

CHAPTER 4

Scaling proven innovations in Rwanda: Market-led delivery and inclusive impact

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4.1 Context

Rwanda faces multiple challenges threatening its population's livelihood. Ranking among Africa's most densely populated regions, the country continues to record high demographic growth and rapid urbanization. This results in increasingly shrinking agricultural land, affecting agricultural production.

Despite the progress recorded during the last decade, malnutrition and stunting remain high, with one-third of children malnourished and stunted. This is brought about by, among other factors, limited knowledge of household-level processing techniques, and inadequate value addition to agricultural produce, especially at household level, coupled with limited use of nutritious products. In addition, the region's diverse ecosystem is vulnerable to climate change, putting more than 90% of its population, particularly small-scale farmers – and more so women and youth – at risk.

These challenges have been exacerbated by the COVID-19 pandemic and, more recently, by supply-chain disruptions related to the Russia–Ukraine war, leading to higher food and fertilizer prices and associated economic downturns.

Rwanda is also among the top ten countries worldwide most affected by food-price inflation, with an annual increase of 35% (World Bank, 2022). According to the

International Food and Policy Research Institute (IFPRI, 2022), these food-related shocks were projected to have significant impact on Rwanda's gross domestic product (GDP) and employment.

Indeed, the country is affected by global fertilizer prices, which remain above the pre-war levels, considering its dependence on imports to satisfy domestic demand. It was projected that there would be a reduction in the use of fertilizer between 31 and 36 percent in 2023 and 30 and 34 percent in 2024 because of price increases if government policies remain unchanged (Fofana & Sall, 2023).⁵

Smallholder farmers in Rwanda are particularly vulnerable, and any increase in the costs of inputs disproportionately affects their ability to invest in agricultural technologies, and adapt to changing market conditions, thereby reducing agricultural productivity and affecting their livelihood.

For these reasons, AID-I GLR designed tailored interventions and their corresponding strategies for target areas in Rwanda to counter the threats above by disseminating climate-resilient agricultural innovations (e.g., highly productive and early-maturing varieties), training farmers in good agricultural practices (GAPs), and providing advisory services to enhance food security and combat malnutrition.

4.2 Adaptation and implementation of the AID-I GLR strategies in Rwanda

4.2.1. Scaling partnerships

As part of the project's approach, IITA invited a diverse group of stakeholders to a regional co-creation workshop. They included technology developers (CGIAR centers⁶ and the Rwanda Agriculture and Animal Resources Development Board [RABI]), large organizations implementing agricultural development projects, seed and agricultural input producers and distributors, mechanization service

providers, and a few development partners investing in agriculture.

These stakeholders discussed and deliberated on the objectives of the interventions, partnership building, target areas, and innovations selected.

The project facilitated two partnerships to deliver technologies and innovations to farming households, with technical assistance from CGIAR centers and service

⁵ However, the Seasonal Agricultural Surveys conducted by the National Institute of Statistics of Rwanda (NISR) in 2023 and 2024 in fact show an increase in fertilizer use, attributed to a higher government subsidy on fertilizer.

⁶ ABC, CIP and IITA.

providers in alignment and collaboration with RAB and the Ministry of Agriculture and Animal Resources (MINAGRI).

The first partnership was led by the Alliance for a Green Revolution in Africa (AGRA), formed initially with the Catholic Relief Services (CRS) and market actors delivering agronomic technologies and practices for selected crop value chains (beans, orange-fleshed sweet potatoes [OFSP], potatoes, and vegetables).

AGRA and CRS combined and complemented their experience in delivering specific interventions. On the one hand, AGRA focused on deploying high-

quality seeds of nutritious crops and inputs to agro-dealers, and building the capacity of seed companies to create awareness of technologies farmers need. On the other hand, CRS utilized its vast and deep community networks to ensure last-mile delivery of technologies (seeds, fertilizers, and advisory services) to target farmers.

By doing this, AID-I GLR provided need- and demand-differentiated services to targeted populations depending on geographic location and partner presence and vulnerability analyses, thereby providing tailored support to selected smallholder farmers.

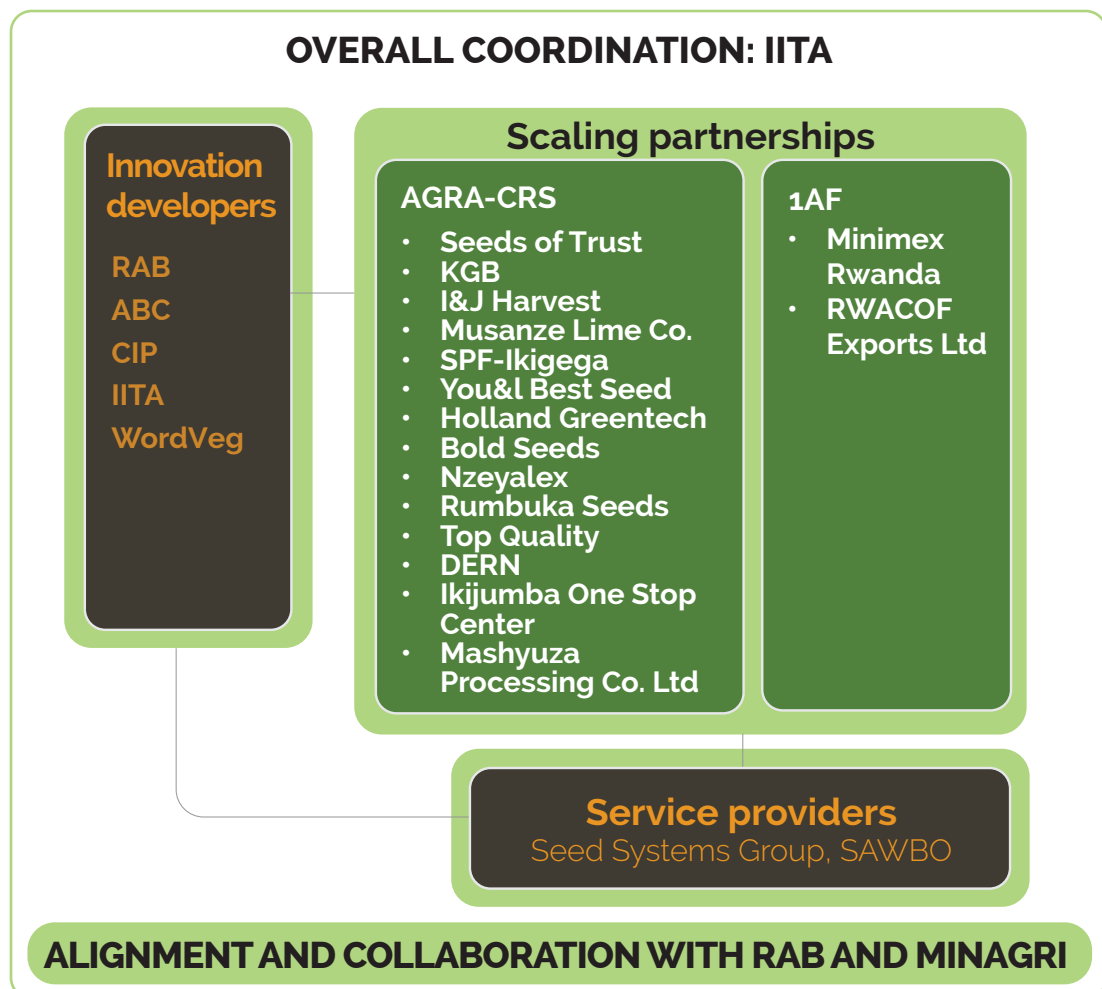


Figure 19: Partners and roles in Rwanda.

Recognizing the crucial role of seed companies in technology transfer, the AGRA-CRS partnership involved 12 seed companies and two lime companies to expand the reach of improved agricultural technologies. This strategic expansion aimed to broaden the network of suppliers of improved inputs, effectively serving farmers across diverse agroecological zones in Rwanda. Seed- and lime-processing companies were classified into consortia for proper coordination of their

efforts, fostering efficiency and accelerating the adoption of new technologies by smallholder farmers.

The second partnership was led by One Acre Fund (1AF), working with Rwanda Coffee Exports Ltd (RWACOF) and with Minimex Ltd (a maize milling factory) on the maize value chain, specifically focusing on the production and commercialization of whole maize flour in rural communities (Figure 19).

4.2.2. Target areas and selected innovations

During the co-creation workshop in December 2022, stakeholders outlined the main objective, which was to contribute to increasing income, and improving nutrition. They therefore concentrated on interventions for increasing the use and adoption of good agricultural and nutritional practices and technologies in some of the

locations worst hit by malnutrition and stunting in the country.

By layering the scaling organization's operation location with the malnutrition-prone districts, stakeholders targeted the Eastern Province (Kayonza, Ngoma, and Rwamagana Districts), Northern Province (Burera, Rulindo, Gakenke, and Musanze Districts), and Western Province (Nyabihu, Nyamasheke, Karongi, Ngororero, Rusizi, Rutsiro, and Rubavu Districts) (Figure 20).

