research and seed systems;</li> <li>• Supporting agri-weather, market, and advisory services.</li> </ul>
<b>Agricultural Sector Development Support Programme (ASDSP)</b>	Government programme to enhance the capacity of different “Priority Value Chain Actors” at different levels to tackle the problems that hinder the commercialization of agriculture by: <ul style="list-style-type: none"> <li>• Increasing the productivity of priority value chains (such as potato);</li> <li>• Strengthening the entrepreneurial skills of chain actors; and</li> <li>• Improving market access.</li> </ul>
<b>EU Instruments for Devolution Advice and Support (IDEAS)</b>	Constructing a tissue culture laboratory and seed potato multiplication set-up and storage at Ol Joro Orok and Njabini Agricultural Training Centre in Nyandarua, to provide farmers with certified seed.



**NPCK as industry platform: driving investments and sector coordination**

The National Potato Council of Kenya (NPCK) is a multi-stakeholder organization whose responsibility is to co-ordinate potato value chain activities with the aim of developing the sector into a robust, competitive, and self-regulating industry. NPCK has been a partner in the Kenya-Netherlands collaboration from the onset and contributed to what it calls “a true transition of the potato sector” over the past ten years. The CEO Wachira Kaguongo summarizes the key changes as follows:

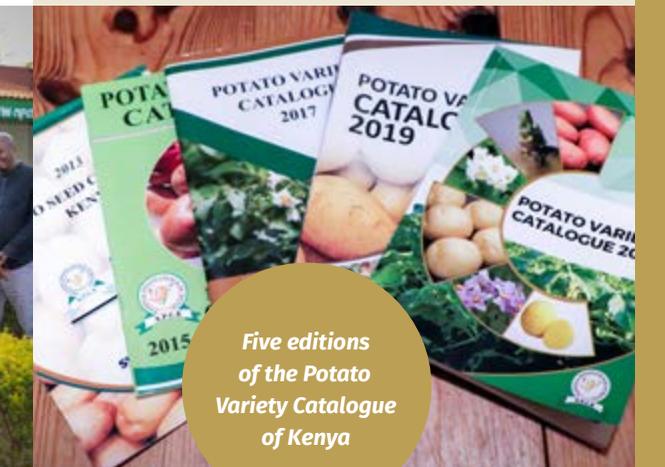
- The potato is currently regarded as a commercial crop rather than a subsistence crop. This has far-reaching implications for investment potential, value addition, and hence income and employment generation. Potatoes are not just food; they now also mean serious business.
- The registration of an increasing number of potato varieties - from 15 in 2013 to 65 in 2021 - has greatly assisted in generating investments in the sector. Where previously Kenyans only knew table varieties, now there are varieties for crisping and chipping that promote investments in the processing industry.
- Where once the development of the industry was driven by the public sector and progress was debatable, we now see private companies moving the sector forward. People increasingly appreciate and trust the industry to take a leading role and realise that sector growth must come from the private sector.

- This trend influenced the role of County and central Government who now increasingly create a conducive regulatory and policy environment - including financial support mechanisms - rather than covering an implementation role.

This transition is partly the result of sector stakeholders regarding themselves as value chain actors that depend on and collaborate with each other. The chain is as strong as the weakest link; all will suffer when the chain breaks. The Council sees it as its mandate to ensure that this does not happen.



NPCK staff at their offices in Nairobi



Five editions of the Potato Variety Catalogue of Kenya

**The Potato Variety Catalogue of Kenya**  
 Since 2013, NPCK publishes the Potato Variety Catalogue of Kenya bi-annually. The update and publication are funded by selected NPCK partners such as the Kenya-Netherlands Seed Potato Support Programme. The catalogue describes potato varieties in terms of usage, tuber features, maturity period, yield, disease and pest resistance, variety owner, and, most importantly, from which grower in Kenya the seed can be purchased. The catalogue is meant to raise awareness amongst potato farmers and other value chain actors about the large selection of available seed and help them pick the variety that suits their ecological conditions, farming practices, and market. As such, the catalogue is an indispensable asset for the sector’s development.

