Scaling project – Annual/Final report

COVER PAGE

Project title Market-driven scaling up and adoption of potato in Africa through a technology package combining market-driven, climate resilient, novel potato varieties with a seed system innovation

Project start and end date Jan 2019 – Dec 2020

Project leader Monica Parker

Project lead organization International Potato Center

Partners: Farm Input Promotions Africa (FIPS-Africa)

- Not-for profit business

Kenya County Governments of Elgeyo-Marakwet, Kiambu, Meru, Nakuru, Nandi

Self Help Africa (SHA)

- NGO part of Irish Potato coalition that CIP leads with SHA and Vita

Kachwekano Zonal Agricultural Research and Development Institute (Bugizardi), Uganda

Buginyanya Zonal Agricultural Research and Development Institute (Kazardi), Uganda

- ZARDI's are part of the National Agricultural Research Organisation

District and Sub-county Agricultural Offices of Kisoro, Rubanda, Kanungu, Kabale, Mbale, Kapchorwa and Kween, Uganda

Country(ies) of intervention: Kenya and Uganda

Total budget: $820,103 US

Total co-investment: $586,000 US

Date of submission March 13 2020

Progress and results

Outputs

Summarize the level of achievement of each output and briefly present the key milestones completed.

Refer to the list of deliverables reported for more details (see Annex 1)

Project start up

In order to meet project objectives, activities began right at start in February 2019 to start kick start seed potato production of new varieties. While partner agreements were being prepared, CIP organised production of cuttings for seed production, as it is through seed that the majority of beneficiaries and targets are met. In Kenya, CIP worked with Stockman Rozen Kenya (SRK)[1], who CIP supported to commercially produce cuttings of all the required varieties. In Uganda, CIP just began supporting private professional nurseries Agromax and AGT Laboratories, 2 months earlier under GIZ-Uganda project. All nurseries have tissue culture labs and produced cuttings of new varieties which were purchased by the projects in March/April to distribute to seed multipliers to produce seed. The priority on startup was to have cuttings ready for seed multipliers for when the cropping season started in April 2019. ***This was a remarkable milestone having cuttings produced by private nurseries 2 months from when activities began, particularly for Uganda as the two private sector never knew a cutting before a few months earlier.***

FIPS-Africa and SHA partner agreements were finalised in March. FIPS-Africa and SHA immediately began to support seed multipliers to produce seed from cuttings, noting previous interventions had trained all seed multipliers in general seed potato production. FIPS-Africa, whose capacity in the innovation package was developed in previous interventions, have evolved to become champion of raising awareness and scaling out technologies, and capturing the MEL aspects of delivery to validate intervention results and outcomes.

Output 1: Market relevant product profiles for potato varieties

Seed is being produced in year 1 for the main distribution to raise awareness of new varieties in year 2, although cuttings of new varieties have been distributed in year 1 to a limited number of farmers to evaluate their performance. As a result of kick starting seed production, seed multipliers collectively produced enough seed to distribute to approximately 20,000 farmers (detailed in output 3).

To support the SMS feedback system, the database of farmers has been generated and continues to grow. The actual system will roll out in March/April planting season when new varieties as seed tubers or cuttings are distributed (Deliverable 19840).

Output 2: Business cases and production guidelines for producing apical cuttings

Five large-scale and 12 small-scale nurseries were supported with training and technical backstopping to produce cuttings of new varieties (Table 1). The small-scale nurseries were further supported to start up production with cost-sharing construction of a screenhouse. In Kenya, six small-scale nurseries each co-invested from $100 to 322 US for a total of $1,067 US. In Uganda, the small-scale nurseries collectively invested in $575 USD to purchase tissue culture plants from Kazardi, above those provided by the project, and build a screenhouse (detailed in Impacts). The project supports the initial production by buying cuttings for variety distribution to support marketing the small-scale nurseries.

SRK sold 675,000 cuttings valued at $67,500 US. Of these, 182,651 or 27% were purchased by the project, the remaining purchased by private sector (486,685, 72%) and development projects (5,500, 1%).

Table 1. Nurseries producing apical cuttings for onward seed potato production

	Nurseries Producing RAC	Total	Led/managed by women	Led/managed by youth
Kenya	- Grace Rock Farms	3	1	-

[1] A large-scale, professional propagator in Kenya who invested in cuttings with support from CIP under previous interventions.

(large-scale)	- Taita Papa - Stokman Rozen Kenya			
Kenya (small-scale)	- Faith Kajuju - Paul Munene - Mary Nkatha - Robert Kimathi - Erick Bittok - Cecinta Nduru	6	3	1
Uganda (large-scale)	- Agromax - AGT [a]	2	-	-
Uganda (small-scale)	- Public institution (KaZARDI)	1	-	1
	- Maziba Progressive Farmer Resource Centre Limited - CKB Clean and Quality Seed Potato Production Enterprise - Kigezi Farmer Resource Centre - Bukimbiri Development Company Ltd - Michael Kosgei	5	-	0
	Total	**17**	**4**	**2**

[a] AGT Laboratories left the project late in 2019

Another major milestone of the project to have small-scale nurseries already selling cuttings to rural farmers within months of start-up and support. In Kenya, of the small-scale nurseries produced 47,748 cuttings, of which sold 18,258 cuttings, 1,380 were to 13 rural farmers. In Uganda, where the technology was just introduced as the beginning of the project, one small-scale nursery already sold 500 cuttings to 2 two businesses, this is incredible. All the 153,462 cuttings distributed in year 1 were produced by private nurseries, 120,968 and 32,494 in Kenya and Uganda, respectively, of which 16,878 cuttings were provided by small-scale nurseries in Kenya.

CIP relied on private sector partners trained by CIP in previous interventions to in turn provide training services to produce cuttings at their facilities. SRK trained four large- and 12 small-scale nurseries, and project partners to produce cuttings, along with private sector and national programs supported by other interventions from Cameroon, Madagascar, Mali, Nigeria and Tunisia. Other interventions to support cuttings, like the World Food Program (WFP), were directed to SRK when they requested CIP to provide capacity development services for cuttings. CIP still follows up with WFP as shared to record keeping logbooks with their nursery owners.

Cecinta Nduru[2] – the first small-scale producer of cuttings who started production prior to scaling fund project - not only trains other nurseries to produce cuttings, she provides one on one technical backstopping to Taita Papa – a philanthropic business investing in seed potato (cuttings) to support development in Taita Taveta county, Kenya. She trained nurseries supported by WFP intervention in seed potato and cuttings.

Production, cost and sales data of operational small-scale and large-scale nurseries is being collected to support developing business cases. CIP and Scaling Champions developed a record keeping tool for nurseries producing cuttings (Deliverable 18360). CIP trained nurseries on the tool, and partners monitor the tool and provide data to CIP. The reporting templates to report data from logbooks were also distributed to and completed by partners.

Output 3: Business cases and production guidelines for producing seed from apical cuttings

All 88 seed multipliers supported by the project to produce seed of new varieties from apical cuttings were trained in general seed potato production and business during previous interventions (Table 2). In Kenya, FIPS-Africa support 23 seed multipliers in Meru county, and CIP works with 7 seed multipliers in North Rift

[2] From small-scale farmer to commercial seed potato producer: Cecinta's story

region. In Uganda, SHA and BugiZARDI lead efforts to support 23 and 35 seed multipliers in west and east Uganda, respectively. Four seed business invested a combined $15,150 US for 5.5 ha under seed production, which generated $38,800 US in revenue, of which one of the four is a youth who invested $3,250 US for 1.2 ha and generating $8,000 US.

Table 2. Seed multipliers producing seed from apical cuttings of new potato varieties

	Seed Multiplier	Total	Led/managed by women	Led/managed by youth
Kenya (Meru)	Individual business	23	8	1
Kenya (North Rift)	FreshCrop Ltd (licensed by KEPHIS)	1		
	Individual business	2	-	-
Kenya (North Rift)	Nandi Coop ATC Chebara ATC Chebororwa Potato Empire	4	-	-
Uganda (East)	Individual business	35	15	-
Uganda (West)	Individual business	23	4	4
	Total	**88**	**27**	**5**

CIP and Scaling Champions developed a record keeping tool for seed multipliers producing seed in the field from cuttings to collect production, cost and sales data – considering the two rounds of multiplication. Scaling Champions trained seed multipliers on the tool, and partners monitor the tool and provide data to CIP (Deliverable 18361). The reporting templates to report data from logbooks were also distributed to and completed by partners (Deliverable 14784).