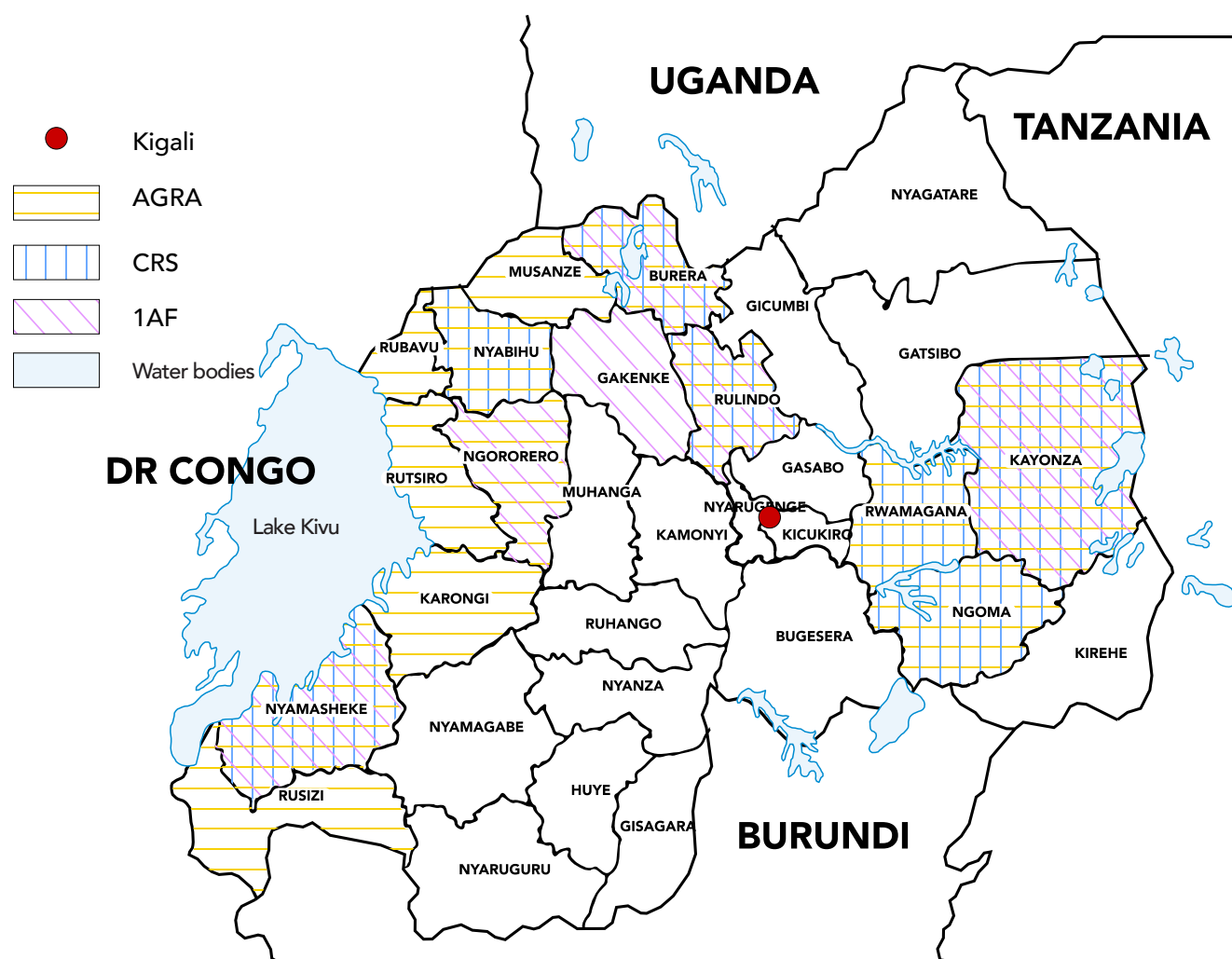


Figure 20: AID-I GLR target areas in Rwanda.

Following the presentation of different innovations and considering the partnership's objectives, stakeholders selected technologies that can help farmers increase yields and improve household wellbeing. The innovations disseminated all had a common dual purpose: improving nutrition and increasing

income, with additional benefits such as disease resistance, aflatoxin control and climate resilience for some of the innovations.

Focus was on beans, OFSP, potatoes, maize and vegetable value chains.

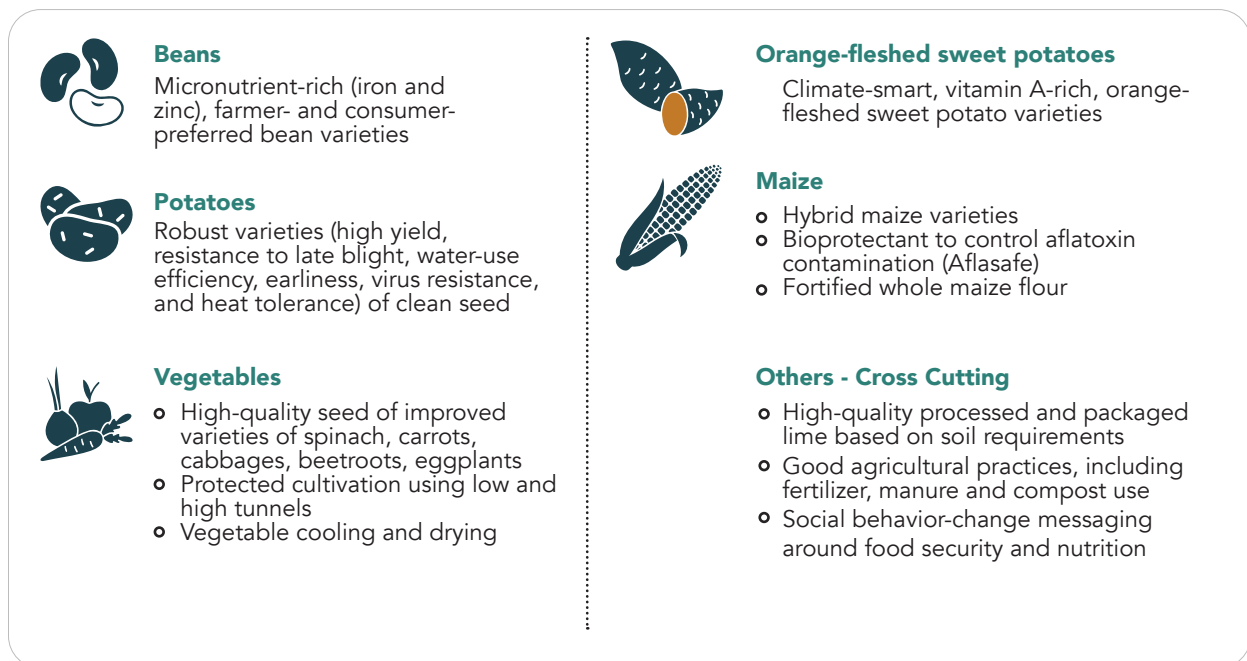


Figure 21: Technologies selected to help farmers increase yields, and to improve household wellbeing in Rwanda.

4.2.3. Input system

The country has a very nascent seed system, comprising a dozen young local seed producers, a couple of regional seed companies, and several agro-dealers across the country. However, these market actors focus almost exclusively on commodities covered by the national subsidy program.

The project leveraged this ecosystem to introduce demand-creation innovations by seed companies, thereby contributing to a more sustainable system.

4.2.4. Village-based advisors (VBAs) and small-pack approach (VBA/SP)

The project adapted the VBA/SP approach, dovetailing it into the existing extension system, where farmer promoters (FPs)

played the VBA role, considering their pre-existing prominent role in advising farmers at the village level.

FPs are lead farmers and part of the national extension system. This national extension system clusters 20–25 farmer households as a group under a single FP. This FP supports the group in learning new agricultural technologies through different approaches, including demonstration, providing advisories, supporting farmers to register for subsidies, linking farmers to reliable sources of improved inputs, etc.

Therefore, seed companies and other market actors partnered with FPs to roll out this market-promotion approach.

One Farmer
promoter manages
a group of
20–25
farmer households



4.3 Results in Rwanda

Great Lakes Accelerated Innovation Delivery Initiative Rapid Delivery Hub (AID-I GLR) in Rwanda

October 2022–September 2025



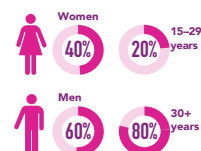
Rwanda

PARTNERSHIPS



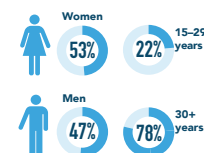
TARGET

652,031
People to be reached



REACH

701,568
People reached



INNOVATIONS

More than

12

Innovations and practices

VALUE CHAINS



5

Groups of value chains

SMALL PACKS

1,071,479

Distributed to farmers

749,109*



Farmers accessed improved agricultural technologies with advisory information through small packs

413,270
Women

335,839
Men

584,954
30+ years

164,155
15-29 years

*Aggregated for the 5 value chains. Some farmers were in several value chains.

16,284



Metric tons of inputs sold by market actors valued at

\$8,116,184



95.2

Metric tons of early-generation seeds produced and supplied to market actors

11,487



Metric tons of certified seeds produced

YIELD (mt/ha)

	BEANS	MAIZE	OFSP	POTATOES	VEGETABLES
Average farmer-reported yield	1.5	6.9	14.6	26.2	21
Innovator projection of potential yield	1-2.5	4-8	9-14	20-40	20-30
Baseline	0.8	1.55	7	8.6	N/A

Figure 22: The numbers at a glance – Results of the AID-I GLR Project in Rwanda..

TESTIMONIAL

Farmer field day with potato farmers in Bweyeye sector, Rusizi District.



March 2025

In the remote Bweyeye Sector of Rusizi District in Rwanda's Western Province, a groundbreaking agricultural project is transforming local farming practices and boosting Irish potato production.

The AID-I GLR Project, in collaboration with Seed Potato Fund Joint Venture Ltd (SPF) and supported by AGRA, has introduced high-yielding Irish potato varieties such as Ndamira and Cyerekezo to local farmers, revolutionizing their farming methods.

Bweyeye farmers used to grow Irish potatoes using local and farm-saved seeds. Before the AID-I GLR program, no seed potato companies or cooperatives were known to operate in the region, and Irish potato cultivation in Bweyeye covered a paltry 10 hectares. Farmers lacked awareness of the benefits of improved seed varieties and were largely ignorant of effective agricultural practices. However, through the test-and-see introduction of Ndamira seed potatoes and lime grade one distributed in small packs, farmers saw for themselves the remarkable results.

Each participating farmer received 5 kilos of Ndamira seed potatoes and 10 kilos of lime grade one to enhance soil fertility. According to Ferdinand Nduwayezu, Bweyeye Agriculture Sector Officer, farmers who used these improved inputs reported significantly higher yields. "Ndamira is an excellent variety. In our trials, it matured in 80 days, whereas the old variety took 100 days. Additionally, it yields 914 metric tons per hectare, compared to just six metric tons from the previous variety," he said.



Distribution of small seed packs of Irish potatoes.

One farmer, Joseph Munyemari from Rwamagare village, is already planning to expand his potato farm after seeing the success of the new varieties. He and two neighbors each received 50 kilos of Ndamira seed potatoes. He planted his on 0.03 ha and harvested 400 kilos (equivalent to 13.3 mt/ha compared to 6 mt/ha previously harvested). He is optimistic about the future. "We are grateful to the government for providing us with high-yielding seeds that help improve our livelihoods. These seed potatoes allow us to increase productivity and hence rise out of poverty and build a better future," Munyemari said.

The small-pack initiative has distributed seed packs to more than 1,500 farmers in Bweyeye. As part of the broader AID-I GLR Project, the initiative aims to close the knowledge gap on

modern agricultural technologies. It is focused on raising awareness about the benefits of high-yield, nutrient-rich seed varieties, and on encouraging farmers to adopt these innovations.

In addition to providing quality seeds, the project offers extension services and connects farmers with input suppliers, making it easier for them to access fertilizers, lime and other crucial agricultural tools. AGRA and its partners have implemented the village-based advisor/farmer promoter (VBA/FP) model, which includes demonstration farms where farmers can learn about new technologies and crop varieties with expert guidance from the International Potato Center. This hands-on approach has been instrumental for the successful uptake of improved farming techniques, ultimately boosting productivity and contributing to Rwanda's agricultural economy.

The results of this demonstration have been promising, and local officials are optimistic about the future. "Our goal is to double the area dedicated to Irish potato farming from 10 hectares to 20 hectares in Season B. We remain committed to raising awareness to increase the number of potato farmers in our sector. Our farmers have now ordered more than 20 mt of the same variety from SPF Ikigega to plant in 2025B season," revealed the agronomist.