## Civil society: supporting the potato sector development

Non-Governmental Organisations and (international) donors have played an important role in the development of the potato sector. Here are only a few examples:

- IFDC: the Netherlands-funded “Toward Sustainable Clusters in Agribusiness through Learning in Entrepreneurship (2SCALE)” programme 2012-2017 strengthened the potato sector in Kenya. The programmes tested and promoted Agrico varieties, mobilised farmers into groups, trained them in GAP, and assisted in linking farmers to the processing industry through brokered production contracts. Investments were made in small storage facilities built with locally available material such as straw bales to reduce post-harvest losses and fetch higher prices off-season.
- Technoserve: contributed to the sector by conducting studies that have shaped the way the industry views its development agenda. These included an overview of the challenges and opportunities in the Kenya potato sector (ISP, 2018) and a study on the Kenya Seed Potato Industry Diagnostics with IFC. Technoserve further played a critical role in stakeholder engagement to ensure that the potato disease surveillance of 2019-2021 took off.
- SNV Netherlands Development Organisation: The Hortimpact Project (2015-2019) funded by the Netherlands invested in various potato business cases around farmer organisation, usage of certified seed, storage, and processing. Its successor programme - Climate Resilient Agribusiness For Tomorrow (CRAFT) (2019-2023) - also includes potato business cases but brings in climate risk analysis and climate-smart innovations in production technologies.

*Other donor programmes supporting the potato sector in the recent past included the GIZ projects, the Kenya Agricultural Value Chain Enterprises project (USAID-KAVES), and Syngenta Foundation initiatives.*

### Box 19

#### Potato surveillance on potato bacterial disease (blackleg) in Kenya

The survey was conducted in six leading potato producing Counties: Elgeyo Marakwet, Meru, Nakuru, Narok, Nyandarua, and Trans Nzoia. 1002 farmers were selected by the Counties to participate in the survey and nearly 3,000 samples of tubers, plant material, and soil were collected and sent to the KEPHIS laboratory for analysis. In addition to the collection of samples, a structured questionnaire was distributed among farmers to better understand the farming systems potentially affected by blackleg. The farms were visited for sampling in November and December 2019, the laboratory analysis took the whole of 2020, and the report was published in October 2021. *Pectobacterium* spp. were identified in 290 samples, which is the equivalent to one in every ten samples. More specifically, the survey found the following species: *P. brasiliense*, *P. carotovorum*, and *P. wasabiae*. These blackleg- and soft rot-causing species were found and described in earlier studies in Kenya, and their presence has been confirmed again. During this survey, a *Pectobacterium* species was found in Kenya for the first time: *P. atrocepticum*, while another new find was *Dickeya solani*. Both cause blackleg. The latter was found on two farms in Elgeyo Marakwet and in Narok.

## Research institutes: driving innovation in potato production

The potato sector is in development and will always be. The effectiveness of current technologies and production systems are questioned; newly discovered potato pests and diseases demand for new disease control and mitigation responses; changing climatic conditions require adaptations in production techniques; changing lifestyles and consumer preferences urge the processing industry to develop new products. When travelling the entire value chain, this translates into innovation in breeding new potato varieties. Apart from the private sector research capacity, a range of national and international research institutes are triggered to invest in innovations. A few examples are:

