CGIAR project on

Accelerated Varietal Improvement and Seed Systems in Africa

Annual Technical Report 2023

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CGIAR Technical Reporting 2023

CGIAR Technical Reporting has been developed in alignment with the CGIAR Technical Reporting Arrangement. This Science Group Project (SGP) report is a Type 1 report and constitutes part of the broader CGIAR Technical Report. Each Science Group Project submits an annual Type 1 report, which provides assurance on SGP progress towards End of Project outcomes.

The CGIAR Technical Report comprises:

- Type 1 Initiative, Impact Platform, and Science Group Project (SGP) reports, with quality assured results reported by Initiatives, Platforms and SGPs available on the CGIAR Results Dashboard.

- The Type 3 Portfolio Performance and Project Coordination Practice Change report, which focuses on internal practice change.

- The Portfolio Narrative, which draws on the Type 1 and Type 3 reports, and the CGIAR Results Dashboard, to provide a broader view on Portfolio coherence, including results, partnerships, country and regional engagement, and synergies among the Portfolio's constituent parts.

The CGIAR Annual Report is a comprehensive overview of CGIAR's collective achievements, impact and strategic outlook, which draws significantly from the Technical Report products above. For 2023, the Annual Report and Technical Report will be presented online as an integrated product.
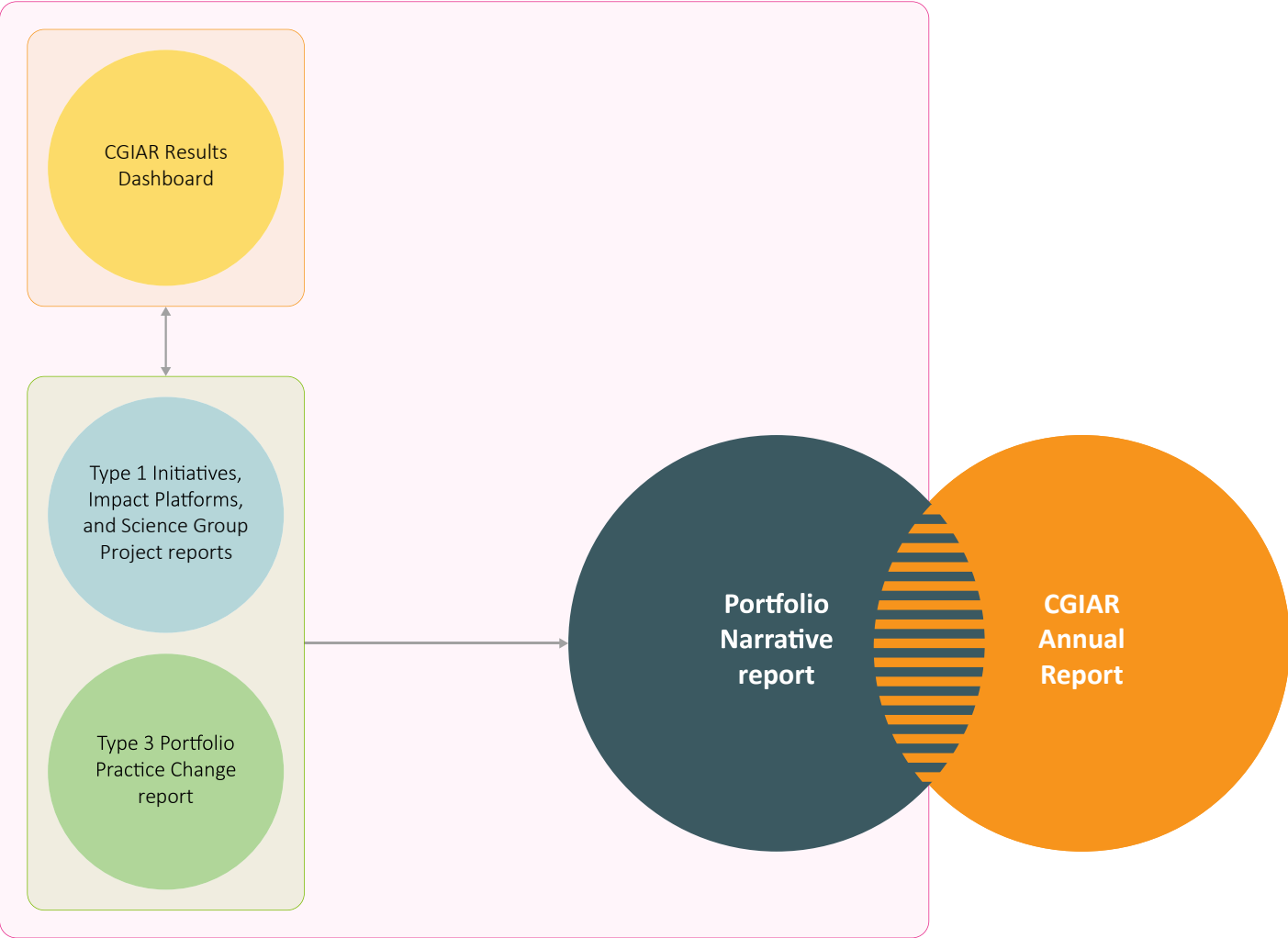
Section 1: **Fact sheet and budget**