Seed multipliers received cuttings in two batches, one for each season in 2019 to be multiplied over two seasons then the seed distributed to farmers. From the first distribution of cuttings, seed multipliers produced 10 tonnes of seed of new varieties after the first round of multiplication (Table 3). This seed is being multiplied a second generation for distribution in April-June 2020. Projections after the second round of multiplication indicate 100 tonnes of seed will be available, sufficient to distribute 5 kg of seed of new varieties to 20,000 farmers. Seed from the second round of distributing cuttings was planted in Oct-Dec thus harvest data not available at time of reporting. After two rounds of multiplication, the seed will be distributed in October 2020.

Table 3. Seed production by seed multipliers for distribution to farmers to promote new varieties

Region	# of seed multipliers	# tubers harvested ≥ 20 mm	Weight tubers harvested (kg)
Meru - Kenya	23	61,209	4,567
North Rift, Kenya	5	64,537	3,924
Taita Papa-Kenya	1	15,454	333
Total Kenya[a]	**29**	**141,200**	**8,824**
East Uganda	35	17,803	548
South-west Uganda	23	25,725	689
Total Uganda[b]	**58**	**43,528**	**1,237**
Total	**87**	**184,728**	**10,061**

[a]Kenya varieties: Unica, Wanjiku, Konjo, Nyota, Lenana, Chulu

[b]Uganda varieties: Kachpot 1 and Victoria

The project supported selected seed businesses and staff from FIPS-Africa to participate in certified seed production course hosted by KEPHIS – the seed certification regulatory body in Kenya. The intention is to license 2-3 seed businesses to produce certified seed. The Horticultural Crops Development Authority

(HCDA) who license nurseries to operate in Kenya trained nursery owners in complying with licensing procedures. The intention is to license 4-6 of the small-scale nurseries in Kenya. The large-scale nurseries are already licensed by HCDA and have their production certified by KEPHIS.

Project output 4: Methods for effective scaling new of varieties and cuttings

Critical to scaling is developing partner and stakeholder capacity to fully manage in the operational environment, making partner capacity development a focus area in year 1. See further details in Outcomes section institutionalizing capacities to foster the scaling process.

In Kenya, while FIPS-Africa were able to lead interventions related to field production prior to the project, in 2019 their capacities were expanded to enable them to technically support nursery production of cuttings, licensing of nurseries and seed multipliers, and certifying seed potato.

In Uganda where there was no capacity for apical cuttings since the technology was just introduced so had to build capacity of the scaling champion SHA and project partners, concentrating on nursery and field production as this is where evidence is most needed to convince authorities to accept the technology. Stakeholder workshops held in year 1 supported engaging the broader stakeholder community to understand the innovation package.

Stakeholder engagement and investments are being monitored to develop evidence to contribute to case studies focusing on specific scaling interventions and relating to scaling readiness of the country of intervention. All evidence collected is from the users and enablers of the innovation so presents the reality of scaling the innovation in the actual operating environment.

Outcomes

Present a quantitative assessment of the results achieved and explain any difference with the expected targets. Refer to the project proposal for the complete list of research and development outcomes.

Tables 4 - 6 summarise the achievements towards development and research outcomes against targets, with Table 6 disaggregating the achieved numbers by women and youth of the relevant indicators. Note that the indicators were refined, some were broken into two indicators, one was deleted to enable the project to accommodate to the PMU expected deliverables that were clarified after the project document, partner agreements and commitments were completed (Indicator changes Potato Scaling Fund PO2.4).

Table 4: Overview of progress towards the development outcomes of the potato PO2.4 project - Scaling potato varieties and apical cuttings

Development Outcome	Indicator	Kenya achieved	Uganda achieved	Overall achieved	Project target	Remarks
1. At least 50,000 potato farmers, among which 30% are female farmers, will be reached in Kenya and Uganda with high quality seed of new varieties	I-1: Number of farmers exposed to new varieties	1,952	58	2,010	50,000	Year one was devoted to producing seed as per the report, thus the majority of farmers will be reached in year 2
	I-2: Number of farmers providing variety feedback	0	0	0	5,000	Wide-spread variety distribution will occur in year 2 after seed bulked as per above.
	I-3: Number of farmers reached with cuttings	2,195	58	2,253	5,000	Cuttings produced by small-scale nurseries will largely be ready for distribution in year 2, as year 1 was training and practice
2. 30 private seed business* have the combined technical and resource capacity to annually produce and sell 500,000 cuttings, and to annually produce at least 1,000 tonnes seed from cuttings	I-4: Number of nurseries that produce cuttings	3 large-scale 6 small-scale nurseries	2 large-scale 6 small-scale nurseries	5 large-scale 12 small-scale nurseries	3 large-scale nurseries 10 small-scale nurseries	4 of the large-scale and 11 of the small-scale nurseries are new to producing cuttings, the two others were in production before the project started
	I-5: Number of seed businesses that produce seed from cuttings	30 seed multipliers 1 seed merchant	58 seed multipliers	88 seed multipliers 1 seed merchant	44 seed multipliers	All seed multipliers were already existing and previously trained in seed potato production in earlier interventions
	I-6: Quantity of cuttings and (certified) seed annually produced	385,166 cuttings: Large-scale nursery 337,418 cuttings 47,748 cuttings by small-scale nurseries	47,435 cuttings: Large-scale nurseries 32,494 cuttings Small-scale nurseries 14,941 cuttings	432,601 Large-scale nurseries 369,912 cuttings 62,689 cuttings by small-scale nurseries	No target set – responded to project capacity	• Kenya: only SRK had production statistics for 2019 • Kenya: 29,490 cuttings were planted by the small-scale nurseries for seed production and 18,258 were sold • Uganda: 14,441 cuttings were planted by the small-scale nurseries for seed production, 500 were sold

Development Outcome	Indicator	Kenya achieved	Uganda achieved	Overall achieved	Project target	Remarks
	I-7: Sales or profit per seed business	Not reported year 1	Not reported year 1	Not reported year 1	No target as project is determining the sales/profit in operational environment	Data is being collected to assess revenue and profits of nurseries and seed businesses using the innovation
	I-8: Number of farmers buying RAC, seed from RAC and new varieties	76	2	78	No target set – responded to project demand	Kenya: 76 farmers purchased 3,187 cuttings Uganda: 2 farmers, of which one seed business, purchased 500 cuttings
	I-9: Quantity of cuttings sold	356,676 cuttings: Large-scale nursery (SRK data only) [b] 337,418 cuttings Small-scale nurseries 18,258 cuttings	32,994 cuttings: Large-scale nurseries 32,494 cuttings Small-scale nursery 500 cuttings	388,670 cuttings Large-scale nursery: 369,912 cuttings Small-scale nurseries 18,758 cuttings	No target set – responded to project demand	44 private buyers bought 154,867 cuttings from SRK Project purchased the 182,651 cuttings from SRK Kenya: of the 18,258 cuttings purchased, 16,878 by FIPS for distribution and 1,380 by farmers Uganda: the 32,494 large-scale nursery purchases commissioned by project

[a] Scaling fund directly + leveraged other projects

[b] While there were three nurseries with producing cuttings in 2019, SRK data only presented as the other two nurseries began production in last quarter of 2019 and data will be presented in 2020.