- The Kenya Agriculture and Livestock Research Organisation (KALRO) in Tigononi has been a potato plant breeding and research institute since the seventies. The organisation regularly releases new varieties; has been involved in post-harvest loss research; organises potato crop demonstrations to study both adaptability of varieties to climate change as well as disseminating knowledge to potato farmers; and gives technical advice to seed growers.
- The International Potato Centre (CIP) is a CGIAR research centre, and a global research partnership with an office in Kenya. CIP provides breeding material to develop new potato varieties jointly with local partners. Since many years, CIP has been promoting the use of Diffused Light Stores for the low-cost storage of seed potatoes. Recently, the Centre has been promoting seed potato production through apical cuttings as an alternative for seed production through mini-tubers. The technique is tested and promoted as a cheaper way to make starter material available for seed growers.
- The Centre for Agriculture and Bioscience International (CABI) is an international research centre on plant health. The Kenya office was contracted by Wageningen University & Research in 2019 to undertake a potato bacterial disease surveillance in six potato growing counties (see box 19). The importance of the study was to assist KEPHIS with the detection and identification of the different “*Erwinia*” bacteria present, with mapping the occurrence of blackleg in the country, and to ensure that seed regulations are aligned with determined risks. This will lead to increased awareness of the country’s disease status, better disease prioritization, and increased investments in appropriate disease prevention and control. This will potentially improve disease management practices of authorities and market actors, drive increased availability of quality seed, while improving potato productivity, incomes, and food security.
- Wageningen University & Research in the Netherlands has been involved in the development of the Kenyan potato sector for the past ten years through studies and capacity building programmes such as:
  - **The value chain** for seed and ware potatoes in Kenya - Opportunities for development, was a 2013 study conducted by Wageningen Economic Research & Wageningen Centre for Development Innovation.
  - **The 2015 ware potato market study** in Kenya, jointly with SNV/Kenya.
  - **The upscaling of commercial storage** and warehousing of potato value chains in Kenya. The 2017 Wageningen Food and Biobased Research produced three reports: Quick scan on potato storage & warehousing initiatives in Kenya; Product and market research; and Storage opportunities and location study.
  - **Several training programmes** on seed production, storage, and certification have been implemented for seed growers in Kenya.

**Seeing is believing: the importance of trade fairs, field day demonstrations, and potato conferences**

Field days are educational events meant for technology and information dissemination. Institutions such as NPCK, various NGOs, national, and County governments, but also the private sector - such as Agrico PSA and Kisima Farms and other stakeholders - normally take the lead in organising such events. Farmers usually attend field days in large numbers.

The field days include practical demonstration of good potato agronomic practices; showcasing technological innovations and farming equipment; highlighting research methods and results; and introducing new potato varieties. This way, the audience can see how innovations could be practically applied to improve their farming practices.

NPCK has also been organising annual potato conferences, drawing participants and stakeholders along the potato value chain, and inviting keynote speakers and expert panellists to engage in discussions in various key areas affecting the potato sector. Unlike the field days, the annual conferences draw participants from all potato producing counties and, in some instances, from outside the country. Other events such as trade fairs, business to business match making forums, and knowledge sharing events have been organised over the years. These events help highlight updates on subsector developments including available opportunities, projects and programmes, and policy and strategy changes (e.g., the potato packaging and marketing policies, the Viazi Soko app, etc.). Examples over the past ten years are shown in table 11.

Table 11. Trade fairs, field day demonstrations, and potato conferences over the years

Event	Venue	Theme/sub themes
Agribusiness fair organised annually by the Netherlands Embassy as part of the Eldoret Trade fair (2014-2017), with specific attention for potato.	<b>University of Eldoret Agribusiness Trade Fair</b>	Enhancing food security through technology and agricultural trade for national growth.  Demonstration of potato varieties by various NL seed houses, machinery and storage companies, agro-chemical companies, potato seminars and business to business match making events.
National Potato Conference and Trade Fair, annually organised by NPCK.	<b>KALRO Headquarters, Loresho</b>	Optimizing opportunities in the potato value chains through innovations and partnerships.
Regional potato fairs, organised by Agricultural Training Centres, Colleges, Counties, and private sector companies such as Agrico PSA and Kisima Farms.	<b>Eastern and Central Region, South Rift Region, and North Rift Region</b>	Enhancing technologies in potato value chains for food security and agribusiness.
EU Instruments for Devolution Advice and Support (IDEAS)	<b>Kitale (Trans Nzoia), ADC Molo (Nakuru), Marimba (Meru)</b>	Promotion of newly released potato varieties.
KALRO Tigoni-Open day.	<b>Potato Research Centre, Tigoni</b>	Big Four Agenda: availing improved potato technologies for sustainable food and nutrition security, and household incomes.
Demonstrations of new potato varieties for local farmers organised by the Kenya-Netherlands Seed Potato Support Programme together with Agrico, Europlant, Meijer and HZPC (2013-2015).	<b>Kinangop, Narok, Molo, Naivasha, Thika, Naromoro, and Timau</b>	Demonstrating the adaptability of new Dutch varieties to local conditions.