Science Group Project name	Accelerated varietal improvement and seed delivery of legumes and dryland cereals in Africa
Short name	AVISA
Action area	Genetic Innovation
Science Group Project Lead	Harish Gandhi (harish.gandhi@cgiar.org)
Science Group Project Co-lead	Tamerlane Mark Nas (t.nas@cgiar.org)
Science Group	Genetic Innovation
Start – end date	1 May 2023 – 31 December 2024
Geographic scope	**Countries:** Burkina Faso · Cameroon · Chad · Ethiopia · Ghana · Kenya · Malawi · Mali · Mozambique · Niger · Nigeria · Senegal · Sudan · South Sudan · Tanzania · Togo · Uganda · Zambia · Zimbabwe
Website link	Dryland Crops – CIMMYT

EXECUTIVE SUMMARY

The Science Group Project on Accelerated Varietal Improvement and Seed Delivery of Legumes and Dryland Cereals in Africa (AVISA) increased demand-driven, gender-equitable, and timely access to quality seed and other inputs by small-scale producers through large-scale promotional activities, strengthened links among seed producers, farmers, and grain aggregators, with emphasis on women and young farmers, and in collaboration with partners such as the national agricultural research and extension systems (NARES), the Syngenta Foundation for Sustainable Agriculture (SFSA), the Centre for Behaviour Change Communication (CBCC), and the Tanzania Seed Traders Association (TASTA). The Project also compared various impact pathways to help improve the scalability of dryland crop innovation through consultation with CGIAR-NARES teams. So far, in-country consultations on these impact pathways have involved 188 NARS scientists in 9 countries: Ethiopia, Kenya, Mozambique, Tanzania, and Uganda in East and Southern Africa (ESA), and Burkina Faso, Ghana, Mali, and Nigeria in West and Central Africa (WCA).

Fifty-eight regional market segments were identified in sorghum, pearl millet, finger millet, groundnut, chickpea and pigeon pea across ESA and WCA. Of these, 28 were prioritized to have breeding pipelines. Portfolio management through market segmentation enables strategic investment of subgrants in breeding programs that will create the most impact. Target product profiles for the region were also consolidated and priority traits such as against Striga, blast, rosette and anthracnose are now being addressed by the crop health/pathology network. Agreed breeding schemes were implemented in shared pipelines, i.e. breeding programs co-led by more than one CGIAR-NARES center, addressing the components of genetic gain. Regional trials were implemented to identify founder germplasm for the new breeding programs and attain quick wins by selecting varieties that can be released across countries. Similarly, tricots were implemented with 2,461 farmers.

The IITA team formed a cowpea WCA working group and is now conducting in-country consultations to further refine market segments. Twenty-six market segments for common bean were identified across East Africa. Awareness and demand creation activities were conducted by NARES and non-NARES partners to increase farmer reach on new varieties. Farmers and other actors were reached through promotional activities, including seed fairs, demonstrations, exhibitions, field days, radio talks, participatory variety selection trials, print materials, and small seed packs.

Data-driven decisions are key for the success of delivering rapid genetic gain and improving variety adoption. This project took several steps to improve and enable the use of data in breeding decisions, including the formation of network-level breeding informatics teams, quality assurance/quality control analytical pipelines, and templates that advance decisions and digitization.