Table 5: Overview of progress towards the research outcomes of the potato PO2.4 project - Scaling potato varieties and apical cuttings

Research Outcome	Indicator	Kenya achieved	Uganda achieved	Overall achieved	Project target	Remarks

1. Farmer institutions, national programs, businesses, NGOs and other stakeholders raising awareness of the new varieties and RAC	I-10: Number of stakeholder workshops	3	6	9	No target set – responded to project need	
	I-11: Number of awareness creating events	12	3	15	No target set – responded to project need	
2. Public and private institutions transferring knowledge in producing cuttings and producing commercial and on-farm seed from cuttings by seed businesses and farmers	1-12: Number of trainings lead by partners, public and private institutions	52	1	53	No target set – responded to project need	6 trainings were conducted by VPAs to famers during cuttings distribution,3 TOT training to VPA on cuttings management and 1 TOT training to County WAOs and Cooperatives
	I-13: Number of farmers trained in RAC, new varieties	799	0	799	10,000	309 farmers trained on on-farm saving of seed from cuttings
	I-14: Number of cuttings distributed to farmers and seed multipliers	120,968 cuttings: Seed multipliers 71,555 Rural farmers 49,413	32,494 cuttings all for seed multipliers	153,462	240,000	Kenya: of 120,968 cuttings: Unica (31%), Shangi (26%), Wanjiku (14%), Konjo (6%), Nyota (5%), Lenana (5%), Chulu (4%), others (4%) Small-scale nurseries contributed 16,878 cuttings to farmer distribution Uganda: of 32,494 cuttings: Victoria (36%), Kachpot 1 (29%), Naropot 2 (12%), Naropot 1 (10%), Rwangume (5%), Naropot 3 (3%), Kachpot 2 (3%)
3. Private-private/public partnerships to support satellite nursery systems	I-15: Number of private/public-partnerships	3	0	3	4	Grace Rock Farms/Kiambu county Taita Papa/Taita county SRK/FreshCrop Ltd

Table 6: Gender disaggregation for select indicators towards the development and research outcomes of the potato PO2.4 project - Scaling potato varieties and apical cuttings

Indicator	Total reached	Women reached	Youth reached
I-1: Number of farmers exposed to new varieties	1,335	487	82
I-3: Number of farmers receiving cuttings	1,578	763	246

Indicate what was the project contribution in institutionalizing capacities to foster the scaling process (what organizations/groups are capable of taking this forward beyond the scaling project – in terms of knowledge, interest, and means to do so; with some supporting evidence for claiming this).

In Kenya 3 years after the initial introduction of apical cuttings when the project started, the technology was already operating without support from an R4D intervention. Stakeholders, enablers and private sector were investing in the technology. There is user and enabler commitment to continuing the along the scaling pathway.

While the technology was operating without R4D support in Kenya, CIP observed that practices were often not technically correct. The project allowed to partner with technology users - nurseries and seed businesses to enhance their capacity – by correcting existing practices and expand capacity of new stakeholders. The project also focused on expanding partner, enabler and stakeholder capacity development in the innovation package, and collect and report monitoring data.

CIP further invested in capacity development of FIPS-Africa with the outlook for them to become a reliable scaling partner due to the specialised nature of competencies needed to deliver CIP technologies. Capdev in production of cuttings, and seed certification and quality will broaden the partnership areas for FIPS to lead. In year 2, FIPS-Africa can lead more complex activities in Kenya to technically backstop nurseries producing cuttings and support seed business to become licensed to produce certified seed.

County governments are a key partner in Kenya to disseminate technologies, with capacities being developed in three additional counties than targeted *as a result of demand* (Kiambu, Nakuru, Taita Taveta). The private sector also is requesting CIP's support to develop seed businesses. Thus by the end of the project, capacities will be developed at a wide scale among diverse users and enablers to take the innovation forward.

As the innovation package – particularly apical cuttings, is a new technology in Uganda there was no capacity among partners in Uganda to pilot and scale out the intervention. Partners and stakeholder capacities are being developed to enable transitioning to being capable to manage in an operating environment with minimal R4D support.

The partners build and monitor the investment, evidence and experiences among users and enablers to contribute to validating the social, economic and environmental sustainability of the innovation as part of documenting the scaling process. All evidence collected is from the operational environment, the users and enablers of the innovations so presents the actual reality of scaling the innovation in the actual operating environment.

As a result of the stakeholder and business community becoming more aware of cuttings, two additional large-scale professional nurseries are investing in cuttings production in Kenya - Grace Rock Farms[3] and Taita Papa, who started producing cuttings in 2019. County governments are leading ToT of extension to train farmers in using cuttings to produce seed on farm to support marketing the nurseries, thus leaving capacities to continue operating without R4D support.

Both FIPS-Africa and SHA have strategized seed potato interventions among their strategic intervention areas and both appreciate the opportunities to strengthen their capacities in the innovation package to enable them to lead further interventions without R4D support.

Present other effects (positive or negative) that were not foreseen beforehand (e.g. new partnerships which came into existence that also have a positive contribution to other things than scaling that particular innovation; changes in the policy environment that show increased government interest in particular crops, integrated agricultural/livelihood approaches, etc.; unexpected negative environmental trade-offs of intensification practices; unexpected social or gender-related biases related with components of the innovation package or scaling strategy).

[3] Grace Rock Farms Facebook

As mentioned above, the demand for the cuttings technology from users, stakeholders and other development projects in Kenya, particularly county governments, is enabling CIP to expand and build relationships to support further interventions. In Kenya, the county government is the unit of operation – all activities are managed by county governments, making their support critical to scaling technologies and obtaining support for interventions in general.

In Uganda, the partner coalition is strengthening through jointly implementing interventions thus building diverse profiles of partners in the innovation package.

Actually the negative impact is the widespread demand accelerating at a faster pace than knowledge, there were still many unanswered questions resulting in incorrect practices due to the innovation of cuttings being released to and taken up by the wider stakeholder community very early in its development along the scaling readiness pathway. Trying to correct this by engaging with stakeholders with a role of developing capacity of users to ensure correct guidance and use.

Impact

Present a qualitative and, as far as possible, quantitative assessment of the contributions toward the expected impact (e.g. indications that achieved outcomes contributed and will contribute to changes in livelihood, food and nutrition security, business opportunities, resilience to climate shocks, sustainable management of resources) and explain any difference with the expected targets. Refer to the project proposal for the initial impact statement.

In Kenya, this project allowed to accelerate scaling the technologies that had already springboarded from previous interventions. Users and enablers of the innovation package were already engaging without R4D intervention. This project has allowed the increase the scope of engagement to three further counties and solidify county engagement in five counties already identified in the project.

Nurseries and seed multipliers collectively invested $27,440 US generating revenue of $57,000 US from the data we could collect, noting these values are not inclusive of all costs for each nursery or seed multiplier, and excludes investment and/or revenue of large-scale nurseries Agromax, Grace Rock Farms and SRK or FreshCrop.

Contributing to the investment, the new seed business FreshCrop Ltd partnered with SRK, the latter providing apical cuttings to produce certified seed, which was certified by KEPHIS. FreshCrop Ltd invested in a 15 x 30 m screenhouse to plant 73,000 cuttings valued at $7,300 US.

As a result of participating in implementing activities and observing productivity gains with cuttings, NARO partners Kazardi and Bugizardi have invested in cuttings without project support (Fig 1.). Each institution converted a screenhouse to produce cuttings, largely as starter material for internal seed production. Grace Rock Farms only recently ventured into potato as a nursery producing fruit and vegetable seedlings. Demand for new robust varieties, such as Chulu, among farmers trained by Kiambu county where Grace Rock Farms operates is creating market for the nursery.

In Uganda, seed multiplier Michael Bosei invested approximately 300 USD in a screenhouse entirely on his own after exposure to cuttings (Fig. 2). Agromax will upgrade a screenhouse in Mbale, eastern Uganda to expand production of cuttings from the headquarters in Kampala.

Figure 1. Screenhouse KaZARDI (Kabale district, Southwestern Uganda). Left: Mother plants to produce rooted apical cuttings of potato, right: rooted apical cuttings ready to be transplanted in the field.

Figure 2. Outside and inside of a screenhouse of a small-scale nursery to produce apical cuttings of potato where all investments were made by the owner with technical backstopping from Scaling Fund project (Kween district, Eastern Uganda). Michael Bosei invested approximately UGX 1,160,000 (~300 USD) in construction materials and labour. Left: Outside view of screenhouse, right: Inside view of screenhouse.

Reflections and learnings about Scaling and Scaling Readiness

Innovation package

Describe the innovation package at the beginning and at the end of the project.

At the beginning of the project the innovation package consisted of the core technology – resilient potato varieties packaged as apical cuttings or seed derived from apical cuttings with two levels of use: production of cuttings by a nursery followed by production of seed from the cuttings by seed multipliers. The apical cuttings technology accelerates the time to when a new variety can be available for farmers compared to seed production from minitubers. If in the form of cuttings, a new variety can be available within months of release, if as tubers, seed can be available within 12-15 months of release. Starting with 1,000 cuttings on a 120 m^2 nursery bed at an approximate cost of $130 US are projected to produce 4.2 to 6.5 tonnes of seed potato, compared to minitubers, where the same initial area costs $270 US is projected to produce 4 to 4.5 tonnes after two seasons of multiplication: once in nursery bed then second round in field[4].