Assorted pictures of Potato Fairs across Kenya

## 8 Climate-smart potato production



From plants to plate

**The climate of Kenya's potato growing areas has become more unpredictable**

Potato production with drip irrigation

There is increasing scientific evidence that the climate of Kenya is changing. Potato farmers have realised that too and are facing various climate risks: seasons are shifting, temperatures are gradually increasing, and farmers experience extreme weather events more frequently, including dry spells or excessive rains resulting in floods.

The climate of Kenya's potato growing areas has become more unpredictable. Rainfall patterns are changing all over the country, but vary based on the different agricultural ecological zones (AEZ). Some receive more rain during the season, others less. Weather models for East Africa and several derived scenarios confirm this picture for the decades to come<sup>32</sup>.

We already see the negative implications of climate change in decreased production. If this trend continues, the sector will have to adapt to, build resilience to, and mitigate the effects of several challenges through effective counter measures. The unpredictable timing of the seasons and extreme weather events will negatively impact the already low yield levels. Changing weather will influence the prevalence and distribution of invasive species, as well as weed, pests, and diseases control. Drier or wetter conditions, and higher or lower temperatures will impact adaptive capacity of current potato varieties.

Therefore, farmers need the knowledge and skills to adapt their crop management to the increasing risks in potato production.

The SNV Netherlands Development Organisation in partnership with Wageningen University & Research, the CGIAR research programme on Climate Change, Agriculture and Food Security, Agriterra, and the Rabo Foundation with funding from the Netherlands Government launched the Climate Resilient Agribusiness for Tomorrow (CRAFT) programme to assist farmers and entrepreneurs in the potato value chain to adapt to climate change. The approach is private sector-led in a bid to prompt investments in climate-smart agriculture and, by doing so, sustain the introduced innovations.

Below are three examples of selected business cases. Support includes a sharing of investment costs between the project and the entrepreneurs (50/50 for SMEs and 30/70 for Cooperatives):

**1.** Freshcrop Company Ltd. is located in Nakuru. Its business model focuses on decentralising seed potato multiplication by using apical cuttings as starter material. Seed is multiplied by affiliated farmers to supply other affiliated farmers with certified seed for ware potato production, for which the company has secured markets. Climate-smart investments include conservation tillage, rainwater harvesting, solar-drip irrigation, improved and adapted seed varieties, improved storage to reduce post-harvest losses, and integrated pest management (IPM).

- 2.** Sereni Fries Ltd. is a processor in Nairobi. The business case is meant to improve the efficiency of the manufacturing process through better market linkages with ware potato producers, and assist farmers with producing better quality potatoes through climate-smart practices. Joint investments are in water harvesting, irrigation schemes, and improved storage.
- 3.** Starlight Farmers' Cooperative Society in Nakuru County aims to support its membership in seed potato production and marketing and doing so in a climate-smart manner. This includes conservation tillage methods, improved seed varieties, solar-driven drip irrigation, water harvesting, integrated pest management (IPM), and improved pre- and post-harvest handling and storage.

In all three cases, markets are reasonably assured. Farmers will have sustained revenue inflows for reinvestment in climate-smart technologies and other productive assets to improve the productivity and expansion of their farming businesses.

What the three business cases have in common is an approach meant to bring about the "triple win" of climate smart agriculture: increase productivity in an economically viable and ecologically sustainable way; make farmers more resilient to climate shocks; and reduce greenhouse gasses (GHG) by means of alternative production technologies.

32] Chapter 2 in NPCK/CRAFT (2020). Climate resilient potato production handbook – a guide for farmers and trainer. A "training aid" booklet is published separately.

### 9 Looking back to charter a way forward

#### The potato sector in Kenya: opportunities for development through partnership

The previous chapters provided an inventory of the initiatives, investments, projects, and programmes in the potato sector that Kenya and the Netherlands jointly designed and implemented over the past ten years. The overview is not a proper analysis around effectiveness or impact, and therefore it would not be appropriate to draw conclusions.

However, the authors take the liberty to make several observations by looking back to the changes in the sector over the past ten years, and what this could possibly mean for the next decade.