Toward the key vision of forming a functional and sustainable CGIAR-NARES network for dryland crops, this Project supported the formation of governance structures and steering committees for the two target regions of sub-Saharan Africa. These steering committees are already operational with elected officials and sub-committees.

	2023 ▼	2024 ⌄
APPROVED BUDGET [1]	**$8.00M**	$12.00M

1 This is the BMGF-funded portion of the budget. This document reports overall progress across other funding sources such as USAID and ABI.
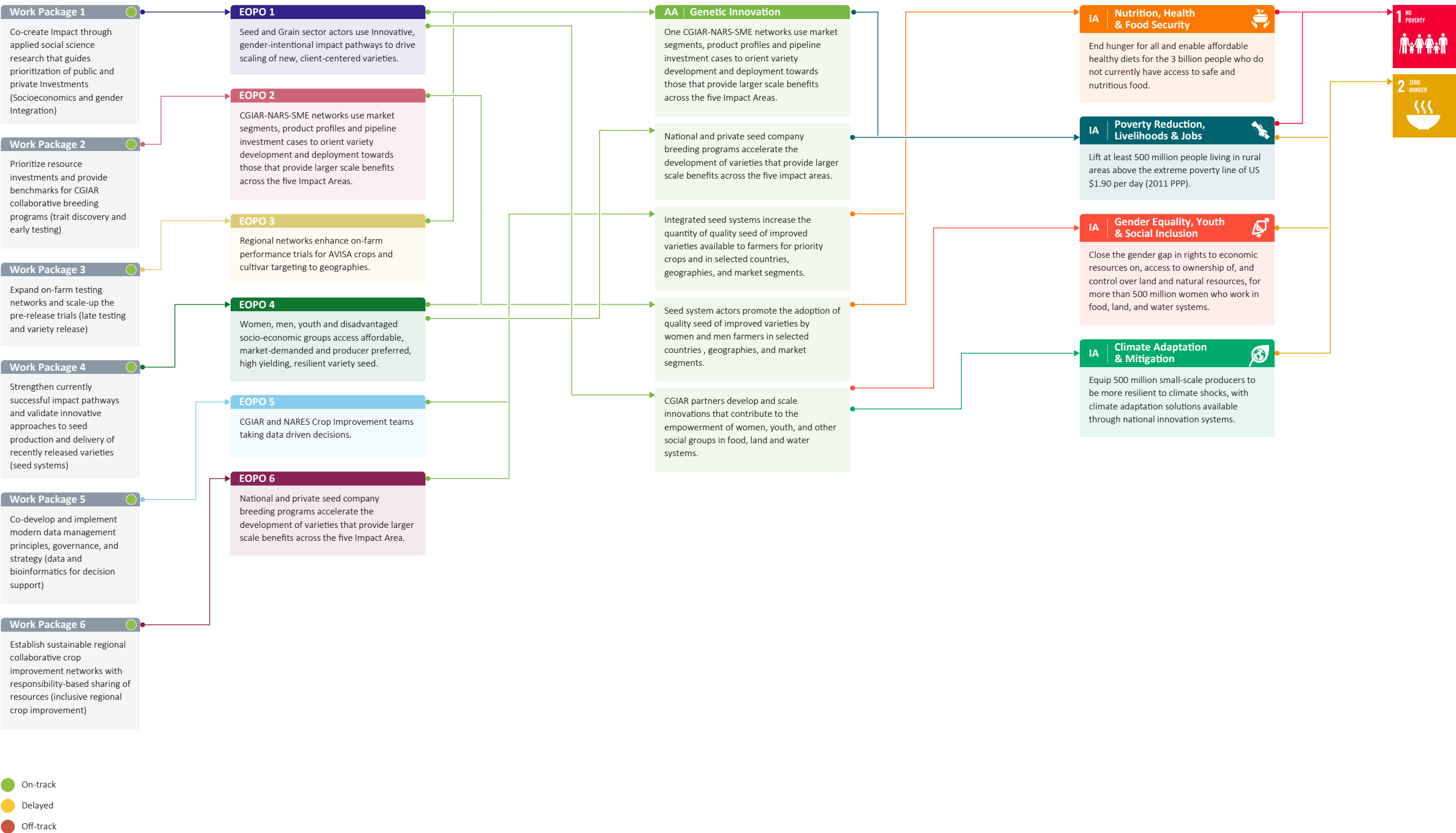
A farmer and a research officer in a pigeon pea farm.
Credit: ZARI

Section 2: **Progress on science and towards End of Initiative outcomes**

Science Group Project-level theory of change diagram

This is a simple, linear, and static representation of a complex, non-linear, and dynamic reality. Feedback loops between this and other Initiatives' theories of change are excluded for clarity.