[4] New technology bridging the seed potato gap in Kenya, Apical rooted cuttings - Technology brief and General presentation_Innovation apical cuttings

At the beginning there is a core nursery producing cuttings to support the project and to assess if a business opportunity. Trained seed multipliers produce seed from the cuttings. Resilient varieties are distributed to farmers either as traditional seed tubers derived from cuttings or as cuttings to raise awareness and for farmers to try the new varieties and cuttings. As interventions progress, the innovation package diversifies to producing cuttings in decentralized nurseries, and farmers buying cuttings to produce seed on-farm in seed plots as they already have behavior of saving seed on-farm (Fig. 3).

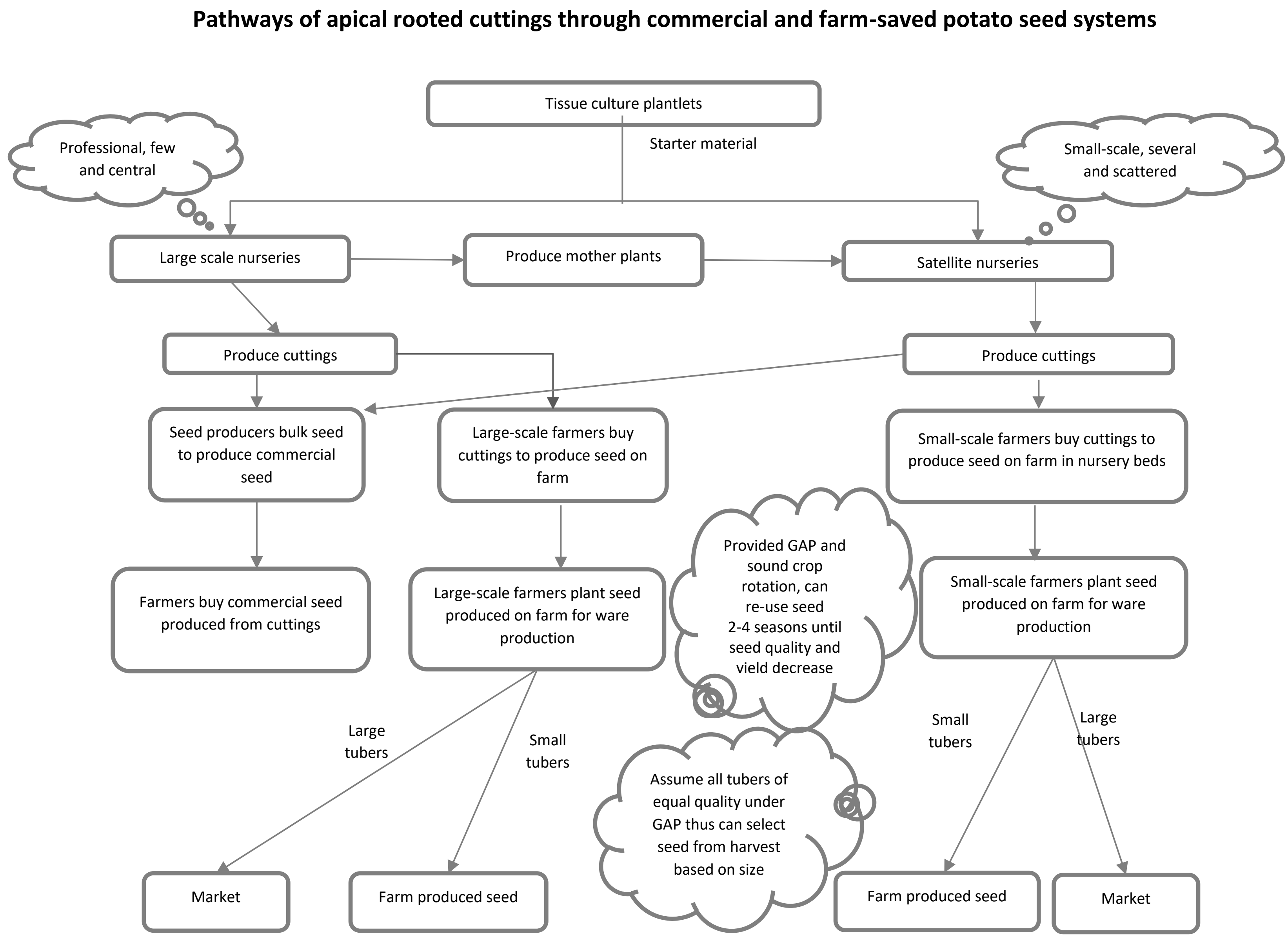

Figure 3. Pathways of apical rooted cuttings through commercial and farm-saved potato seed systems

Explain which were the main changes that have been made in the innovation package and the reasons/ processes that have determined these changes.

Explain if and how the changes have enhanced or will enhance the scaling potential and /or the technical, economic, social and environmental viability of the innovation package.

There have been no changes to the innovation package as from the original plan. Change in scaling strategy occurred as a result of demand for the innovation and the ability of the project to respond, as described below.

Partnership strategy

Present the network of partners that have been involved in the scaling projects. Explain how partners and partner modalities were identified.

Since cuttings/new varieties is a new innovation package (hence limited technical capacity among partners and stakeholders in the various aspects of the innovation package) with several scaling approaches, CIP shares scaling champion responsibilities with project scaling champions, and consolidates work of Kenya and Uganda. CIP coordinates among partners and stakeholders, and provides technical backstopping to nurseries producing cuttings, particularly large-scale nurseries, due to the specific expertise required for this. Partners also coordinate among stakeholders leading events to promote the innovation package.

The core implementation team consists of partners to:

- support cuttings production in the small-scale nurseries,
- train users in cuttings and distribution of promotional packs to apply the training:
    - seed multipliers to produce commercial seed
    - farmers to produce seed on-farm in small seed plots
- awareness creation, support market development,
- develop system to collect user feedback on innovation package,
- technically backstop field production of seed from cuttings, and
- data collection and organization,
    - CIP provided partners with specific templates to collect and report data.

The scaling champions FIPS-Africa (Kenya) and SHA (Uganda) are responsible for the actual scaling activities to support users along the scaling pathway to apply the innovation package. They lead activities in the field, including field days, and provide organised data of activities. The network of core implementation team and key stakeholder partners is summarised in Fig. 4.

The scaling champions were identified as a result of engaging with them in previous projects, both have experience supporting seed potato interventions, particularly FIPS-Africa, and their potato agronomic expertise. The remaining core partners and stakeholders were identified as a result of their involvement in seed potato systems either as enablers, service providers or users of the innovation package.