Thanks to the AID-I GLR project and its partners, Bweyeye farmers have now been reached with the knowledge, skills, and resources for improved potato farming. This is not only helping to increase yields but also contributing to food security and economic growth in one of Rwanda's most remote regions. Through AID-I GLR, farmers in Bweyeye continue to gain a deeper understanding of the importance of adopting improved seed potato varieties and sustainable agricultural practices. This initiative has the potential to significantly boost productivity, create more economic opportunities, and foster long-term growth in this challenging region.

Box 10: What Cyerekezo potatoes mean for Rwanda.

Jean Claude Nshimiyimana, Seed Systems Specialist (CIP-Rwanda)

Released in 2024, the Cyerekezo potato variety is rapidly transforming Rwanda's potato-production landscape.

In Musanze, Dukomeze Ubuzima Cooperative farmers harvested more than 1.5 mt from 200 kilos of seed – exceptional productivity.

Producing double the tubers at 10–15 per plant, compared to 4–7 in other varieties, Cyerekezo is now among the most popular varieties in major potato-growing areas.

Strong collaboration between RAB, CIP, AGRA, CRS, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), and farmer cooperatives has accelerated seed multiplication and farmer training, enabling better agronomic practices, increased resilience, and improved incomes.

Farmers are now benefiting from both enhanced household food security and new market opportunities, including cross-border sales to eastern DR Congo.

Demand for quality seed has correspondingly soared. As at August 2024, seed multipliers requested about 130,000 mt of basic potato seed for season 2025A, of which more than half (52%+) was for new varieties. Cyerekezo alone accounts for nearly one-third (31.3%) of the total potato-seed demand – up from less than 10% two years ago.

Cyerekezo is climate-smart, quick-maturing, and suitable for multiple cycles per year, making it a scalable solution to long-standing seed-quality and disease challenges.

Cooperative-led expansion demonstrates high farmer confidence and positions Cyerekezo as a game-changer for rural livelihoods and national food security.



4.3.1. Outputs

4.3.1.1. An active scaling partnership to drive the delivery of innovations

The AGRA–CRS scaling partnership in Rwanda was formed to accelerate the adoption of improved agricultural technologies among smallholder farmers by leveraging the strengths of public institutions, development organizations, research centers, and private-sector actors.

The partnership brought together AGRA, CRS, CGIAR centers and allied institutes (the International Potato Center [CIP], IITA, Alliance of Bioversity and CIAT [ABCI], World Vegetable Center [WorldVeg]), and RAB. All these diverse partners rallied around a common cause: to shift farmer behavior, expand access to quality seed, and drive productivity through coordinated extension systems and market-led delivery models.

The collaboration recognized that no single institution could sustainably solve systemic barriers alone – particularly inadequate access to seed, weak last-mile delivery, fragmented advisory systems, and limited farmer awareness of improved varieties.

Each partner, therefore, contributed distinct comparative advantages:

- AGRA strengthened private-sector seed systems and input networks;
- CRS delivered behavior-change and nutrition-sensitive interventions for vulnerable communities;
- CGIAR centers provided high-yielding, climate-resilient and nutrient-dense crop varieties; and
- RAB anchored the initiative within national extension and early-generation seed (EGS) production systems.

The partnership operationalized its strategy through four complementary delivery models integrated into Rwanda's pre-existing extension infrastructure.

- First, the Gikuriro Kuri Bose (GKB) seed pack sampling model distributed small trial seed packs, bundled with nutrition education, to targeted vulnerable households.
- Secondly, the FP model showcased improved varieties through a 'mother demo–baby demo' approach that enabled local peer learning under optimal crop management.

- Thirdly, the local government extension model leveraged the national Twigire Muhinzi system, equipping health workers, local agronomists, and extension officers with input demos to accelerate community exposure.
- Lastly, the agro-dealer–FP model strengthened private-sector distribution networks to reach farmers who had not yet adopted improved inputs. Across models, partners scaled the use of affordable small seed packs, co-designed by CGIAR and seed companies, enabling farmers to experiment before investing, while strengthening market links and boosting demand for certified seeds.

The sustainability of the partnership was achieved through the institutional adoption of delivery approaches, ongoing commercial relationships, and continued farmer- and partner-engagement beyond the project's close, including new collaborations.

- Seed companies continued sourcing early-generation seed from RAB at increased volumes post-project, reflecting stronger – and rising – market demand and stabilized supply chains.
- Agro-dealers and farmer promoters continued to play their roles as trusted intermediaries, facilitating last-mile access to inputs and agronomic guidance.
- The small-pack model remained commercially viable for companies and accessible to farmers.
- The partnership created platform effects, attracting new collaborators such as Technologies for African Agricultural Transformation (TAAT), Youth Empowerment and Advocacy Network (YEAN), and Be Proactive Actors for Women Empowerment (Be4We), who adopted the same extension and seed-dissemination mechanisms to scale additional innovations.

Despite overall success, the partnership faced several operational and structural challenges. Coordination complexity and role ambiguity emerged early due to the large number of institutions involved, each with different internal processes, planning cycles, and decision-making layers. This occasionally slowed approvals, delayed joint field execution, and led to inefficiencies in activity synchronization.

Divergent messaging in year 1 created confusion among farmers, local leaders, and even partners, as inconsistent technical guidance and organizational communication diluted the partnership's credibility and slowed initial adoption efforts.

Externally, the USAID stop-work directive caused a major disruption during the no-cost extension period: it temporarily stalled implementation momentum, weakened partner alignment, and interrupted data flows between seed companies, extension agents, and field teams.

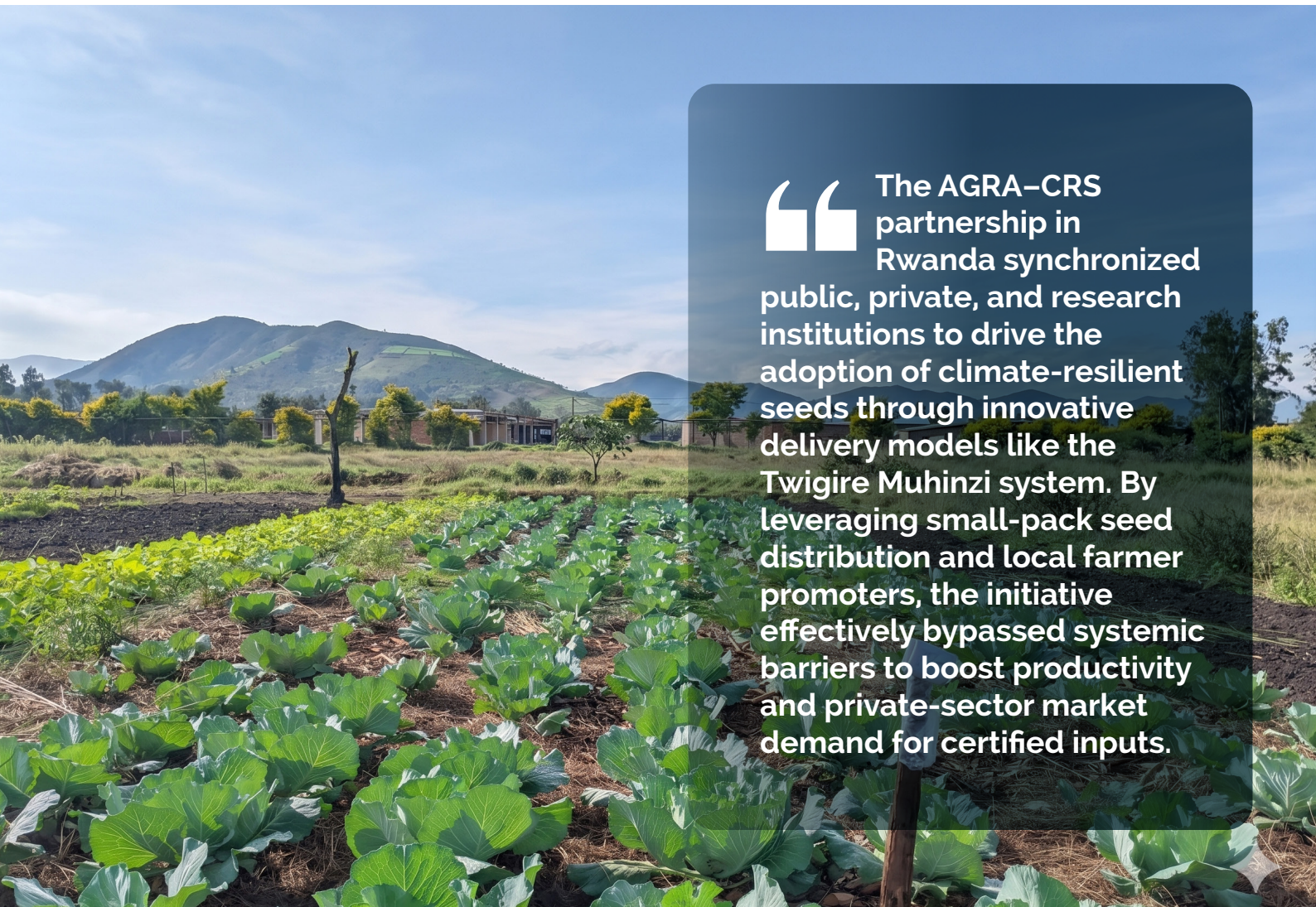
Further, the short project duration limited the ability to track long-term behavioral change, institutionalize partnerships, and measure sustained adoption at scale. Some interventions, particularly those requiring mindset shifts or nutrition behavior changes, require multi-season reinforcement that exceeded the project timeline.

Resource constraints also limited the number of demonstration plots, extension

events, and follow-up monitoring visits, reducing geographic coverage and intensity of farmer engagement.

To strengthen future partnerships, key recommendations included:

- extending implementation timelines to enable sustained behavior change, institutional learning, and impact measurement;
- improving upfront role codification and harmonizing communication given different organizational cultures and procedures;
- increasing funding for last-mile extension support and monitoring systems; and,
- expanding actor inclusion to integrate microfinance institutions, youth networks, and downstream value-chain players to deepen market resilience and to bolster long-term sustainability.



“ The AGRA–CRS partnership in Rwanda synchronized public, private, and research institutions to drive the adoption of climate-resilient seeds through innovative delivery models like the Twigire Muhinzi system. By leveraging small-pack seed distribution and local farmer promoters, the initiative effectively bypassed systemic barriers to boost productivity and private-sector market demand for certified inputs.

Bundling and delivery of agricultural technologies by private actors in Rwanda: A new way to reach farmers with complete solutions

Peter Okomoh, Head of Programs – Rwanda, AGRA

In brief: In Rwanda, many farmers face low yields due to acidic soils and limited access to quality inputs. To overcome these challenges, AID-I GLR, through an AGRA–CRS implementation partnership, introduced an innovative approach: the bundling and delivery of technologies.

Instead of supplying single inputs like seeds or fertilizers in isolation, this approach delivered complete productivity packages, combining improved seeds, lime, fertilizers, biofertilizers, and extension services with goal of ensuring farmers receive the right technologies together in a timely fashion, thus enabling maximum impact on yields, profitability, and soil health.