Over the past ten years, the Kenyan potato sector underwent an enormous transformation, and the Netherlands played a role in initiating and financing that change. It was especially the introduction of new varieties and the expanded production of certified seed potato through the private sector that proved to be a game changer. The development of the seed potato subsector triggered investments in storage and processing, it prompted NGOs such as IFDC and SNV to build capacity in the potato sector, and pulled in donors such as GIZ, the World Bank, and the EU to invest. The change in mindset about potatoes from subsistence crop to commercial investment opportunity has been equally important. This led the Dutch and Kenyan private sector to tap into emerging markets and contribute to the growth of the sector.

Being a “potato country” with a well-established international outlook, the Netherlands has proved to Kenya that it has knowledge, technology, and markets to share. The foundation for the development of a viable, sustainable, and growing potato sector in Kenya has been laid between the partners.

*There are many reasons to believe that both countries will continue to work together towards the development of the potato sector.*



Potato processing at the Tropical Heat plant

Can the past ten years tell us something about development of the potato sector in the next decade?

### Without seed, nothing grows

As mentioned above, over the past ten years the most impactful changes have occurred especially in the seed potato sector. 35 Dutch varieties were registered, some of them in direct demand by the processing industry. Agrico Potato Services Africa made huge investments in seed multiplication, turning the company into one of the biggest seed growers in Kenya and East Africa in just a few years. The availability of certified seed increased fivefold between 2012 and 2021 (KEPHIS data).

Fivefold sounds like a lot, but in real figures the marketed 5,000 tons of certified seed per annum is still negligible if compared with the amount of seed annually planted by Kenyan farmers. Yet, considering the large proportion of subsistence growers, the demand for certified seed will always be lower than the total amount of seed planted. The rough estimate is that when the demand for certified seed is 10% of the total amount of seed planted, the current amount of 5,000 tons of certified seed represents only 10% of what would be required to produce the envisioned 2.5 million tons of ware potatoes in 2025. There is a lot more work to do.

The sector has learnt the hard way that potato pests and diseases spread rapidly, especially through contaminated seed, and it has been documented that the informal seed sector is largely responsible for this spread. Only certified seed is free of pests and diseases, but - as we have documented in this booklet -

the production of certified seed is generally a costly and specialised undertaking. Drawing on the success of Kisima farms, ADC, and Agrico PSA, the authors see the necessity of future large-scale commercial investments in the seed sector as the most effective and efficient way out of seed shortages, as well as managing the mounting potato disease pressure. The potato sector in the Netherlands has learnt that seed production - of all generations - is a specialised type of potato farming, requiring specialised expertise and costly specialised equipment and storage solutions. The question is to what extent such required seed production expertise will be sufficiently recognised and supported in Kenya in the future.

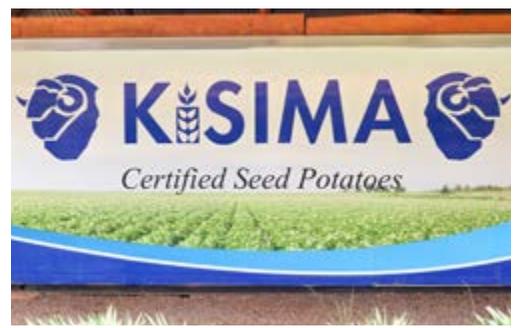
Additionally, the authors hope to see the introduction of new varieties resistant to prevailing pests and diseases (e.g., late blight); better adapted to small-scale farming practices; adapted to changing climate conditions; and responding to the demands of the processing industry as well as to consumer preferences especially for table potatoes at fresh markets.



### The distribution and marketing of certified seed

Seed potatoes are a bulky product, making them costly to move from seed grower to the potato farmer. Recently, a range of promising marketing and distribution models were developed facilitating the exchange - e.g., the digital platform Viazisoko managed by NPCK, and the network of “connected farmers” facilitated by Agrico PSA.

These models will have to prove their value over the years to come, but the distribution network needs to be greatly enlarged and refined to make certified seed more accessible and affordable for farmers and become an alternative for the circulating informal seed. Currently, only three large commercial seed growers are operating in the most suitable areas for seed production with relatively low disease pressure. According to the authors, this suggests that investments in large-scale commercial ventures are required to produce certified seed at a competitive price and in huge volumes. This may require financial support to regional and national marketing and distribution networks “to flood the market” with certified, disease-free seed.