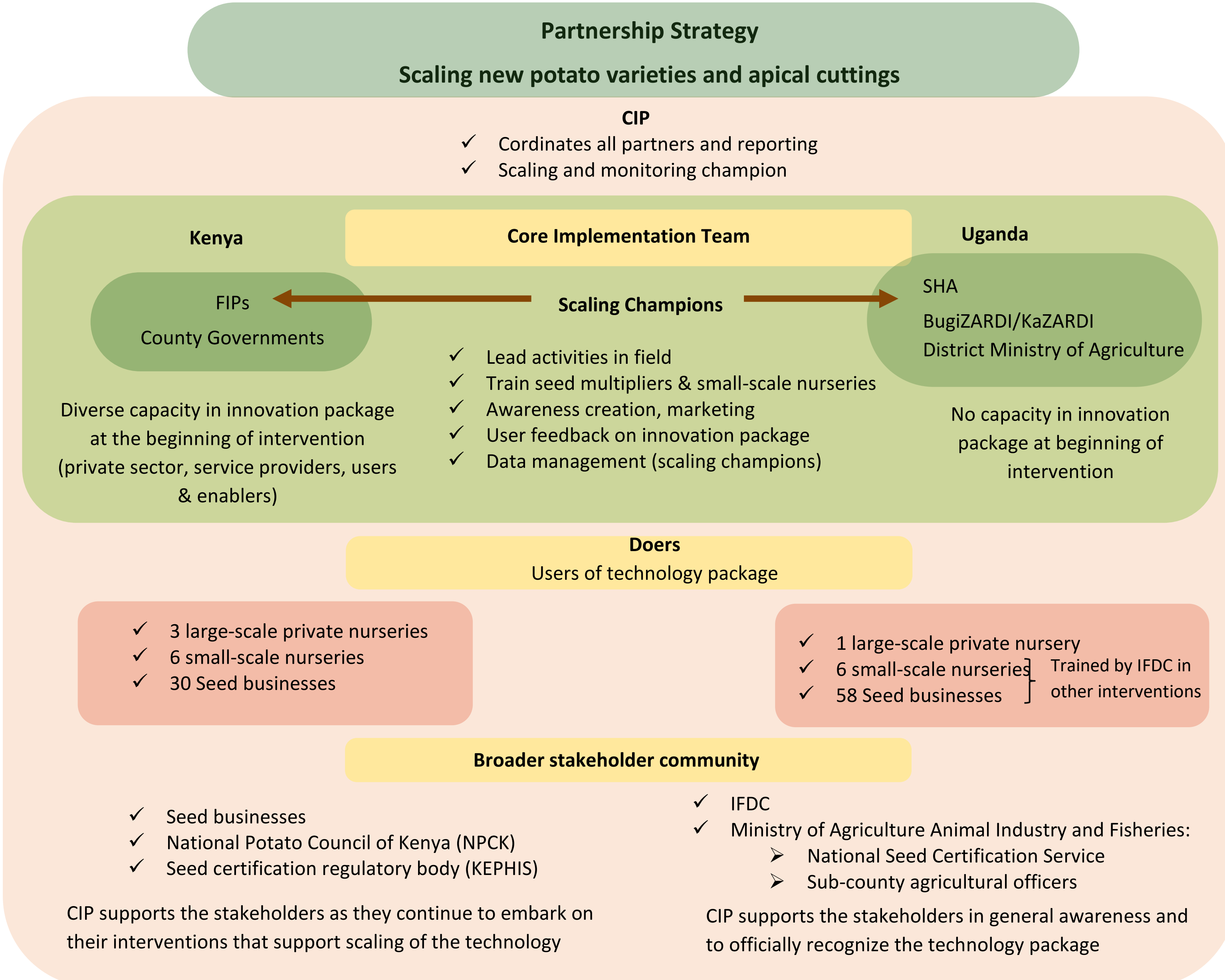

Figure 4. Partnership Strategy of the Potato Scaling Fund (PO2.4)

In Kenya, the project works in two regions with different partnership strategies (Fig 5). FIPS-Africa lead activities in Meru county (central Kenya), and support the six small-scale nurseries to produce cuttings. CIP invested in capacity development of FIPS-Africa in seed production and apical cuttings during pervious interventions, thus have the skills to immediately scale out the innovation package upon project start up.

In Eastern Kenya (North Rift region) the project works through farmer producer organisations, seed businesses and county governments (partnerships and capacities developed in previous interventions) to produce seed of new varieties for members, thus providing services to member farmers, and creating market demand and opportunities for new varieties and cuttings. CIP coordinates activities in these counties whereby the counties train farmers on saving seed on farm from cuttings to promote private nurseries.

Private sector, namely SRK and Cecinta Nduru trained in previous interventions and mastered the production of cuttings, provided training services for nurseries and staff from national institutions from Kenya and Uganda, under other interventions from Cameroon, Mali, Nigeria and Tunisia; and other development projects, such as WFP. This was a great support to the project and contributed to the scaling strategy.

The stakeholder community of seed businesses, National Potato Council of Kenya (NPCK), KEPHIS, KALRO and other stakeholders were engaged in the cuttings technology prior to the project start. This project allows CIP to support various activities of the stakeholders as they continue to embark on interventions that support scaling of the innovation package.

In Uganda, SHA, Kazardi and Bugizardi lead activities to scale out the innovation package, working with 58 seed multipliers. District and sub-county agricultural officers of the 7 districts (Kisoro, Rubanda, Kanungu, Kabale, Mbale, Kapchorwa and Kween) support extension activities with SHA and the Zardi's.

CIP provides technical backstopping in cuttings production to Agromax, the large-scale producer of cuttings based in Kampala with satellite nurseries spread over Uganda, and the six small-scale nurseries trained by IFDC in minituber production, who also trained the 58 seed multipliers in seed production (Fig. 6).

CIP engages with Ministry of Agriculture Animal Industry and Fisheries (*MAAIF*), particularly National Seed Certification Service as important stakeholders to officially recognize cuttings for seed systems. IFDC is an important stakeholder as the project is leveraging in capacity development of nurseries and seed multipliers IFDC trained.

The broader stakeholders of NARO, other Zonal Agricultural Research and Development Institutes, nurseries, seed businesses, other seed potato projects will be engaged through a broader workshop towards the end of the project when there is evidence and experiences on the innovation package to present.

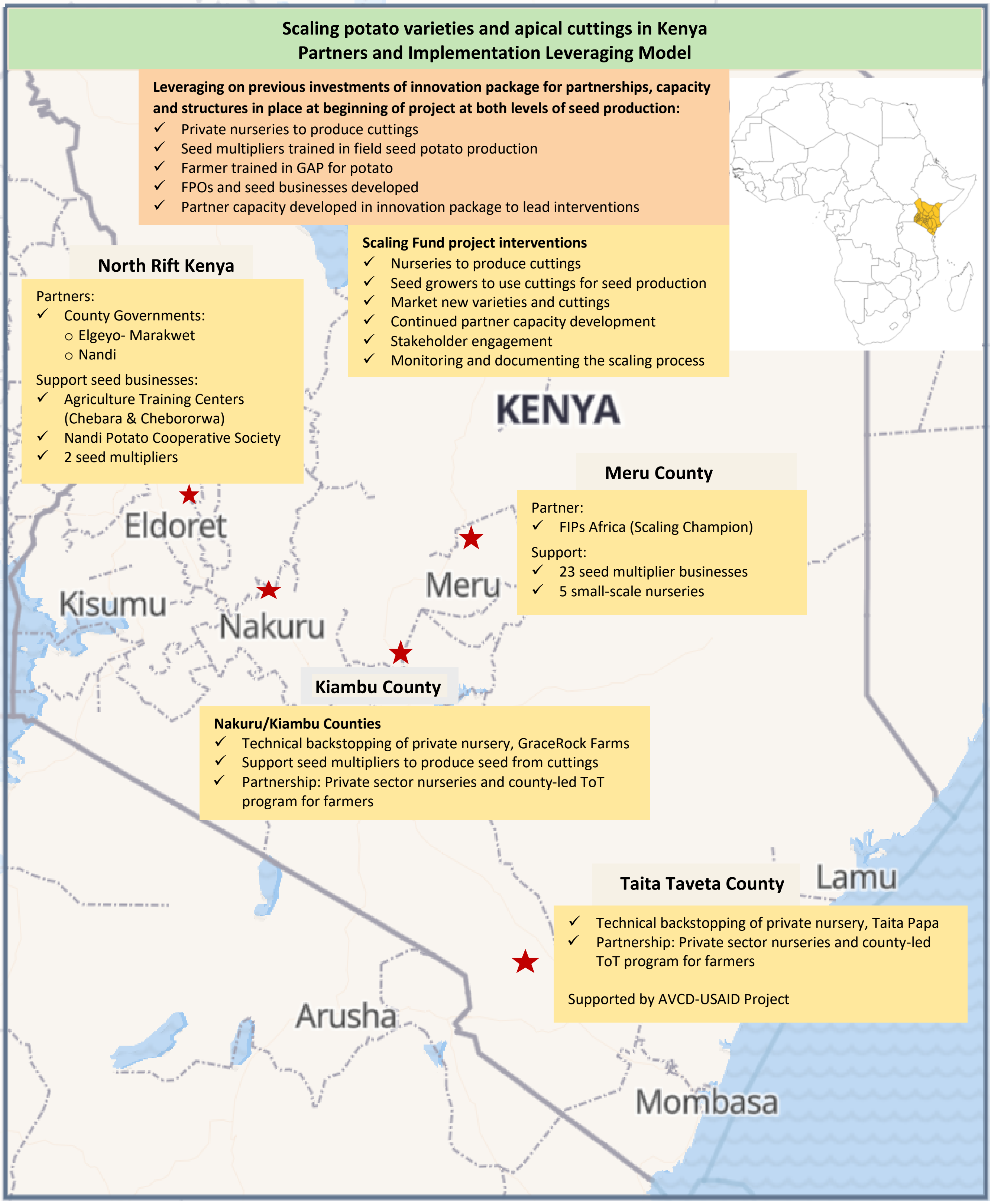

Figure 5. Scaling new varieties of potato and apical cuttings innovation package in Kenya: partners and implementation leveraging model.