Work Package 1

Co-create Impact through applied social science research that guides prioritization of public and private Investments (Socioeconomics and gender Integration)

Work Package 2

Prioritize resource investments and provide benchmarks for CGIAR collaborative breeding programs (trait discovery and early testing)

Work Package 3

Expand on-farm testing networks and scale-up the pre-release trials (late testing and variety release)

Work Package 4

Strengthen currently successful impact pathways and validate innovative approaches to seed production and delivery of recently released varieties (seed systems)

Work Package 5

Co-develop and implement modern data management principles, governance, and strategy (data and bioinformatics for decision support)

Work Package 6

Establish sustainable regional collaborative crop improvement networks with responsibility-based sharing of resources (inclusive regional crop improvement)

EOPO 1

Seed and Grain sector actors use Innovative, gender-intentional impact pathways to drive scaling of new, client-centered varieties.

EOPO 2

CGIAR-NARS-SME networks use market segments, product profiles and pipeline investment cases to orient variety development and deployment towards those that provide larger scale benefits across the five Impact Areas.

EOPO 3

Regional networks enhance on-farm performance trials for AVISA crops and cultivar targeting to geographies.

EOPO 4

Women, men, youth and disadvantaged socio-economic groups access affordable, market-demanded and producer preferred, high yielding, resilient variety seed.

EOPO 5

CGIAR and NARES Crop Improvement teams taking data driven decisions.

EOPO 6

National and private seed company breeding programs accelerate the development of varieties that provide larger scale benefits across the five Impact Area.

AA | Genetic Innovation

One CGIAR-NARS-SME networks use market segments, product profiles and pipeline investment cases to orient variety development and deployment towards those that provide larger scale benefits across the five Impact Areas.

National and private seed company breeding programs accelerate the development of varieties that provide larger scale benefits across the five impact areas.

Integrated seed systems increase the quantity of quality seed of improved varieties available to farmers for priority crops and in selected countries, geographies, and market segments.

Seed system actors promote the adoption of quality seed of improved varieties by women and men farmers in selected countries , geographies, and market segments.

CGIAR partners develop and scale innovations that contribute to the empowerment of women, youth, and other social groups in food, land and water systems.

IA Nutrition, Health & Food Security

End hunger for all and enable affordable healthy diets for the 3 billion people who do not currently have access to safe and nutritious food.

IA Poverty Reduction, Livelihoods & Jobs

Lift at least 500 million people living in rural areas above the extreme poverty line of US $1.90 per day (2011 PPP).

IA Gender Equality, Youth & Social Inclusion

Close the gender gap in rights to economic resources on, access to ownership of, and control over land and natural resources, for more than 500 million women who work in food, land, and water systems.

IA Climate Adaptation & Mitigation

Equip 500 million small-scale producers to be more resilient to climate shocks, with climate adaptation solutions available through national innovation systems.

1 NO POVERTY

2 ZERO HUNGER

- 🟢 On-track
- 🟡 Delayed
- 🔴 Off-track

EOPO | End of Project Outcome
AA | Action Area
IA | Impact Area
SDG | Sustainable Development Goal

Note: A summary of Work Package progress ratings is provided in Section 3.

The Jitegemee women's group in Tanzania produce and sell sorghum certified seeds based on farmers' demand for certified seeds.
Credit: Florian Ndyamukama/CBCC

Progress by End of Project Outcome

Challenges in scaling new dryland crop varieties cause low adoption rates of new varieties. The challenges include:

- Poor intersectoral collaboration leading to disjointed interventions with no synergistic impact.
- Lack of rigorous and evidence-driven scaling strategies.
- Poor alignment between the new varieties and the low-input agronomic practices of the targeted farmers
- Insufficient investments in comprehensive seed and grain programs.

New strategic approaches are needed to course-correct from these low-impact trajectories.