The initiative focused on Rwanda's acidic soil regions particularly Rutsiro, Nyamasheke, and Karongi where correcting soil acidity is a game-changer for crop performance.

The success of this model was built on partnership power with the private sector at the heart of delivery, and strong collaboration with the public sector, with each bringing unique strengths:

- Seed companies (Kilimo General Business Ltd [KGB], I&J Harvest Ltd, Seed Potato Fund Joint Venture [SPF]), *Développement Rural du Nord* (DERN), and others) supplied high-quality, high-yielding seed varieties:
 - Hybrid maize (MUH 501)
 - Beans (RWR 3194, MAC 44)
 - Irish potatoes (Kinigi and Cyizere)
- Lime processors (Mashyuza Lime Processing Company, Musanze Lime Company) provided grade one agricultural lime, essential to neutralize soil acidity and restore fertility.
- Agro-dealers and input distributors acted as last-mile delivery agents, bundling inputs (seed + lime + fertilizer) into a 'one-stop shop' so that farmers had access to everything they needed in one place.
- Extension providers and allied partners (CRS, AGRA, RAB) conducted training and field demonstrations, ensuring farmers knew how to properly apply lime and use improved seeds for best results.

Demonstration plots and distribution of small starter packs helped farmers see the impact firsthand.

The results were striking.

- In Karongi District (Rubengera Sector), a 0.004-hectare (ha) Irish potato demo produced 1,500 kilograms (kg), equivalent to 37.5 mt/ha.
- In Nyamasheke District (Rangiro Sector), a 0.001-hectare demo yielded 250 kg, equivalent to 25 mt/ha.

Both were far above district averages, proving the power of combining lime with quality seed.

Other demo plots established with seed companies such as DERN, KGB, and Nzeyalexis showed similar results, with 40–60% yield increases among farmers using bundled packages compared to those using single inputs.

This success was made possible by three core elements:

1. Integrated delivery: Farmers receive a full package of improved seed, lime, and fertilizer tailored to their soil and crop needs.
2. Partnership and coordination: The bundling approach thrives on collaboration among seed companies, lime processors, and agro-dealers.
3. Learning by seeing: Demonstration plots and farmer training built confidence, leading to faster adoption.

Early impact showed that private-sector collaboration is driving the sustainability of this model, as attested by two lime processors: Mashyuza Processing Company (MPC) and MULIMECO. Furthermore, the partnership between Mashyuza Lime Processing, KGB, and I&J Harvest demonstrated that private sector-led delivery systems can effectively and sustainably reach farmers even in remote areas.

Strong links were also formed between suppliers, agro-dealers, and distributors. Below are a few examples:

- One Acre Fund purchased 700 mt of lime grade one in Season 2025A and 200 mt in Season 2025B from Mashyuza Lime Processing.
- Nyampundu Epiphane, an agro-dealer in Rulindo, purchased an average of 15 mt per season of lime for maize and Irish potato farmers.
- Jean Paul Sinzabaheza, an agro-dealer in Rutsiro, buys about 500 mt per season from Musanze Lime Company to serve his farmer clients.

These strong supply and demand links indicate that market-driven solutions can sustain input delivery beyond project support.

From this intervention, we learned that:

- Bundling is more than marketing; it is a systems solution. It addresses interlinked constraints that prevent

smallholder farmers from achieving full productivity.

- Collaboration expands market reach. Shared distribution channels help private actors reach more farmers at lower costs.
- Data, training and monitoring matter. Tracking adoption and continuous farmer education ensure long-term results.

Supportive policy is key. Incentives and regulatory alignment can help scale integrated input marketing nation-wide.

Key takeaways

1. Bundling ensures farmers receive complete solutions that unlock productivity.
2. Partnerships between seed and lime companies create win-win market opportunities.
3. Private-led delivery systems strengthen last-mile access to quality inputs.
4. Farmer-centered training drives confidence and sustained adoption.

In a nutshell, this approach is changing how farmers in Rwanda access and use agricultural inputs.

By combining improved seeds with lime and other essential technologies, farmers are not only improving their yields, but they are also restoring soil health, boosting household income, and building resilience to climate shocks.



This initiative has proven that when the private sector, government, and farmers work together, real transformation happens in the field.
–AGRA–CRS Partnership Team.

In conclusion, the bundling and delivery of technologies is proving to be a game-changer for smallholder farmers in Rwanda. Through collaboration between private-sector companies, agro-dealers, and development partners, farmers are accessing the right technologies, in the

right combinations, at the right time, turning once acidic soils into fertile, productive land.

This is a powerful testament on how innovation, partnership, and farmer empowerment can collectively drive real and lasting agricultural transformation.

4.3.1.2. Delivery of agricultural innovations

Scaling partnerships made significant strides in introducing farmers to improved technologies through small-pack distribution, a strategy that facilitates rapid adoption by exposing more farmers to these technologies, based on the principle that a little goes a long way.

These packs included seeds of improved varieties of key crops like beans, maize, OFSP, potatoes, and vegetables, along with lime for on-farm trials and fortified whole maize flour for home-testing.

More than 890,000 small packs of improved seed varieties were distributed, achieving 97% of the target, while more than 600,000 small packs of lime were delivered, meeting nearly half (47%) of the target. Additionally, more than 110,000 packs of fortified maize flour reached households.

Overall, these combined efforts – including the distribution of small seed packs, lime, and fortified flour – reached more than 740,000 beneficiaries, where more than half (55%) were women and 20% youth (Table 24).

Introducing Iyacu fortified maize flour to the market: The road behind and ahead

Milindi Sibomana, Chief Agriculture Officer and Moses Ndayisenga, Market Access Senior Associate, One Acre Fund, Rwanda

Rationale, model and scale

Iyacu fortified whole maize flour was introduced as a new product in the general market, starting with rural areas with high prevalence of malnutrition. The goal was to combat malnutrition by introducing a modified nutritionally dense alternative to a highly consumed staple product – maize flour.

Initially, commission-based sales were delivered directly to shops. This then evolved into wholesale trading where shop-owners from different administrative cells purchase the product from a central distribution trader in their district.

We started with sales in six districts and have now scaled to 15 districts. The target is sales in 17 districts by 2026, and ultimately countrywide. Thus far, approximately 650 tons have been consumed.

Our sales strategy evolved from exclusively offering the product in rural communities to also integrating urban marketing and sales locations. We conducted multi-channel behavior-change campaigns to introduce a new food product in sales target communities. The campaign channels were print, in-person and radio.

Over time, we also incorporated human-centered design (HCD) principles into our marketing campaigns. HCD takes into consideration client perceptions in developing our marketing strategies.

Successes

The product was approved by the Rwanda Food and Drugs Authority, and also received the S-Mark. We will pursue more international registrations (e.g. ISO 22000) when we target exports. Currently, 337 partner shops sell Iyacu across 12 districts, including Kigali. We have established processing controls for a four-month shelf-life.

Based on the Iyacu project experience, whole maize flour has been onboarded to school feeding programs.

Our brand is continually evolving, and growing.

We started by producing only wholegrain fortified maize flour. Now, we are in the process of registering a refined fortified maize flour, with plans to release an additional five fortified blended food products into the market over the next four years.



Fortified whole maize flour



Challenges

Our product is not without its challenges.

A shelf-life below six months is not the most ideal, given that the product has to pass through supply stages and get to the consumer with adequate time for storage and consumption at home.

This is further exacerbated by shopkeepers' desire to sell smaller portions in response to customer needs. For example, portions scooped from an open 25-kilo bag at the shop.

This desire wasn't met due to a concern on maintaining the integrity of quality once the bag was opened by the shopkeeper. We were also uncertain of adherence to safety protocols when handling the product once the bag was opened at the shop.

Also, the rural-client desire for smaller pack sizes would increase the product price due to higher packaging costs. Even with matters as they now are, the last-mile delivery at each shop led to a higher cost of distribution, which affects pricing and profitability.

Consumers are reluctant to leave refined maize flour despite its lower micro-nutrient composition. There is a perception that whole flours are for poor families and should be cheap, which further complicates market penetration.

On the production side, we have a bottleneck.

Currently, only two millers have the capacity to produce fortified maize meal. This maize meal requires specialized milling, and cannot be done anywhere.

Lessons learned

- Comprehensive behavior-change campaigns including talk shows and community-based campaigns using influential members of the community (such as urban communities) is key to informing the population on how to make nutrient-based choices on dietary decisions.
- Rural-client perception on the quality of the product is significantly influenced by price point as well as whether the same product is offered in urban shops too, i.e., if the product is not offered in urban shops, the rural clients believe it cannot be a high-quality product.
- The circular-economy approach has pros and cons: fidelity in the product by local maize suppliers vs perception of rural food for the poor and vulnerable. It is important to uphold the dignity and sense of agency of rural and vulnerable communities while also being practical and pragmatic.

Table 24: Distribution of small packs of technologies by innovation and type of farmer in Rwanda.

	Packs			Beneficiary farmers		
	Target	Distributed	% achieved	Total	Women	15–29 years
Seeds						
Maize	227,419	204,950	90%	131,594	58%	6%
Beans	228,046	233,578	102%	146,959	64%	13%
Potatoes	25,719	24,004	93%	20,453	46%	11%
OFSP	84,036	70,167	83%	53,031	69%	20%
Vegetables	363,522	363,606	100%	250,657	45%	14%
Total 1	928,742	896,305	97%	602,694	55%	13%
Other inputs						
Lime	127,873	60,500	47%	39,275	58%	10%
Total 2	127,873	60,500	47%	39,275	58%	10%
Processed products						
Fortified whole maize flour	87,434	114,674	131%	107,140	57%	64%
Total 3	87,434	114,674	131%	107,140	57%	64%
Grand total	1,144,049	1,071,479	94%	749,109	55%	20%

The objective of the approach was to help seed companies gradually integrate the lessons learned during project implementation into their marketing strategies, thus ensuring impact continues – and is amplified – beyond the project's duration. In this way, most seed companies and whole maize flour distributors can afford to distribute more small seed packs and flour tester-packs to as many farmers and consumers as possible at marginal cost, generating more demand and thus boosting their sales.

For farmers and consumers, the benefit of this approach is that it allows them to test new technologies and products at home, witnessing their potential firsthand and thereby instilling confidence in the products. This encourages them to buy more seeds and other products after directly witnessing their superior product performance.

Partnerships established with other key players along the value chain – such as agro-dealers, retail shops, and wholesalers – will continue contributing to addressing challenges related to access to technologies and products, including through bundling.

4.3.1.3. Capacity development through training, demonstrations, and outreach

The project was designed to enable research organizations – including ABC, CIP, IITA, WorldVeg, and RAB – to build the capacity of scaling partners by providing necessary technical support, thereby enhancing efficiency in delivery.