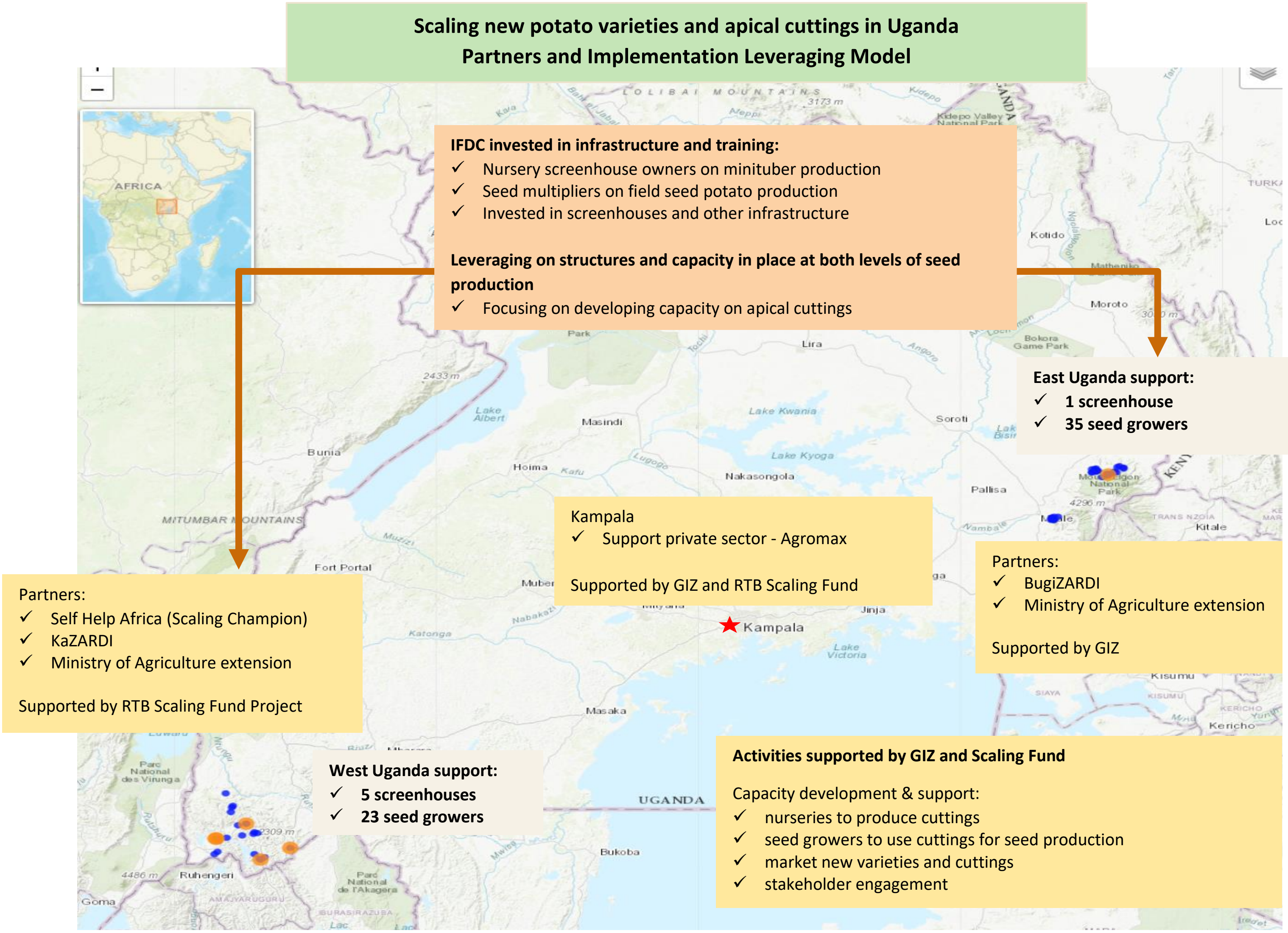

Figure 6. Scaling new varieties of potato and apical cuttings innovation package in Uganda: partners and implementation leveraging model.

Describe if and how the network changed (example new partners, changes in the roles, strengthened capacities).

In response to investments in cuttings by private sector and demands by county governments for seed system support, CIP expanded the partnership strategy whereby CIP supports large-scale private sector nurseries investing in cuttings through technical backstopping and at the beginning stages, market assurances for cuttings by purchasing for project interventions.

To support private-public partnerships, CIP has defined an approach of supporting a (private) nursery to produce cuttings, and county governments train farmers to support marketing the nursery. CIP or partner engages with the county government to conduct farmer training through a ToT program as per the expansion strategy to support farmers using cuttings directly by saving seed on-farm. This will increase market options for cuttings as seed multipliers alone limit opportunities for small-scale nurseries and many farmers to benefit from the technology. This approach resulted in new public-private partnerships in Kiambu and Taita Taveta counties.

Two unexpected private professional nurseries investing in cuttings production (Grace Rocks Farms and Taita Papa) and seed merchants licensed to produce certified seed joined the team of users. The project supports these users with capacity development, sharing start-up and marketing costs.

CIP further invested in capacity development of FIPS-Africa with the outlook for them to become a reliable scaling partner due to the specialised nature of competencies needed to deliver innovation package and CIP technologies in general. Capdev in seed certification and quality assurance will broaden the partnership areas for FIPS-Africa to lead.

Key lessons learned in terms of partnership management and its importance for the scaling process.

Scaling new technologies such as apical cuttings which have complex and technical pathways requires leadership capable of coordinating the partners and ensuring quality control in interventions. A key initial step in the scaling process is building the capacity of partners to correctly lead activities to support users of the innovation package. Particularly int eh case of apical cuttings which were taken up by the external environment early in development with limited knowledge on the technology.

This report highlights developing capacity of partners to lead activities accurately with minimal R4D support as a key outcome. This investment by CIP to lead much of the field activities in year 1 to develop partner capacities has resulted in partners able to implement and monitor activities thus reducing CIP's role in the field for year 2. In year 2, FIPS-Africa can lead more complex activities in Kenya to technically backstop nurseries producing cuttings, and support seed business to become licensed to produce certified seed.

The definition of scaling champion needs to be flexible, as in this project scaling occurs at two levels of scaling readiness. With differing kinds of roles depending on the available capacities, CIP absolutely needs scaling partners like FIPS and SHA who are active in the field, but do not have the higher-level capacity to capture the processes of scaling – they are the active doers of scaling processes. Higher institutions like CIP are better able to lead higher level studies and documentation. Ideally this leadership is handed over to high level institutional partners towards the end of complete innovation handover.

Scaling strategy

Present the scaling pathways defined at the beginning of the project

The potato project has two scaling strategies based on the scaling readiness in the countries. In Kenya the innovation was transitioning from semi-controlled to uncontrolled environment at the beginning of interventions with private sector leading production systems and partners supporting the scaling process, while the innovation package was just introduced in Uganda.

In Kenya, the general stakeholder community is using the technology package with limited R4D support, including nurseries producing cuttings, seed multipliers producing seed from cuttings and the seed certification regulatory body KEPHIS recognized cuttings as starter material to produce certified seed. The strategy in Kenya was scaling out the innovation package to develop capacity of new stakeholders and increase users.

In Uganda, the strategy overall was to introduce the innovationpackage following similar pathway as in Kenya, applying learning to improve the scaling process. The strategy entailed clusters of activities by region, led by differing sets of partners with CIP coordinating and consolidating their work.

The scaling pathway reflects the experience in Kenya (Fig. 7). In Kenya the interventions continue to follow along the pathway, mostly in the scaling process as the foundation had been laid. As stated above, in Uganda the process follows the same pathway as that learned by experience in Kenya.

Criteria for considering a country to invest in cuttings

i) released varieties maintained by a private or public institution authorised to multiply the said varieties
ii) a source of tissue culture plants within the country, preferably private sector lab, but a functional national program or university lab are also suitable. Ideally private sector engages in activities to produce cuttings and seed from cuttings, while national institutions provide supportive environments.

Entry point In a country where the technology is at the pilot stage, the initial step is forming the scaling team, consisting of partners to raise awareness of the technology and train users. The strategy of this core team is support initial activities in the field to gather evidence to present the technology to the broader stakeholder community to obtain their support to scale the technology.

Common to both countries at the pilot stage is identifying a nursery willing to produce cuttings for project activities as a source of cuttings is needed for next users (seed multipliers and farmers) to scale out the innovation. Ideally the nurseries have the general expertise in producing transplants, thus are technically capable to produce the initial cuttings with some technical backstopping from CIP experts. Support to the nursery is in technical backstopping to continually improve production systems and purchasing the initial cuttings for project needs, thus supporting the investment and operational costs of the nursery to provide cuttings as a service to the project.