Achievements from CIMMYT Team

National agricultural research systems (NARS) and the CIMMYT socioeconomics team identified three strategic pathways to greater adoption of new business cases for seed production and delivery:

- Integrate and leverage grain and seed agribusiness as economic multipliers in local communities to attract investments.
- Develop innovative seed delivery models that build early-stage adoption momentum after the release of new varieties by making significant investments in seed production and distribution at discounted prices and by prioritizing village-gate seed delivery.
- Implement breeding strategies that optimize farmers' mixed cropping systems, such as cereal-legume-livestock production, to ensure resilience under diverse and low-input conditions and use of multipronged breeding programs that cater to local as well as broader markets.

These revised strategies were proposed in consultations with 10 national and agricultural research and extension system (NARES) teams in Burkina Faso, Ghana, Mali, and Nigeria in West Africa, and in Ethiopia, Kenya, Uganda, and Tanzania in East Africa and included in a strategic impact pathways document. Leveraging insights from the NARES teams, the socioeconomics team crafted a series of analyses, reports, and strategic frameworks to enhance implementation of CGIAR and NARES strategies for scaling dryland crop varieties and fostering systemic transformation in dryland crops systems.

A major market innovation in these new strategies is designing, testing, piloting, and scaling localized seed and grain business micro-ecosystems in a few selected countries.

Achievements from CIAT Team

During the reporting period, the socioeconomics team at CIAT helped shape the direction of target product profiles by addressing information gaps about the evolving needs of consumers and farmers. This team advanced understanding of consumer and farmer preferences across various market segments, particularly in Uganda and Ethiopia. Traits pertaining to consumption, such as grain expandability, cooking duration, seed coat tenderness post-cooking, and color retention, were identified as crucial to product acceptance, which sparked interest among breeders and led to the incorporation of these traits into product profiles. Additional research is being conducted in local bean processing and utilization. The goal is to identify any traits previously overlooked by breeders and to estimate the potential impacts of including these traits in breeding priorities.

A field verification process we conducted affirmed that researchers have already developed bean varieties aligned with the production goals and physical production environments in certain areas, but the information about and distribution of these varieties often do not reach the farmers who need them most due to low capacity among extension services.

Our major achievement was the development of shared breeding pipelines and research objectives. We convened product design teams (PDTs) in each of the participating countries in Eastern and Southern Africa (ESA) and West and Central Africa (WCA). We worked with crop and country PDTs to develop and prioritize market segments (MS) and target product profiles (TPP). More than 50 PDT meetings were conducted for 6 crops and we identified 58 MS across Africa, of which 28 were prioritized for breeding.

Crop multidisciplinary CIMMYT-NARES teams co-designed breeding strategies for prioritized breeding pipelines in consultation with quantitative genetics experts. We developed partnerships with strategic global and national partners to collect germplasm of targeted crops (sorghum, pearl millet, finger millet, and groundnut). The plant health teams (pathologists and entomologists) of CIMMYT-NARES developed a regional strategy for screening key priority traits and held workshops with regional breeders to harmonize screening protocols.

Groundnut ESA secured Crops to End Hunger (CtEH) funding to build a regional phenotyping network and trait-augmentation facility, which will supplement investment from AVISA-Transition . We conducted fingerprinting and quality assurance/quality control studies of sorghum, groundnut, and pearl millet germplasm. Characterization of the collected germplasm to address national and regional priority traits (e.g. resistance to the disease sorghum anthracnose) is at different stages across crops in ESA and WCA regions. Regional trials were conducted for pearl millet open pollinated variety (OPV) pipelines to identify a set of founder populations that will serve as starting materials for the newly established breeding pipelines. The same activity was initiated for groundnut, sorghum, and finger millet in ESA and for sorghum and groundnut in WCA.

For cowpea (IITA), the PDTs physically met in 2023 to identify national-level current MS and TPPs in West Africa. In addition, clear protocols/prototypes were identified to refine current MS and identify near-future MS.

CIAT made progress in defining MS for common beans based on seed color to correspond to the market needs and the bean corridor approach. With a Work Package of the Accelerated Breeding Initiative, breeding operations were costed for Uganda and Tanzania CIAT breeding hubs. A Breeding Program Assessment Tool (BPAT) was also run for the Tanzania Agricultural Research Institute (TARI), the National Agricultural Research Organisation (NARO) of Uganda, and the CIAT breeding hubs in Tanzania and Uganda. The CIAT-NARES bean network successfully implemented a robust breeding system for common beans. Three Pan-African Bean Research Alliance (PABRA) yield trials are being multiplied for the 2025 regional trial. In 2023, 122 trials were designed using the Breeding Management System (BMS) and distributed to 15 countries. A bean breeders' workshop held in Kampala, Uganda, reviewed the common stage-gate system and strengthened collaboration and knowledge sharing among the network members.