### Storage solutions

The past ten years showed a huge change on the market for potato storage solutions whether it was for storing seed, ware potatoes, or processed potato products. At least five Dutch storage solution companies entered the Kenyan market and sold their technologies and expertise to local companies in the potato value chain. This is not just an economic success story. The changes in this field made all stakeholders in the sector fully aware of the importance of effective potato storage either to properly store seed between seasons; or to reduce post-harvest losses of ware potatoes; as an aggregation/distribution node; to control prices; and, in most cases, for a combination of these factors. In recent years, not only the large seed growers and processors have invested in storage, but Counties and farmer groups have seen the importance of appropriate storage as well and are investing.

This trend in exploring the appropriate storage solution for each purpose and making the necessary investments will undoubtedly continue over the years. So far, most investments in storage took place in the seed and potato processing sectors. It is notable that very little investments have been made in storing ware potatoes for the fresh market - not even in the big cities of Kenya, where the biggest volumes of potatoes are purchased daily from open markets. To reduce post-harvest losses, decrease daily transport costs, and control prices, it is likely that the need for storage solutions for ware potato around big cities will trigger the

next round of investments. Increasingly critical urban consumers are demanding a continuous supply of good quality food, providing another opportunity for the sector to meet that demand with the right varieties and a well-functioning supply chain. Experience has shown that effective storage solutions are an essential element of such supply chains.

### Potato production

Ware potatoes in Kenya are predominantly produced by smallholder farmers, numbering around 500,000-800,000. There are worrying signs that the sector is not doing well: the yield per hectare decreased from 21.2 tons in 2008 to a meagre 8.6 tons in 2018, and 9.3 in 2019 (FAOSTAT data). The reasons explaining this low yield are multiple: ever-increasing land fragmentation; the use of poor quality informal seed, high disease pressure; limited resources to invest in GAP on small land sizes (98% of farmers grow potatoes on less than 1 acre); distorted markets and poor market infrastructure. Potato is a high-input high-output crop. Even certified seed in the hands of subsistence farmers is a waste if they don't have the resources for the other required inputs. Increases in productivity will have to come from market-oriented farmers that have the resources to apply the full package of certified seed, fertilizer, crop protection, and have the land area to rotate crops correctly. An alternative would be well-organised farmer groups that can pool knowledge, land, and resources to achieve the necessary

economies of scale. In this regard, the Dutch varieties fit perfectly well in such business model since they respond well to high inputs.

Potato production by medium- to large-scale farmers of whom there seem not to be many in Kenya or by organised groups would make it easier to satisfy another condition for a viable and sustainable potato value chain: contract farming. Contract farming in the Kenyan potato sector is the exception rather than the rule, although examples can be found. The next ten years ought to see a reversal of that trend as transparent contracts between farmers and markets are vital mechanisms to better organise market access and better regulate supply. Contracts are designed to benefit both the grower and the buyer, they may stipulate quality standards, (fair) prices, volumes, time of delivery, varieties, and other conditions. Contract farming linked to aggregation and storage is likely to become an important intervention domain in the near future.

Having concluded that potato yield levels in Kenya are currently low does not mean that high yields are not possible. Different field demonstrations with smallholders have shown the potential of potato farming in the country if the “full works” are applied with the accompanying training and support. For example, a consortium of Bayer, Yara, and Agrico PSA assisted a group of smallholder farmers in 2019 to produce 33 tons/hectare of ware potato, which is four times the 2018 national yield average.

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## Potato processing

When ten years ago the first Dutch varieties were registered in Kenya - and some of these were multiplied and entered the market - it was no coincidence that most of them were processing varieties such as Markies, Destiny, Challenger, Jelly, and Royal. The thinking behind it was that the processing industry in Kenya would function as an engine of growth and sector development. It would demand large and steady volumes of quality potatoes, prompting large-scale professional production of ware potatoes, and in turn steer the production of the right chipping and crisping varieties for which there was a market. In turn, this would also trigger the demand for certified seed of the desired varieties. Looking back one can say that this happened to an extent but not as much as expected. For one, the potato processing industry is still small in Kenya, and large volumes of processed products are still imported from abroad. Secondly, the supply chain of raw material to processed product is faltering. The cases described in previous chapters show that processors find it difficult to secure the quality and quantity of potatoes they need to the extent that, out of desperation, they sometimes venture into potato production themselves. One may wonder if this is either efficient or sustainable. There may be several explanations for this disconnect. Some include low prices offered to growers attracting opportunistic processors - especially during glut periods; lack of trust; lack of quality of the potatoes produced by farmers; and lack of quality standards for processed products.