While in the current project the identified nurseries are not in the potato growing zones thus the project has to support the transport to deliver the cuttings to seed multipliers and farmers during the pilot phase. In Kenya, while the private propagators SRK is distant to potato growing areas, the packing and courier system allows for efficient transport. In Uganda the pilot nursery is located in Kampala, 300-450 km from the target producing areas, but this was the only identified nurseries capable to produce cuttings and willing to co-invest in the technology prior to knowing market demand. Interventions supported transport as a temporary measure to ensure a source of cuttings for project activities in order to assess feasibility of the technology before expanding the nursery system to potato areas to ensure sustainability.

Raising awareness of the innovation. Seed multipliers are the initial target user of cuttings to produce commercial seed and provide the evidence to present the technology to the wider stakeholder community. Partners train multipliers in seed production from cuttings, in this case FIPS-Africa, SHA, Kazardi and Bugizardi. Initially the project provides cuttings, with the multipliers investing in remaining production costs, with the subsequent steps in the pathway showing multipliers buying cuttings from large- and small-scale nurseries. Seed multipliers use the multiplication plots to host field days to raise awareness of the technology among stakeholders and farmers. Seed multipliers should already be trained in/practicing commercial seed production, with the intervention leveraging on this foundation and further complimenting their skills specifically in cuttings.

Seed for project use takes a 12-15 months to produce considering two cropping cycles and dormancy. The priority at the beginning of the project was to work with the nursery to get cuttings for seed multipliers to use cuttings as starter material to bulk seed for project activities, with multipliers receiving cuttings by beginning of first project season (April). This seed is expected to be ready for distribution a year later. Noting aside from a few varieties that are commercially available to use for project purposes, seed businesses do not already produce the new varieties hence have to be produced as part of project activities. Producing minitubers with two seasons of field bulking takes 21+ months.

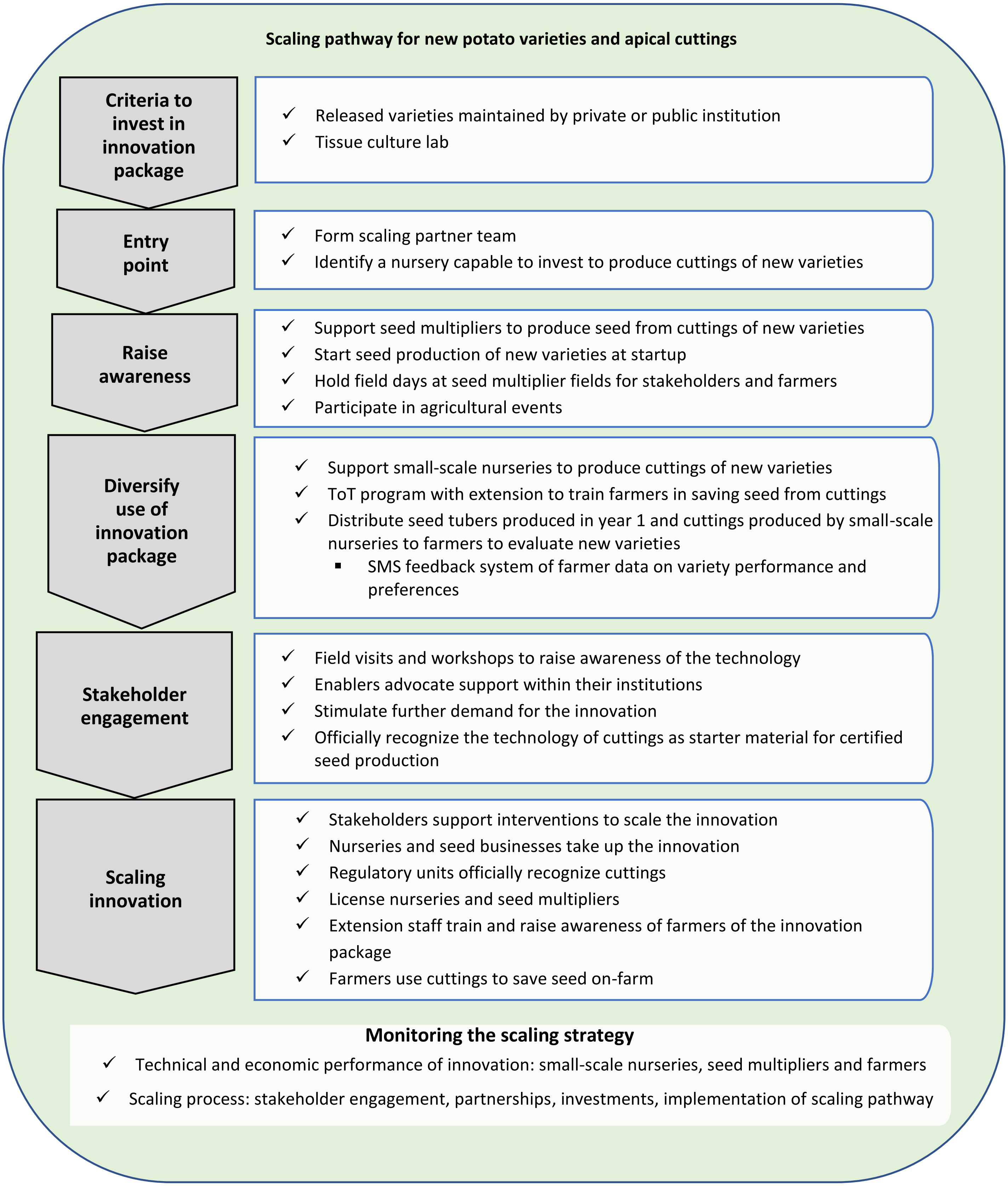

Figure 7. Scaling pathway for innovation package of new potato varieties and apical cuttings

After confirming initial acceptance for cuttings by the pilot seed multipliers, the next step is to expand and support nurseries, normally but not limited to small-scale, in the potato growing areas. In Kenya, this entailed developing capacity of lead seed multipliers to produce cuttings in small-scale nurseries. In Uganda, the strategy was to support screenhouse owners already producing minitubers to diversify production to include cuttings as well. The strategy behind the small-scale nurseries is to increase scope of reach of users with the technology – to have both farmers and seed multipliers buying cuttings of new varieties to produce seed on-farm and commercially, respectively.

Diversifying use of the innovation package to support small-scale nurseries involves capacity development of the nursery and training farmers in saving seed from cuttings on farm in seed plots to support creating markets for cuttings and new varieties. To support this pathway of use, farmers are trained in small groups and receive small packs of cuttings to apply the training at home. These farmers have previously been trained in good agricultural practices for potato, with the intervention leveraging on this foundation and further complimenting their skills specifically in cuttings. The core implementation team leads this training, ensuring to link trained farmers to small-scale nurseries. When receiving cuttings, farmers may receive cuttings of already preferred varieties in addition to new varieties, as introducing two new technologies at once without something a farmer is familiar with could backfire.

To expose farmers to new varieties, seed multipliers produce seed of new varieties from cuttings multiplying over two seasons to be distributed in year 2, and small-scale nurseries provide cuttings for farmers. At their farms, farmers apply small seed plot technique to multiply seed one season (either from seed tubers or cuttings) and begin ware production for following season. After applying and observing the new varieties and high-quality seed produced from cuttings, it is assumed farmers will return to their local nurseries to buy cuttings and seed multipliers to by seed tubers.

Feedback from farmers on variety preferences is key to advise seed producers and understand what drives farmers preferences. Feedback will be collected through an SMS USSD feedback asking farmers key questions to assess variety performance and preferences.

Stakeholder engagement Stakeholder field visits and workshops are important to raise awareness among enablers to advocate within their institutions to support the innovation. Presenting preliminary evidence from the field is expected to convince them of the value of the innovation. Scaling Champions and other partners/stakeholders at this stage also organize events to build awareness and capacity in the innovation package. Engaging with seed certification units begins to recognize cuttings in certification protocols as starter material for seed production.

Scaling innovation Upon presenting evidence validating the feasibility and value of the innovation package to stakeholders, they support interventions to scale the innovation:

- County/district Ministry of Agriculture mobilise extension staff to train and raise awareness among farmers of the innovation package, noted extension are recognized for being important promoters of technologies among farmers.
- Nurseries and seed businesses take up the innovation
    - of particular mention is the scaling smaller-scale nurseries in potato producing areas
- Regulatory units officially recognize cuttings
- Farmers use cuttings to save seed on-farm.