Regional trialing networks are operational at different stages across crops and regions. The CIMMYT-NARES team mapped all the current testing locations for six crops. These locations were prioritized for Stage 1, Stage 2, and late-stage trials. CIMMYT-NARES crop teams agreed on the strategy for regional coordinated trials. CIMMYT will support overall trial coordination, product advancement, and on-farm testing strategies. Regional trials were established in different planting windows across countries that aimed to identify starting germplasm for breeding and potential cross-country varietal releases. The network planted regional trials across regions in 2023, and data will be aggregated in 2024 for decisions on starting germplasm.

Simulation modeling under a linked project showed that incorporating on-farm data testing at stage 1 can likely accelerate the rate of genetic gain for on-farm conditions, especially if there is low correlation between breeding stations and farmers' fields.

A blog article and a brochure on farm genomic selection beans were published. A multicrop on-farm trial (OFT) network coordinator is engaging with the NARS and CIAT common bean breeders to develop
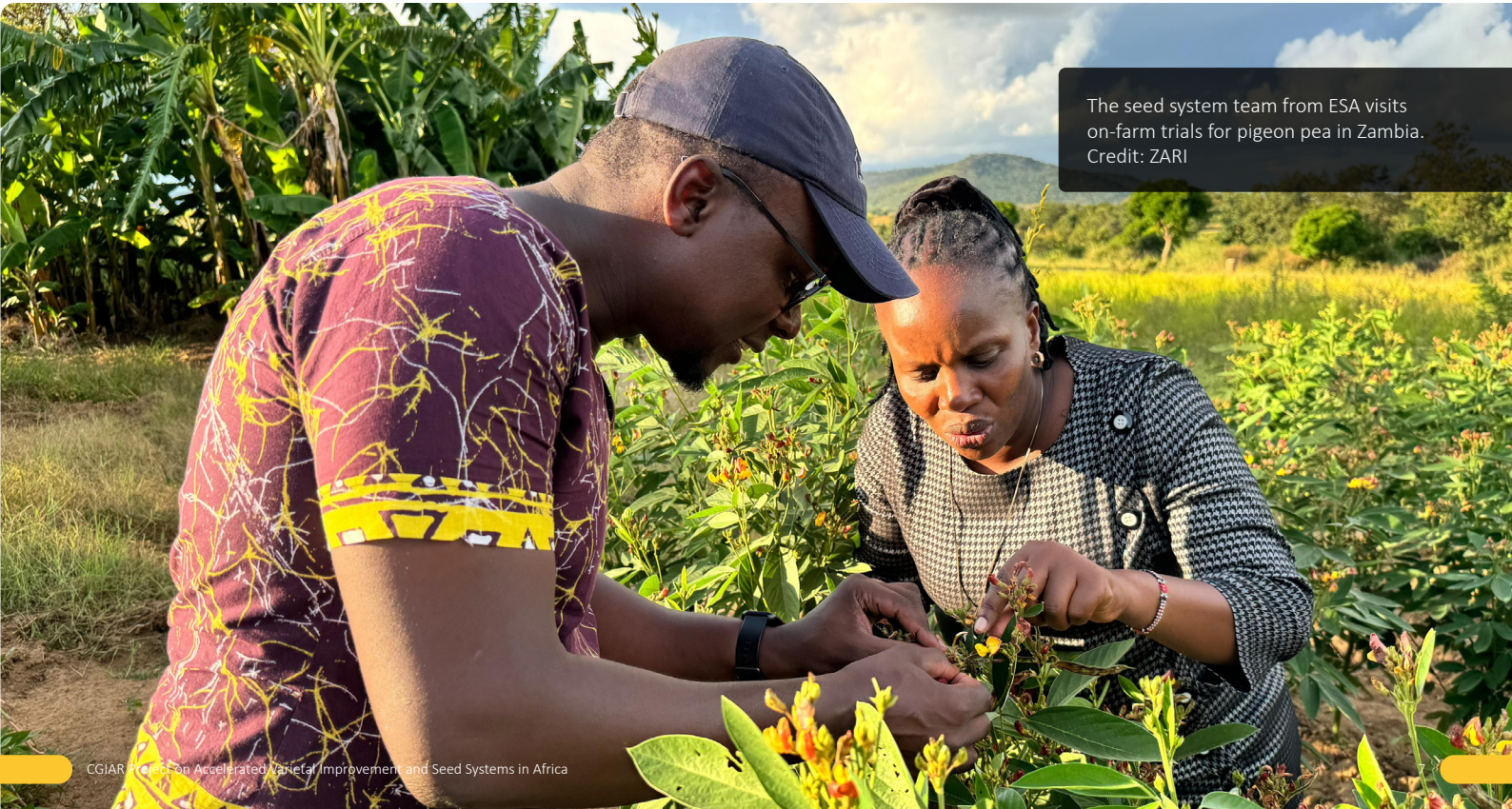
The seed system team from ESA visits on-farm trials for pigeon pea in Zambia.
Credit: ZARI