The next ten years will probably see changes in the sector. With a market for potato products bound to grow in rapidly urbanising Kenya, big multinational players will likely enter the market. They will have a regional outlook and will prompt investments in large-scale, good quality ware potato farming to supply in required steady volumes to associated fast food chains. Those investments will have their multiplier effect on seed production, investments in storage, and in better understanding consumer preferences for a wide array of potato products beyond crisps and French fries. For better or for worse, these developments are likely to change the potato landscape dramatically and accelerate the trend of commercialisation of the potato value chain in Kenya.

**Potato sector development and innovation**

Sector development and innovation are the result of an interplay of many stakeholders from the public and private sector - from academia and civil society, to the national, County, and international levels. Corporations and organisations from the Netherlands played a role, but so did many others. Looking back, it is gratifying to note how much time and resources have been invested in potato in Kenya. This trend is bound to continue, although the role of the private sector and trade is likely to increase at the expense of the public sector's aid. In fact, Kenya is increasingly regarded as a medium income country, and soon might not be eligible

for development aid. Sector coordination, collaboration, and networking will be critical to avoid the duplication of efforts and realize synergies. In that regard, it is good to note that private companies are increasingly taking up roles that hitherto were performed by the public sector - e.g., training of farmers, organising field demonstration days, and setting up seed distribution networks.

**Climate-smart potato production**

The global climate is changing, and so is the climate of Kenya. There is ample evidence that climate change is affecting potato production in the country. A growing number of organisations and private sector parties are contributing to increased climate resilience of the potato sector through research, training, and investments in difference production technologies, irrigation, and storage. The Netherlands funded Climate Resilient Agribusiness for Tomorrow (CRAFT) programme is one of these initiatives. Through business cases, the programme aims for a “triple win” in climate-smart agriculture: to increase productivity in an economically viable and ecologically sustainable way; make farmers more resilient to climate shocks; and reduce greenhouse gasses (GHG) by means of alternative production technologies.

*This ten years partnership between Kenya and the Netherlands in strengthening the potato sector is worth celebrating.*

*The authors trust that this booklet sufficiently reflects the results of this collaboration.*

## Acknowledgements

Many people in the Kenyan potato sector contributed to this publication. Whether being their story as farmer, entrepreneur, or civil servant, their contributions were recorded by the authors and the information they provided is somehow included in the text. They generously shared their time and insights, as well as facts, figures, and pictures. They are too many to mention, but the authors thank them wholeheartedly.

Most case studies and interviews were conducted between February 2020 and November 2021. The process of compiling this booklet with “live” interviews was seriously delayed by the COVID-19 pandemic, and we had to resort to email and zoom meetings. All draft write-ups of individual cases were shared with the respondents prior to publication. We sincerely hope to have done a good job in reflecting your ideas on how the partnership between Kenya and the Netherlands has shaped Kenya’s potato sector over the past ten years. As the Kenya-Netherlands Seed Potato Support Programme (2011 – 2022), we are proud of having been part of this process.

### Thank you!

Ms. Emily Osen, Nico Rozemeijer, and Dr. Siert Wiersema

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## From plant to plate

### Ten years of cooperation between Kenya and the Netherlands in supporting the potato sector in Kenya

*Kenya and the Netherlands have a long history of collaboration towards sustainable trade and investment in agriculture, and the partnership in strengthening the potato sector is no exception. Investments across the value chain came from many more partners than only the two Governments. Throughout this booklet one can read about multiple stakeholders from the farming community, private and public sector, research institutes, and civil society joining together - albeit sometimes with differing approaches - to work for the same cause: contributing to Kenya’s food security by developing a productive, inclusive, and sustainable potato industry, from plant to plate.*