These research organizations conducted training on good agricultural practices and nutrition for field staff from scaling partners and national extension services. The expectation is that these staff would, in turn, train other key players, such as farmer promoters, through cascade-training events.

More than 68,000 individuals were trained, of whom 62% were women and 11% youth. These figures account for 119% of the annual training target (Table 25).

Of those trained, more than 28,000 attended training of trainers (ToT) sessions, comprising 58% women and 6% youth. Additionally, 39,885 participants were farmers, comprising 64% women and 14% youth.

Table 25: Training, by type and trainees in Rwanda.

Type	Trainees	Target	Actual	% Achievement	Women	15–29 yrs
Training of trainers (ToT)	Lead farmers/lead breeders	14,813	23,101	156%	58%	6%
	Government	2,073	5,182	250%	61%	8%
	Private sector	612	205	33%	52%	28%
	Civil society	133	98	74%	42%	8%
	<i>Total participants trained in ToT</i>	<i>17,631</i>	<i>28,586</i>	<i>162%</i>	<i>58%</i>	<i>6%</i>
Training of farmers	Smallholders	40,000	39,885	100%	64%	14%
Total trainees		57,631	68,471	119%	62%	11%

Stakeholder feedback indicated that the collaboration between innovation developers and scaling partners was highly effective, responsive, and technically enriching for seed companies and implementation actors. Testimonies from private-sector partners reported strong institutional support, timely troubleshooting, and valuable technical backstopping throughout the project implementation period.

For instance, the Managing Director of Bold Seeds Ltd said that a RAB maize breeder provided hands-on technical support at her seed production site on three separate occasions, at critical stages of crop development during the previous production season.

This expert guidance significantly contributed to improved seed-production outcomes and enhanced the quality of hybrid maize seeds.



**Private-sector
partners reported
strong institutional
support**



Strengthening Rwanda's hybrid maize seed systems through capacity building and knowledge exchange

Rwanda's agricultural transformation agenda continues to prioritize the development of strong local seed systems to enhance food security and farmers' livelihoods. While the hybrid maize seed industry in the country is still at an early stage, it holds significant potential to boost productivity and incomes among smallholder farmers.

To realize this potential, IITA, in collaboration with RAB and the National Seed Consortium, organized a series of capacity-building initiatives in Nigeria, where IITA has its headquarters, to enhance the technical expertise of Rwandan seed sector stakeholders.

The first training targeted six production managers from different Rwandan seed companies for an immersive, hands-on learning experience from 24th February to 9th March 2025. Hosted by IITA maize breeders, the participants got some insights into hybrid maize seed production, parent line maintenance, stress tolerance evaluation, pest management, and practical breeding techniques such as controlled pollination.

Participants also gained exposure to large-scale commercial seed production systems at Premier Seed and Value Seeds Ltd in Kaduna State, where they learned about innovation in breeding programs, market-driven production, and the role of partnerships in strengthening the seed industry.

The seed companies that were represented in the training include Agro Processing Industries Ltd, Kilimo General Business Ltd, Top Quality Seed Production, Rwanda Improved Seed Company, Seeds of Trust, and IABM Cooperative (*Iterambere Ry' Abahinzi Borozi ba Makera* [Development of Makera farmers]).

The second training was in August 2025 and brought together eight RAB field technicians and two senior officers, who were exposed to advanced practices in hybrid maize seed development and the maintenance of parent lines. The training was conducted at IITA's headquarters in Ibadan, as well as at IITA's Ikenne and Abuja stations. It covered key aspects such as different types of isolation techniques, rogueing, detasseling, harvesting, seed processing, and storage. Participants also visited the National Agricultural Seed Council (NASC) and leading Nigerian seed companies such as Premier Seed and Value Seeds Ltd, where they learned about seed certification, quality assurance, and regulatory frameworks. These experiences highlighted the importance of maintaining genetic purity, using standard operating procedures, and fostering collaboration among research institutions, seed companies, and regulatory bodies.

"The training in Ibadan, Nigeria, was a significant moment of knowing and seeing in practice advances that will help improve the maize hybrid seed value chain in Rwanda," said Dr Claver Ngaboyisonga, Cereal Program Coordinator at RAB. "The advanced molecular laboratory at IITA can be used to build skills in our maize molecular breeding. Also, molecular tools can be used to check seed purity and maintain maize hybrid varieties, as seen at NASC. The strong partnership between private seed companies such as Premier Seed Ltd and public research organizations, can be key in improving the seed value chain in Rwanda. The seed codex can solve several problems in Rwanda's seed sector. More importantly, IITA-specific germplasm, such as fall armyworm-tolerant and pro-Vitamin A maize germplasm, can be introgressed locally for well-adapted maize varieties," he added.

Trainees expressed their commitment to applying the newly acquired knowledge and skills to improve hybrid maize seed production in Rwanda. They emphasized the importance of collaboration with institutions like IITA, RAB, and Rwanda Institute for Conservation Agriculture (RICA) to enhance research, quality control, and innovation within the national seed system.

The Nigeria experience has equipped RAB and private seed companies with practical expertise and a renewed vision for transforming the hybrid maize seed sector in Rwanda.

This lays a firm foundation for increased productivity, resilience, and food security for Rwanda.

Collaboration also extended to the establishment and technical oversight of demonstration plots.

Research institutes and innovation developers played an active role in site supervision and agronomic guidance in selected locations, enabling seed companies to internalize and replicate the demonstration model independently in other geographical areas.

Furthermore, technical knowledge from these engagements was cascaded to frontline actors, including extension agents, farmer promoters, and smallholder farmers, thus broadening system-wide capacity and strengthening beyond the primary partners.

But while the collaboration model proved highly functional, stakeholders noted that its duration was insufficient to maximize long-term impact. Engagements were project-bound and time-limited, reducing

the opportunity for sustained mentorship, institutional learning, and deeper integration and immersion of innovations into commercial seed systems and extension services.

Demonstration plots are vital for technology transfer in agriculture, allowing the benefits and performance of new technologies to be showcased to farmers under the guidance of lead farmers or extension agents.

In this context, technology developers and seed companies collaborated to establish these demonstration plots, working together on site selection, planting, and maintenance.

To promote knowledge-sharing, usage, and adoption of new technologies, the project supported scaling organizations and input suppliers in setting up 4,091 mother demonstration plots, reaching more than 100% of the target (Table 26).

Table 26: Demonstration plots – Target vs achievement in Rwanda.

Commodity	Demonstration plots		
	Target	Actual	Achievement
Maize	172	328	191%
Beans	102	127	125%
OFSP	61	63	103%
Potatoes	31	49	158%
Vegetables	3,557	3,467	97%
Lime	35	57	163%
Total	3,958	4,091	103%

In addition to demonstration plots, various scaling events were organized to reach more farmers with advisory services, mainly through field days, sensitization events, and

agri-shows. More than 800,000 farmers participated in these scaling events, representing 130% of the annual target (Table 27).

Table 27: Scaling events by type and participants in Rwanda.

	Participants			Women	15–29 yrs
	Target	Actual	% Achievement		
Field days	9,125	12,334	135%	51%	12%
Sensitization events	344,631	727,448	211%	54%	19%
Agri-shows	3,777	2,993	79%	32%	18%
Interactive voice response messages	250,000	58,537	23%	32%	14%
Total	607,533	801,312	132%	52%	19%

A series of community outreach campaigns, including 11 roadshows (attended by 69,880 farmers) featuring skits by well-known local actors, were also organized across six districts – Rusizi, Karongi, Rutsiro, Musanze, Ngororero, and Rubavu – to raise awareness among farmers on the benefits of using improved agricultural technologies. These events highlighted the importance of these technologies in boosting crop yields and enhancing resilience to environmental changes.

The outreach campaigns helped foster connections between farmers and seed companies, providing farmers with access to high-quality agricultural inputs. Farmers were introduced to various seed varieties tailored to their specific agroecological conditions, and provided with information on how to purchase them.

These outreach campaigns captured the attention of not only farmers but also seed companies and agriculture officers, all working to promote new technologies and ensure their accessibility. These events also provided an opportunity for 1AF to highlight the benefits of fortified whole maize flour, showcasing the value of collaboration among different partners. The involvement of well-known theater actors added an engaging element of 'stickability' to the campaigns, helping to attract, retain, captivate and educate the audience.

4.3.1.4. Strengthening the seed systems

In Rwanda, AID-I GLR supported RAB and seed companies in increasing the production of quality seeds, and in bringing their products and technologies closer to farmers by strengthening partnerships between seed companies and agro-dealers. This enhanced and diversified the products in agro-dealer shops – especially bean seeds, which are not subsidized – thus, enhancing farmers' awareness and access to the new varieties.

As a key technology developer in this initiative, RAB, collaborating with CGIAR centers (ABC, CIP, and IITA), is responsible for producing EGS, which seed companies use to produce certified seeds.

RAB supplied over 95 metric tons (mt) of EGS for beans, OFSP, and potatoes (Table 28).

In total, seed companies produced more than 11,000 mt of certified seed for beans, maize, OFSP, and potatoes through RAB and CGIAR support (innovation developers).

This collaboration between technology developers and seed companies ensures that farmers' demand is met, especially when they are satisfied with the performance of new technologies.

Table 28: Production of early-generation and certified seeds (mt) in Rwanda.

	Crop	Total qty produced (mt)
EGS	Beans	32.7
	OFSP	43
	Potatoes	19.5
	Total 1	95.2
Certified	Maize	3,661.6
	Beans	428.8
	OFSP	2,414.7
	Potatoes	4,981.7
	Total 2	11,486.8
Grand total		11,582

To further enhance this work, the project mapped agro-dealers in 13 districts to select those to be linked to seed companies in a commercial partnership. Selected agro-dealers were trained to enhance their technical knowledge of the promoted innovations and business-management skills.

Seed companies seeking to expand their businesses through agro-dealers were also supported in developing, testing, and scaling promotional materials for display in agro-dealer shops.

Seed companies received tailored support to ensure that smallholder farmers had greater access to the improved technologies introduced in previous seasons.

Twelve seed companies sold more than 16,284 mt of agricultural inputs, including about 3,000 mt of maize, 349 mt of beans, more than 6,140 mt of potatoes, and 547 mt of OFSP seed vines, along with 6,130 mt of lime (Table 39 in Annexes).

These efforts resulted in a total revenue of 8,116,184 United States dollars (USD) for input suppliers during the project's duration.

4.3.2. Outcomes

As highlighted in the theory of change, the monitoring, evaluation, learning and impact assessment (MELIA) systems were designed to provide data and insights on key outcome indicators related to the use and adoption of promoted innovations, agricultural productivity, and the consumption of nutritious food at household level.

4.3.2.1. Increased number of individuals who applied improved management practices and technologies

The application of the technologies and practices introduced through the project in Rwanda was exceptionally high, with the overall application rate exceeding 90%. Maize posted 92%, while beans and potatoes had an impressive 96%, and OFSP stood at 93% (Figure 23).