annual crop trialing, data reporting, analysis, and advancement calendars. The OFT coordinator is also developing a responsible, accountable, consulted, and informed (RACI) framework for the teams involved in on-farm trialing.

The National Crops Research Resources Institute (NaCRRI), in Uganda, submitted two promising lines for variety release (UGKT-KSI 1073-1; UGKT-B157-4) and four superior varieties are in the process of distinctness, uniformity and stability (DUS) authorization, setting the stage for potential release. TARI has submitted six varieties to the Tanzania Official Seed Certification Institute (TOSCI) and is awaiting

a decision. Within the cowpea regional network, IITA and NARS have established three testing platforms, with the outputs providing potential lines for release in the participating countries.

The cowpea network still needs to harmonize the OFTs across the region. Countries are adopting both the tricot approach and the traditional on-farm approach.

Similarly, INERA has conducted the tricot approach with 40 on-farm trials using nine varieties. These trials were distributed in two agroecological zones of Burkina Faso. Seventeen farm trial results have been submitted to the online platform ClimMob.

EOPO 4: Women, men, youth and disadvantaged socioeconomic groups access affordable, market-demanded and producer preferred, high yielding, resilient variety seed.

The project increased demand-driven, gender-equitable, and timely access to quality seed and other inputs by small-scale producers of sorghum, pearl millet, finger millet, cowpea, groundnut, common bean, chickpea and pigeonpea, through large-scale promotional activities, strengthened seed producer and grain aggregator linkages, and leveraged grain aggregator and farmer linkages with emphasis on women and youth farmers. This was in collaboration with other CGIAR centres, IITA and CIAT, as well as partners NARS, Syngenta Foundation for Sustainable Agriculture (SFSA), Centre for Behaviour Change Communication (CBCC), and Tanzania Seed

Traders Association (TASTA). Additionally, the supply of high-quality seed of improved varieties was increased through enhanced seed production, business and managerial skills, and infrastructural support to small-scale seed entrepreneurs and public- and private-sector seed enterprises. Various delivery models were implemented to improve access to early-generation seed by seed producers and certified seed by farmers. Several in-country multistakeholder seed system workshops were conducted to understand existing MS, identify on-the-shelf varieties that suit the different MS, and assess the seed supply readiness to respond to grain demand signals.

EOPO 5: CGIAR and NARES Crop Improvement teams taking data-driven decisions.

As part of the Africa Dryland Crop Improvement Network (ADCIN), we have established breeding informatics teams (BITs) and communities of practice, which are composed of NARES and CIMMYT scientists, technicians, and other support staff across crop breeding programs. The BITs are aimed at fulfilling targeted capacity-building needs across the critical focus areas, driving the adoption of modern quantitative genetic and data science for empowering crop breeding decisions.

The ADCIN BITs foster adoption of modern quantitative genetics methodologies among NARES and CGIAR members across the ADCIN network. They also enhance and modernize NARS and CGIAR ADCIN members' research data management practices. ADCIN partners received advanced support in trial data analysis across crops and countries.

ADCIN has a major focus on routine use of molecular markers and forward breeding approaches. In this line, F1 verification and parental quality control workflows and process were streamlined and made operational. To assist network partners in using low-density markers for F1 verification and parental quality control, a standard structured report and online tool was made available.