Licensing nurseries and seed multipliers as per national regulations follows official recognition of cuttings in seed systems. In Kenya this involves licensing nurseries under Horticultural Crops Development Authority (HCDA) and seed multipliers as a seed merchant with KEPHIS to produce certified seed. Deliberations will be held with KEPHIS to develop certification schedule (costs) for inspecting cuttings due to the low volume and revenue of small-scale nurseries unable to cover the certification costs, noting for seed the volumes cover certification costs.

Monitoring the scaling process With the innovation package still relatively new, data from the performance in the field by users still needs to be documented to confirm the agronomic and economic feasibility of the innovation package across differing potato value chain contexts.

Scaling champions monitor the agronomic and economic performance of small-scale nurseries and seed multipliers who are provided with and trained on logbooks for each stage of production capturing production, harvest, cost and sales data.

To monitor the scaling process, scaling champions collect and organize beneficiary and event/training data, including who leads specific events to demonstrate stakeholder engagement and leadership in the scaling process (indicator Number of trainings/events lead by public and private institutions).

CIP collects monitoring data of higher-level events, such as project workshops, and overall consolidates the monitoring data to understand the outputs, outcomes and impacts of the scaling process. CIP provides the templates to collect and report data to ensure that the necessary variables are collected and consistency in reporting to facilitate consolidating the data.

Present the changes that were needed to the scaling pathways during implementation

Due to demand for the innovation, the project has expanded the areas of intervention to include additional counties in Kenya: Kiambu and Nakuru, and partnered with two large-scale nurseries producing cuttings following the private sector/county government ToT approach. Otherwise there has been no deviation from the original strategy, which is in process of implementation as described.

The demand from private sector, county governments and national programs, within Kenya and Uganda, and beyond, is influencing the scaling process. Overall the demand for seed potato, the most significant limiting factor in potato production, drives demand for innovations in potato seed systems. While there is much demand by nurseries to produce cuttings, market development for the new varieties and cuttings is where focus is needed and the scaling strategy addresses this.

In general, the scaling strategy is guided in part by external demand for the innovation, which particularly in Kenya also guides the scaling process – to adapt to the demand by supporting demand from stakeholders for technical backstopping in their projects, such as WFP who is supporting small-scale nurseries to produce cuttings diverse profiles of users for the innovation. These changes affect the broader stakeholder community and contribute to the scaling process, but not the scaling pathways.

Explain the decision-making process that has been used to adapt the scaling strategy and the key stakeholders involved.

Regular communications and meetings with scaling champions and the core implementation team were held to update on progress of activities and discuss monitoring data. CIP coordinated 4 partner/stakeholder workshops in Kenya and Uganda with the stakeholder team occurred. While the scaling strategy was only articulated for this report, the discussed activities followed the described strategy. Adapting the scaling strategy responds to the demand for the innovation.

Explain if and how the changes have influenced the project capacity of going to scale with the innovation package.

There were no changes other than increasing scaling, but no changes to scaling strategy or partners.

Scaling Readiness

Provide short update on how Scaling Readiness was applied and supported the: (I) characterization of the innovation and scaling context, (ii) diagnosis of bottlenecks for scaling, (iii) design of the scaling strategy, (iv) stakeholder negotiations and development of the scaling action plan, and (v) monitoring, evaluation and learning.

If these learnings have already been captured in other documents, including the ones developed in collaboration with the Scaling consultant and/or the Scaling team, please make reference to these documents.

The innovation of apical cuttings progressed rapidly through the scaling readiness stages, largely due to private sector investment at the earliest stages – 3 years before this project. SRK saw the potential of this technology after an informal meeting and started production the following day. Having such a qualified nursery early on allowed a quality commodity to be produced to use to technically validate the technology directly in the operational environment with users, as the technology had not been validated before the private sector invested to produce cuttings. If not, this would have prevented validating the innovation and sparking further attention. All research and validation responded to the operational environment that the cuttings would actually diffuse through, particularly field performance as this the main competitive advantage of cuttings – high productivity, and stakeholder engagement.

This entry point strategy was repeated in Uganda following a parallel approach, by identifying two professional nurseries to invest in cuttings and a network of seed multipliers. The learning from Kenya is expected to even further accelerate advancing through the scaling readiness stages in Uganda, and will be evaluated and the entire scaling process documented at the end of the project.

The major consideration for this innovation is driving demand for cuttings among users and how to market cuttings. While there is demand for businesses to invest to produce cuttings, this support is only considered once demand for cuttings is determined. In Uganda, KaZARDI intends to sell cuttings at equivalent to $0.27 US/cutting, while Agromax sells at $0.19 US/cutting. These high costs are suspected to drive down demand for the technology once users have to pay themselves. In comparison cuttings are sold for $0.10 US in Kenya. Discussions are being held with these producers as investing in an innovation that will cost more than what the market is willing to pay will trump investments. CIP will hold discussions to discuss pricing based on productivity evidence which guides pricing.

Financial update

Present financial data using the standard cost categories

Categories	Y1 Budget (USD)	Y1 Expenses (USD)	Y2 Budget (USD)	Y2 Expenses (USD)
Personnel	77,452	33,176	175,549	
Collaborator Costs – CGIAR Centers				
Collaborator Costs – Others	159,000	119,616	217,544	
Supplies and Services	66,600	39,043	38,289	
Training / Workshop	36,000	20,071	58,800	
Operational Travel	6,000	7,046	4,000	
Depreciation				
Sub-total of Direct Cost	345,052	218,951		
Indirect Costs/Institutional Overhead (15%)	51,758	32,843	74,127	
TOTAL – all Costs	396,810	251,794	568,795	

Present the level of co-investment mobilized

Categories	Main activities covered and geographical scope	Y1 Expenses (USD)	Y2 Expenses (USD)
GIZ Uganda	All activities in East Uganda	88,000	
AVCD2 – Kenya	Nursery development in Taita Taveta	99,598	

Syngenta Foundation- Dissemination of climate smart potato varieties	Dissemination of new varieties	10,000	
Private nurseries and seed producers	Nursery production of cuttings and seed from cuttings, noting this data is missing much investment data	27,440	
Public extension service	Staff time for training	5,000	
TOTAL – all co-investors		**230,038**	

Annex 1. List of deliverables reported

Output	Deliverable	Description	Status
Scaling readiness approach documented	16706 - Stakeholder profile has been completed and is documented	Profile of stakeholders and partners of the PO2.4 potato scaling fund project	Completed but not submitted – following up with RTB
Intervention profile	16704 - Intervention profile has been completed and is documented	Description of the innovation	Completed and submitted
Innovation package	16708 - Innovation package described with core and complementary components clearly identified	Description of the partnerships and scaling strategy/pathways	Completed and submitted
Project output 1: Market relevant product profiles for potato varieties	19840 - Potato variety catalogue 2019 - Kenya	Variety profiles of varieties released in Kenya, including CIP material published in biannual variety catalogue	Completed and submitted
Project output 2: Business cases and production guidelines for producing apical cuttings	3138 - Manual for rooted cuttings to produce seed potato	Technical manual to produce apical cuttings of potato, 1st edition	Completed and submitted in 2019, to be updated in 2020
	18360 - Logbook for production of rooted apical cuttings (PO2.4 deliverable)	Record keeping tool for nurseries producing apical cuttings of potato of production, cost and sales data to develop business cases	Completed and submitted
	3134 - Apical rooted cuttings in early generation seed potato production technology brief (PO2.4 deliverable)	Technology brief to produce apical cuttings of potato	Completed and submitted in 2017, updated in 2019
	9165 - Using rooted cuttings in early generation seed production - planting guide (PO2.4 deliverable)	Technical brief to produce seed potato from apical cuttings – planting stage	Completed and submitted in 2017, updated in 2019
Project output 3: Business cases and production guidelines for producing seed from apical cuttings	18361 - Logbooks for production of seed from rooted apical cuttings; 1st and 2nd round (PO2.4 deliverable)	Record keeping tool for seed multipliers producing seed from apical cuttings of potato of production, cost and sales data to develop business cases	Completed and submitted
	14784 - Introduction and evaluation of the technical and economic	Data from the seed multiplier logbooks of the first round of	Completed and submitted

	feasibility of seed potato production systems using rooted transplants of apical cuttings in Eastern and Southwestern Uganda	multiplication from season 1 activities, April to Aug 2019.	

Once you have reported the deliverables under the project created in MEL. You may generate this information directly through the POWB page.