Additionally, it is important to note that all technologies and practices promoted in Rwanda were fully applied.

This complete application demonstrates the project's relevance and success in engaging farmers, providing adequate training and support, and ensuring that the technologies are both accessible and applicable across different agroecologies and distributed geographies.

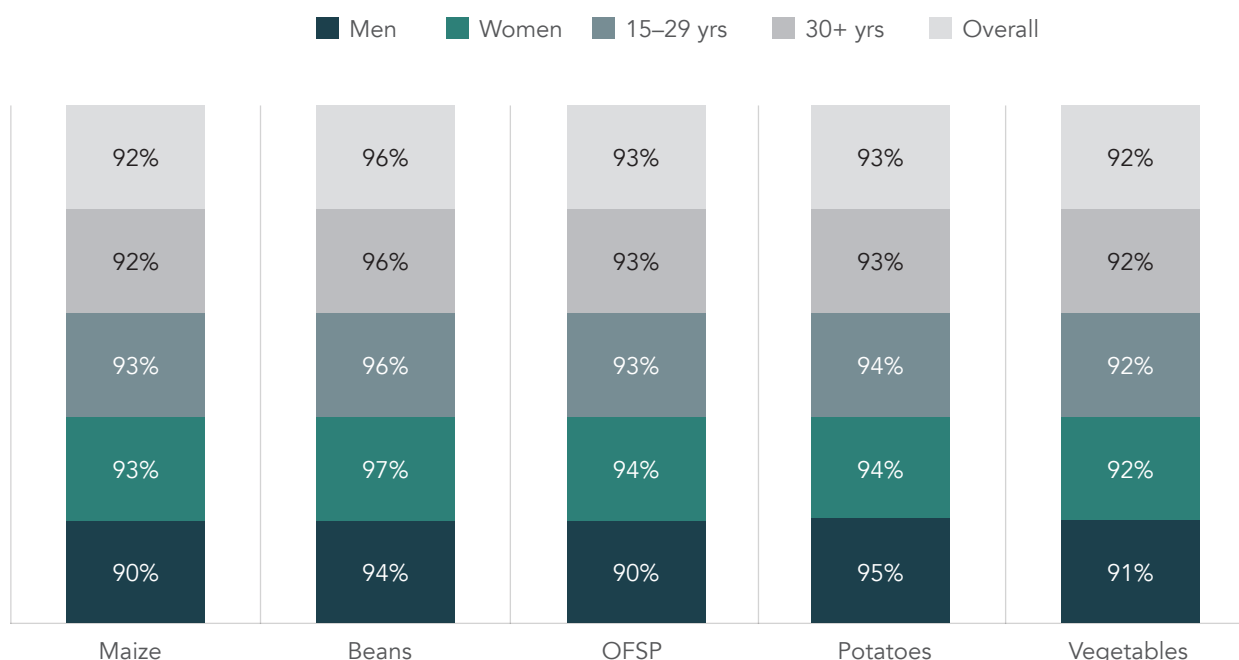


Figure 23: Application rate for seasons A and B 2024 (range: 91–96% across all crops and populations) in Rwanda.

4.3.2.2. Improved farmers' knowledge of recommended practices

The survey conducted after the third agricultural season (2024B) revealed a significant improvement in farmers' knowledge of recommended agricultural practices, with the proportion of well-informed farmers rising from just 4% in the previous year to more than 95% in 2024 across various value chains (Figure 24).

This remarkable progress can be attributed to the consistent use of various advisory

services and delivery channels, which effectively enhanced farmers' access to vital information and supported the high application of best practice.

As revealed by the telephone survey results, the channels that farmers in Rwanda most prefer for knowledge transfer are input distribution events, favored by 50% of the survey respondents, followed by a tie between field days (23%) and training (23%) (Table 33 in Annexes).

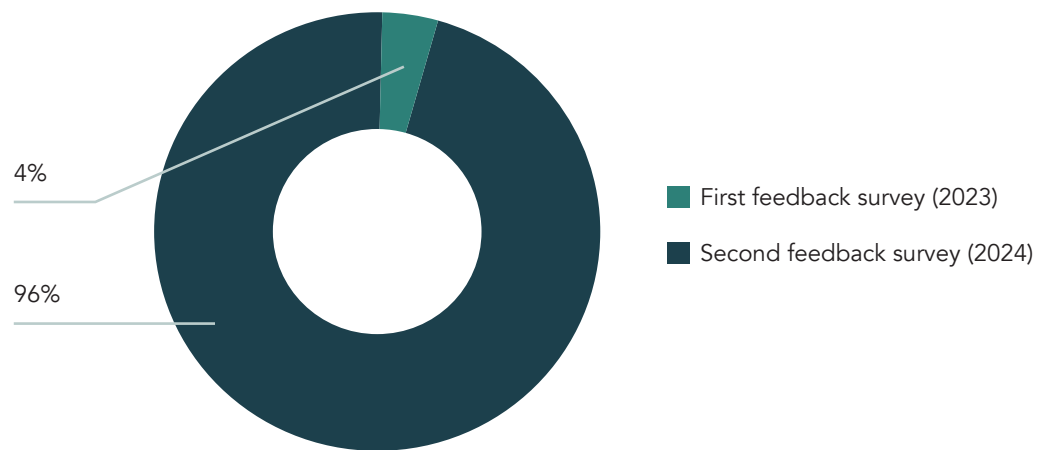


Figure 24: Respondents with correct knowledge of recommended practices in Rwanda.

This trend underscores the effectiveness of the engagement strategies employed to reach farming communities, including demonstration plots, field days, community outreach events, roadshows, and digital communication channels such as interactive voice response (IVR) messaging. These approaches not only increased awareness but also translated into measurable behavioral change, as reflected in the growing willingness to adopt new agricultural technologies.

A notable shift was observed in protected cultivation, where farmer participation and technology uptake continue to rise. Similarly, demand for grafted seedlings has expanded significantly, driven by sustained

capacity-building efforts led by WorldVeg, RAB, and Holland Greentech (HGT) (Box 11).

Along the potato value chain, targeted exposure visits and training on seed production catalyzed a strategic transition among farmers in the Eastern and Western Provinces. Equipped with new technical knowledge and access to improved seed varieties, a segment of producers successfully transitioned from ware potato production (i.e., potatoes for human consumption) to seed potato multiplication.

This signaled increased commercialization, market responsiveness, and an upgrade in farmer roles within the value chain.

Box 11: Grafted tomato success reviving protected cultivation, maximizing return on investment

Dr. Fekadu Dinssa, Scientist – Seed Systems Specialist, WorldVeg

Rwanda has invested significantly in infrastructure for protected vegetable cultivation, with greenhouses established across locations in the country to enhance productivity and quality.

*However, tomato farmers – the primary users of these structures – have long battled a silent enemy: bacterial wilt (*Ralstonia solanacearum*), a persistent soil-borne disease that causes healthy plants to collapse literally overnight, leading to crippling yield losses and income decline.*

As a result, many greenhouse owners shifted from high-value crops like tomato to less-profitable (but also low-risk) options such as cabbage, and occasionally French beans, leaving much of the greenhouse potential underutilized, meaning dead capital despite the considerable investment. RAB faced an urgent challenge: how to restore productivity and confidence among growers affected by this crop disease.

The turning point came through a three-way partnership: RAB, WorldVeg and HGT, under the AID-I GLR Project.

In the absence of commercially available tomato varieties tolerant to bacterial wilt and other soil-borne pathogens, grafting has emerged as an essential management strategy, particularly in protected-cultivation systems.

The three partners aimed not merely to control bacterial wilt, but to revitalize the productivity of the greenhouse through a safer management practice and innovative solution called tomato grafting.

Grafting is a chemical-free intervention and an environment-friendly method for controlling soil-borne diseases and abiotic stresses. It is the grafting of soil-borne disease-susceptible commercial variety as a scion on a soil-borne disease-resistant rootstock line that is not suitable for commercial production on its own, but provides robust resistance and supports the commercially important scion variety.

At RAB's Horticulture Centre of Excellence in Mulindi, WorldVeg experts not only trained RAB staff in the art of grafting but also brought seeds of three bacterial wilt-resistant rootstock lines. An additional commercial rootstock line was brought by HGT. RAB also provided one local rootstock accession.

The first tomato grafting exercise in Rwanda, therefore, was initiated in 2023 under the AID-I GLR Project, using these disease-resistant rootstock lines.

By combining these robust rootstock lines with a popular but bacterial wilt-susceptible tomato variety from HGT, the team produced quite a number of resilient 'grafted seedlings' that robustly withstand the pathogen.





Tomato grafting and protected cultivation

Dr. Fekadu Dinssa, Scientist – Seed Systems Specialist, WorldVeg

The grafting exercise (Box 11) was preceded by both theoretical and practical training for farmers, extension officers and agronomists.

Demonstration plots were established in greenhouses known to be heavily infested with wilt disease.

The results were compelling: while traditional, ungrafted tomato plants wilted and died, the grafted plants remained vigorous, lush, green, and laden with fruit.

These participatory, see-for-yourself, side-by-side comparisons delivered a powerful message that words alone could not convey.

To showcase this breakthrough, RAB, WorldVeg, and HGT organized farmer field days, transforming the demonstration plots into open-air classrooms. Farmers observed the difference firsthand, examined the healthy grafted plants, and learned how to apply grafting techniques in their own greenhouses.

Encouraging outcomes have followed, with farmers enjoying the tangible benefits of grafted tomato technology. There is now growing optimism among greenhouse growers, as shown in Box 11.

TESTIMONIAL

Box 12: Voices from the field on vegetable-growing

Dr. Fekadu Dinssa, Scientist – Seed Systems Specialist, WorldVeg

Mr Eric Janvier Niyoniringiye, of Rwamagana District, Muyumbu Sector, Murehe cell, is a vegetable farmer with about 10 years' experience. He farms potatoes along with vegetables such as cabbage, and staple crops. With his keen interest in vegetable farming, he received a grant of two greenhouse units where he started indoor cultivation of tomatoes, sweet peppers and cucumbers.

Through the AID-I GLR Project, he was trained in tomato grafting for the management of wilt diseases at Kigali-Gahanga by HGT. Thereafter, he was then selected as one of the host farmers of grafted tomato demonstration plots in Rwamagana, a district with many greenhouses.

In the demonstration plots, he found that grafted tomato plots were free of wilt diseases while at least 30% of the plants in the ungrafted tomato plots were damaged by wilt diseases. Also, yield and yield components (e.g., fruits per plant, weight of fruits, and plant vigor) were much higher in the grafted plants. In stark contrast, most of the fruits harvested from the ungrafted demonstration plots were unmarketable.

"Previously, my experience with tomato cultivation had not been good because 10% of my plants wilted in the first season planting," said Mr Niyoniringiye. "This forced me to grow cucumbers in the second season for crop rotation. In the third season, I again planted tomatoes hoping that the rotation would work. But it was quite the opposite: the damage was worse than the first season! My neighbor who too has a greenhouse suffered 100% loss. These terrible experiences made it impossible to grow greenhouse tomatoes in our region."

Farmers who hosted grafted tomato demonstration plots and those who attended scaling events such as field

days valued the technology. They hope it will help them stay competitive in the tomato market, where many growers have abandoned greenhouse production.

However, farmers note that grafting remains challenging for individual growers, both in terms of cost and technical skills.

Farmers said they wish to see grafted tomato seedlings in an accessible market and at a reasonable price. Will this dream come true? It may require the private sector and seed companies to consider raising and selling seedlings – including grafted seedlings – and not just seeds. Experiences from other countries indicate that farmers prefer purchasing seedlings rather than risking poor germination of expensive hybrid varieties caused by inadequate seedbed management.

From despair to "I want more!"

Solid'Africa, a non-governmental organization (NGO) operating in Rwanda, was among the first to adopt the grafted tomato innovation, ordering 1,800 grafted seedlings in early 2025.

After witnessing the seedlings' exceptional performance, the NGO placed an order for 1,500 more grafted seedlings. RAB's Center of Excellence has since evolved from a training ground into a trusted nursery of innovation and hope.

What began as a small pilot has now grown into a sustainable production center. Rwanda's greenhouse farmers are no longer asking, "What is killing my plants?" but rather, "Where can I get more grafted seedlings?"

Through the partnership, science, and local expertise, RAB, WorldVeg and HGT and their collaborators have transformed wilted fields into a harvest of resilience and opportunity.

4.3.2.3. Increased land under improved management practices/technologies

Signs of early adoption by farmers emerged early on.

By the 2024B season, nearly three-quarters (70%+) of participating farmers reported an increase in the land area cultivated with the promoted technologies and practices – a trend which continued into subsequent seasons.

This evidence is also corroborated by comparing the average acreage for the different crops promoted by the project, which, in all cases except OFSP (Box 11), outstripped the average area where small packs were promoted.

This demonstrates adoption, as farmers have now applied the technologies promoted beyond small-pack areas.

It was particularly significant for potatoes, where land under cultivation increased ten-fold from 40m² to 442m² (Figure 25).

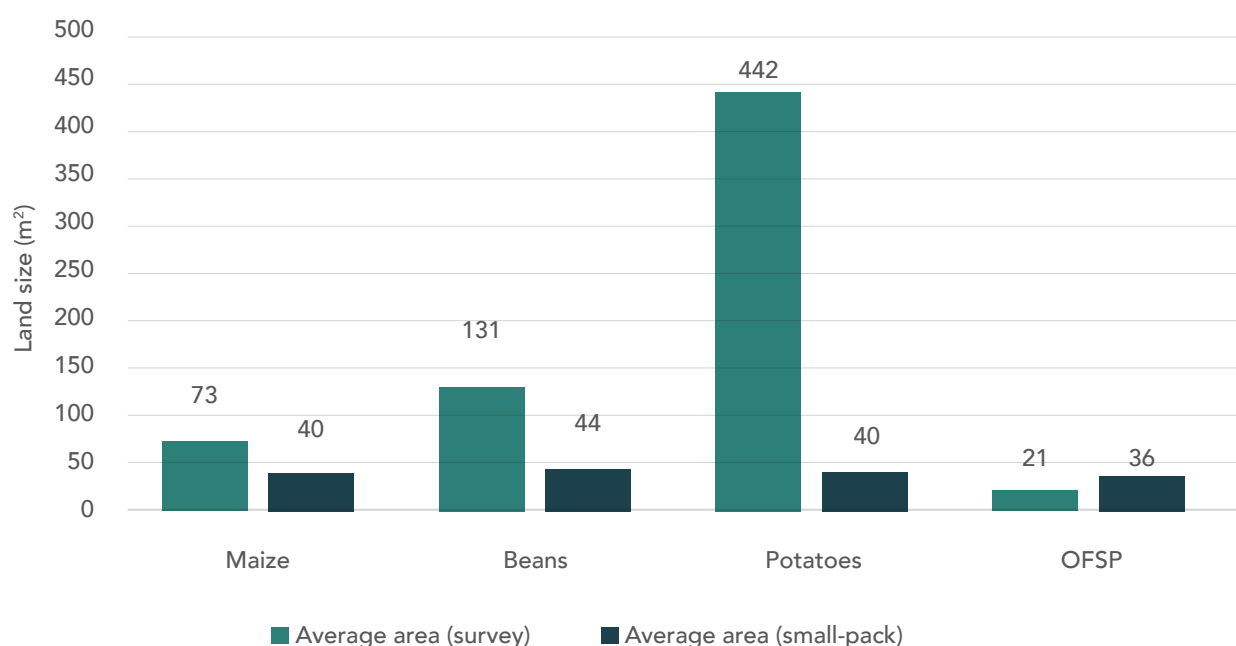


Figure 25: Comparison between projected (from small-pack distribution) and actual land under improved practices in Rwanda.

The strategic distribution of small packs enabled farmers to adopt a 'test-before-investing' approach, significantly reducing the perceived risks associated with new technologies, and accelerating uptake.

Complementing this, field days and community showcase events hosted at demonstration sites created dynamic learning platforms that encouraged peer-to-peer knowledge exchange, practical observation, and collective problem-solving.

The tangible productivity gains documented at these sites – frequently reflecting crop yield increases of up to

twofold for some crops including for maize, OFSP, and Irish potatoes – were powerful proof of the effectiveness of the promoted technologies.

These visible results strengthened farmer confidence, generated local demand traction, and stimulated organic diffusion of improved practices as early adopters influenced neighboring households.

Collectively, this demonstration-driven model played a critical role in deepening community trust, stimulating behavioral change, and driving large-scale technology adoption across target areas.

Box 13: Highs and lows of OFSP: Spotlight on factors behind low adoption

Dr. Jean Ndirigwe, Senior Research Fellow, RAB

AID-I GLR was instrumental in promoting OFSP in Kayanza and Gakenke Districts to combat vitamin A deficiency, improve household nutrition, and enhance income opportunities.

Despite considerable success in pre-basic and basic OFSP seed multiplication, dissemination, and awareness creation through significant promotion efforts, several gender- and behavior-related factors continued to limit widespread OFSP adoption.

Initially, many men perceived OFSP as a 'women's or children's crop', leading to low male participation in production decisions, although men often controlled marketing and income from sales. This gender bias reduced household-level investment in OFSP production and limited its scaling potential. Therefore, understanding gender-based challenges and capturing lessons learned are essential for inclusive scaling and sustainable impact.

Behavioral preferences also influenced adoption rates. In some communities, the orange color of OFSP varieties was associated with a 'carrot-like' taste, making OFSP less preferred compared to traditional white or yellow varieties.

Additionally, limited awareness of OFSP's nutritional benefits and the need for dietary behavior-change slowed acceptance, particularly among households not exposed to nutrition education and the benefits of vitamin A from OFSP.

To address these challenges, more awareness on gender-sensitive training and vitamin A nutrition benefits, and joint household decision-making approaches are needed. Also paramount is focusing efforts on promoting taste-preferred, high-yielding OFSP varieties; emphasizing OFSP's nutritional value; cooking demonstrations; and behavior-change communication.

Farmers and consumers in Rwanda like sweet-tasting varieties with high dry-matter content or the white-fleshed types.

With this in mind, focus should be on promoting OFSP varieties whose sweetness matches Mugande and Wadada types (local varieties).

4.3.2.4. Demonstrated performance of innovations and practices in farmers' fields

Different complementary surveys also highlighted the project's impact on yield. The first survey (via telephone) indicated that, on average, more than half of the farmers reported increased yields. Further

analysis through outcome surveys to quantify this increase was conducted by comparing the yields from the baby demonstration plots with the baseline data.

The results indicated a yield increase exceeding 90% for all crops. For maize, the yields more than doubled.

Table 29: Comparison of 2024 yield (mt/ha) – baby demos vs baseline in Rwanda.

	Baseline	Yield	Percentage increase
Maize	1.55	6	287%
Beans	0.8	1.5	88%
OFSP	7	18	157%
Potatoes	8.6	21.5	150%
Vegetables	N/A	25	N/A

4.3.2.5. Enhanced availability and accessibility of improved technologies

The demand-creation approaches contributed to increasing market penetration for seed companies, and to the availability of new varieties and technologies.

As a result of the dissemination efforts in past seasons, seed companies expanded their operations by connecting with 61 new agro-dealers, helping them reach new areas, and significantly boosting their distribution networks.

A survey conducted in March 2025, conducted by AID-I GLR partner, AGRA, showed that on average, seed companies are now present in most districts, with one seed company nearly doubling its operating districts from seven to 11 districts. The companies also increased the number of seed-distribution agro-dealers in their network by 16%. This geographical and network expansion also led to an increase in the number of new varieties distributed by seed companies. By exposing farmers to packages of innovations, seed companies recorded a 53% increase in the number of new seed varieties in farmers' hands.

Regarding the fortified maize flour, the product was made available in six districts through 93 retail shops, ensuring last-mile access for rural households with more than 25,000 individuals benefiting from the distribution. Nearly half (approximately 49.5%) of the contracted retail shops were operated by women or youth, demonstrating strong inclusion of these groups in project implementation. The uptake of whole maize flour and awareness in rural communities also improved significantly through multi-channel communication efforts, including radio broadcasts, printed materials, and direct community outreach.

Despite this notable progress, much remains to be done to enhance and sustain the robustness and reach of the distribution networks, and to make products available at the last mile. For example, the offtake market would be a key component in the sustainability of the technologies and innovation uptake. Moreover, there are still challenges associated with the cost of transporting seeds, particularly seed potatoes that are bulky by nature.

The results indicated a yield increase exceeding **90%** for all crops



For maize, the yields nearly quadrupled



4.4 Assessment of the theory of change in Rwanda

A theory of change (ToC) maps the cause-effect pathway from project activities and inputs to specific outputs, intermediate outcomes, and ultimately, the intended impact.

For AID-I GLR, its ToC suggests that (a) coordinated partnerships between technology developers, scaling partners and market actors, combined with (b) targeted exposure (demonstrations, small-pack trials, outreach) and (c) capacity development (ToT, extension support), will (d) increase farmer appreciation and demand for improved technologies, and (e) that strengthened input-supply systems will be able to respond, leading to (f) higher adoption, improved yields and nutrition outcomes.

As shown in Table 30, to track this pathway, the project uses the 3F2R framework (farmer exposure → farmer appreciation → farmer demand; system readiness and system response).

Results are as follows:

- **Exposure:** The project delivered very high exposure to innovations through a mix of small-packs, demonstration plots and events. Key figures: ~1,071,400 small packs distributed (94% of target), >4,090 mother demonstration plots (103% of target), and >800,000 participants in field days and scaling events (132% of target). These interventions reached ~749,000 beneficiaries (55% women).
- **Appreciation and demand:** Post-exposure monitoring and surveys indicated a rapid and high level of appreciation. Farmers reported yield increases exceeding 90% for all crops, and application rates across value chains were very high (range ~92–96%). Reported farmer demand and area

under improved management also increased (e.g., potato area expanded substantially). Where farmers saw demonstrable gains, demand for inputs (e.g., grafted seedlings, seed potatoes) increased.

- **System readiness and response:** While the supply side responded, the quantity of EGS was insufficient to meet demand. There is a need to improve the planning between seed companies and RAB to ensure a consistent supply of the required quantity: RAB produced ~95.2 mt of EGS and seed companies produced >11,480 mt of certified seed across targeted crops; 10 seed companies sold >16,284 mt of inputs, generating ~USD 8.1 million in revenue. Seed companies expanded their networks (61 new agro-dealers, reflecting a growth of ~16% in dealer networks), indicating commercial uptake of the small-pack model.
- **Impact signals:** Yield comparisons between baby demonstrations and baselines show very large percentage increases (e.g., maize +222%, potatoes +168%, beans +97%, OFSP +147%), which corroborated the finding that promoted practices and varieties perform well under real-life farm conditions (Table 29 in Annexes).

The ToC proved valid and operationally effective: the project successfully triggered the exposure → appreciation → demand → response chain and delivered strong early productivity gains.

For durable impact, the ToC should explicitly incorporate extended implementation time, reinforced coordination modalities, and targeted investments to address last-mile and financing constraints.

Table 30: Assessing the theory of change using 3F2R framework in Rwanda.

ToC 3F2R element	Assessment	Evidence summary	Justification
Farmer exposure	Strongly achieved	1,071,400 small packs distributed; 4,090 demo plots; 800,000+ participants in events	Multi-channel exposure exceeded target and reached >749,000 farmers, establishing awareness at scale.
Farmer appreciation	Strongly achieved	Knowledge increased from 4% to 95%; application rates 92–96%. Yield comparisons between baby demos and baseline show very large percentage increases (e.g., maize +287%, potatoes +150%, beans +88%, OFSP +157%)	Farmers demonstrated technical understanding and willingness to apply recommended practices.
Farmer demand	Achieved	Increased demand for grafted seedlings, seed potato, protected cultivation	Observed market pull for improved inputs and farmer-initiated replication of demo practices.
System readiness	Partially achieved	95.2 mt EGS produced; 11,480 mt certified seed; 61 new agro-dealers onboarded	Supply systems responded but logistics for bulky inputs and last-mile access remain inconsistent.
System response	Partially achieved	Seed sales generated USD 8.1m; sustained small-pack distribution by private sector	Private sector commercially adopted the model, showing system-level market response.

4.5 Challenges, lessons learned, and recommendations

Challenges

Internal

- The large number of institutions involved – each with a different work-culture and protocols – led to complex coordination and a degree of role ambiguity, particularly pronounced in the startup phase. Consequently, there were occasional inefficiencies in synchronizing activities.
- Teething problems from divergent messaging in year 1 resulted in confusion, which in turn slowed initial adoption.

External

- The USAID stop-work directive caused a major disruption.
- The short project duration hindered tracking long-term behavioral change, multi-season reinforcement, institutionalizing partnerships, and measuring sustained adoption at scale.
- Resource constraints limited the number of demonstration plots, extension events, and follow-up monitoring visits, thereby reducing geographic coverage and intensity of farmer engagement.

Lessons learned

- Strong partnerships among research developers, development partners, private actors (e.g., seed companies) and public institutions contribute significantly to accelerating the dissemination and adoption of agricultural technologies, thereby ensuring sustainability.
- But to get the best from these strong partnerships and to optimize their efficiency, upfront role codification and harmonizing communication are paramount, given the different organizational cultures and procedures that characterize partnerships.
- Approaches such as distribution of small seed packs, demonstration plots, farmer field days, advisory services, and different outreach campaigns proved effective in exposing more farmers to new technologies, thereby building trust and creating demand.
- Strengthening the capacity of seed companies and strong links with agro-dealers enhanced farmers' access to improved seeds and inputs, hence increased yields and productivity. It also created more business opportunities among the value-chain actors owing to gaining new customers and expanding into new areas and products.
- Input bundling is more than marketing; it is a systems solution.
 - It addresses interlinked constraints that prevent smallholder farmers from achieving full productivity, and is a win-win for all involved.
 - Bundling ensures farmers receive complete solutions that unlock productivity.
 - Collaboration amongst marketers expands reach, while shared distribution channels help private-sector actors reach more farmers at lower costs.

Recommendations

- For durable impact, the project's ToC should explicitly incorporate extended implementation time, reinforced coordination modalities, and targeted investments to address last-mile and financing constraints.
- Data, training and monitoring all matter: tracking adoption and continuous farmer education ensure long-term results.
 - Training of extension agents facilitated proper transfer of know-how on technologies, good agricultural practices and nutrition to farmers, leading to high adoption rates.
 - Similarly, farmer training in appropriate technologies and effective demonstrations can lead to easy adoption. This was amply demonstrated in tomato grafting and protected cultivation for the control of bacterial wilt (*R. solanacearum*). However, farmers noted that grafting remains challenging for individual growers, in both cost and technical skills. Also challenging is the unavailability of grafted seedlings – an aspect not easily managed by every farmer. Despite these potential setbacks, participants of the training programs and demonstration plots were convinced of the technology and are eager to obtain grafted seedlings for protected tomato cultivation. This 'problem-solution-readiness' scenario demarcates an area for future efforts to close these gaps in planting materials and technical know-how.
- Consumer perceptions, preferences and intervening social factors are important considerations to take into account, as they influence adoption. This was evident for wholemeal maize flour.
- Similarly, understanding gender-based challenges and capturing lessons learned are essential for inclusive scaling and sustainable impact. OFSP presented an illustrative case in point (Box 11).

5

CHAPTER ANNEXES

5.4. Annexes Chapter 4 (Rwanda)

Table 56. Smallholder crop yield (mt) vs national baseline, disaggregated by age and gender in Rwanda.

	Baseline	Potential yield	Rwanda				
			Overall	Men	Women	15–29	30+
Maize	1.55	4–8	6.9	7	7.9	7	6.3
Beans	0.76	1–2.15	1.5	1.3	1.7	1.5	1.2
Potatoes	8.6	40–80	26.2	26.5	24.3	26	22.2
OFSP	6.97	9–14	14.6	12.6	15.4	13.2	13.7
Vegetables	N/A*	20–30	21	16	18.4	16.7	15.2

*Because AID-I GLR promoted several vegetables

Table 57: Companies producing seeds and processing lime in Rwanda.

Partners	Value chain	Interventions or technologies, and products deployed
- o Kilimo General Business - o Rumbuka Seeds - o Top Quality Seed Company - o Ignite Seeds Co Ltd	Maize	Accelerate the adoption and utilization of climate-resilient and high-yielding hybrid maize varieties in Rwanda
- o I&J Harvest - o Seeds of Trust - o Nzeyalex	Beans	Promoting rapid adoption and widespread use of nutrient-rich bean varieties through demonstration plots, partnerships with seed companies, and agro-dealers
o Holland GreenTech	Vegetables: tomatoes, eggplants, amaranth, cabbages, Swiss chards, carrot, beetroot, onions	- o Transfer technologies on vegetables to farmers to increase productivity, thereby contributing to better nutrition, food security, and improved livelihoods. - o Transfer technologies on protected cultivation - o Build capacity in the vegetable sector through training programs targeting farmers, extension officers, and seed-related personnel across different levels.
- o Ikijumba One Stop Center - o You&I Best Company - o Seed Potato Fund - o DERN Seed Company	Irish and sweet potatoes	Activating smallholder demand for: - o seed of newly released potato and OFSP varieties - o productivity-enhancing technologies
- o Mashyuza Processing Company - o Musanze Lime Company	Maize, beans, Irish potatoes (lime application)	Promoting liming for acidic soils to improve soil fertility and crop productivity

Table 58: Distribution of small packs of technologies in Rwanda

Packs of technologies distributed	Target	Actual	% progress	Farmers reached by small packs				Total
				Women	Men	15-29	30+	
Seeds								
Maize	227,419	204,950	90%	76,756	54,838	23,292	108,302	131,594
Beans	228,046	233,578	102%	94,295	52,664	18,763	128,196	146,959
Potatoes	25,719	24,004	93%	9,377	11,076	2,339	18,114	20,453
OFSP	84,036	70,167	83%	36,411	16,620	10,767	42,264	53,031
Vegetables	363,522	363,606	100%	112,816	137,841	35,817	214,840	250,657
Total 1	928,742	896,305	97%	329,655	273,039	90,978	511,716	602,694
Other inputs								
Lime	127,873	60,500	47%	22,825	16,450	4,089	35,186	39,275
Total 2	127,873	60,500	47%	22,825	16,450	4,089	35,186	39,275
Processed products								
Fortified whole maize flour	87,434	114,674	131%	60,790	46,350	69,088	38,052	107,140
Total 3	87,434	114,674	131%	60,790	46,350	69,088	38,052	107,140
Grand total	1,144,049	1,071,479	94%	413,270	335,839	164,155	584,954	749,109

Table 59: EGS and certified seed produced in Rwanda

EGS	2023	2024	2025	Total
Beans	16.8	15.9	0	32.7
OFSP	0	43	0	43
Potatoes	0	19.5	0	19.5
Total	16.8	78.4	0	95.2
Certified	2023	2024	2025	Total
Beans	0	62.8	366	428.8
Maize	0	1,739.3	1,922.3	3,661.6
OFSP	0	1,674.8	7,39.9	2,414.7
Potatoes	0	2,809	2,172.7	4,981.7
Total	0	6,285.9	5,200.9	11,486.8

Table 60: Area under improved practices or technologies in Rwanda.

Performance indicator/disaggregation		Target	Actual	% achieved	2023		2024	
					Target	Actual	Target	Actual
Gender	Men	4,650	1,750	38%	1,966	654	2,685	1,096
	Women	1,993	1,969	99%	842	1,209	1,151	760
Age	15–29	1,329	792	60%	562	563	767	229
	30+	5,315	2,928	55%	2,246	1,300	3,068	1,628
Management practice or technology type	Crop genetics	6,644	3,678	55%	2,808	1,822	3,836	1,856
	Cultural practices	6,644	3,594	54%	2,808	1,836	3,836	1,758
	Pest and disease management	2,869	852	30%	312	34	2,557	818
	Soil-related fertility and conservation	4,429	3,077	69%	1,872	1,721	2,557	1,356
	Irrigation	1,107	742	67%	468	212	639	530
Commodity	Maize	3,251	1,915	59%	2,736	1,377	515	538
	OFSP	524	222	42%	97	100	427	122
	Potatoes	108	223	206%	54	24	54	199
	Beans	1,322	992	75%	540	360	782	632
	Vegetables	568	367	65%	9	2	559	365

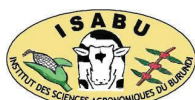
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