Digital transformation of NARES breeding programs is progressing and ADCIN partners' access to research data management was enhanced by making centralized data management systems available.

ADCIN established a Data and Informatics Core Committee (DICC) composed of NARS and CIMMYT scientists to guide efficient data management, analysis, strategic decision-making, and data management policies within ADCIN.

EOPO 6: National and private seed company breeding programs accelerate the development of varieties that provide larger scale benefits across the 5 Impact Areas.

The key progress of EOPO 6 was formation of the ADCIN to build the capacity of members to develop and deliver market-demanded and well-adapted improved crop varieties within the shortest time possible for increased genetic gain. The ADCIN steering committees developed the governance structure and elected officers to steward

the main components. The two ADCIN steering committees, for ESA and WCA regions, were constituted based on discussion and consensus during the network meeting held in Ghana in January 2023, at the end of the previous phase of AVISA.

Beryl Chepkemoi from Faida Seeds Company and Hillary Chelal from Egerton University in Kenya inspect the Ndovu groundnut variety. Egerton University collaborates with Faida Seeds Company to assist with seed processing.
Credit: Marion Aluoch/CIMMYT

WP1: : Co-create impact through applied social science research that guides prioritization of public and private investments (Socioeconomics and gender integration)

🟢 On track
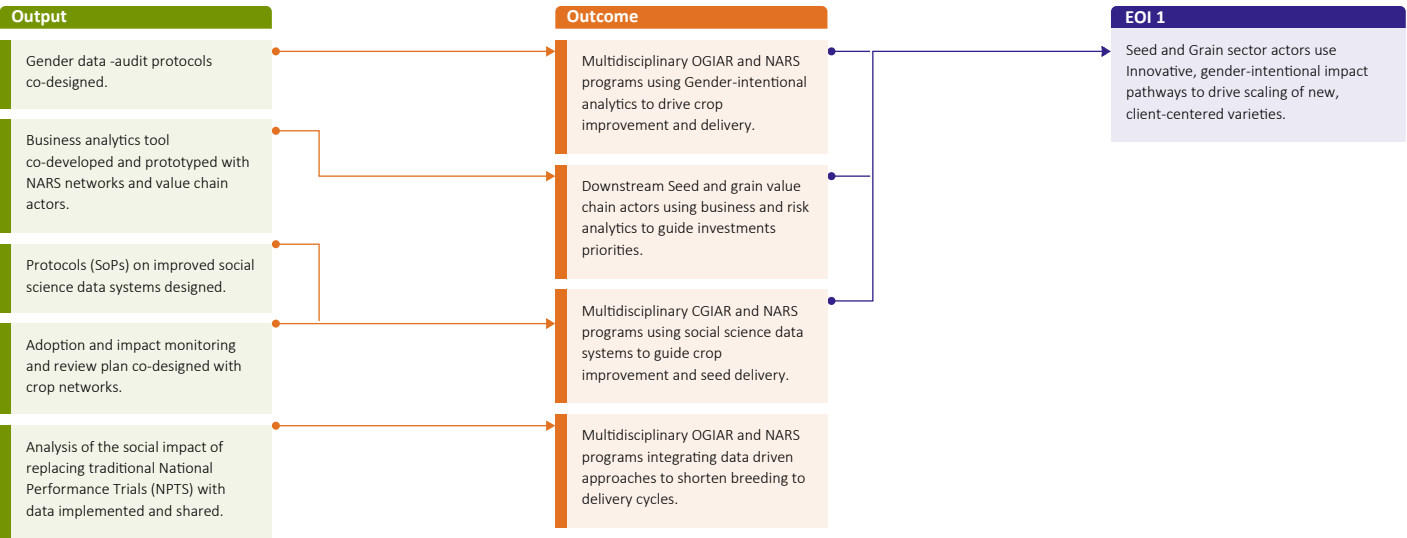
Work Package 1 progress against the theory of change

The socioeconomics team formulated new strategic approaches to address the challenges hindering the development and scaling of new dryland cereal and legume varieties. These challenges include ineffective scaling strategies, a lack of market demand understanding, and insufficient funding for seed programs. Through a comprehensive series of analyses, reports, and business cases, the team is creating an implementation framework that aligns with CGIAR and NARS strategies, such as the CGIAR 2030 and CIMMYT 2030 strategies. A pivotal aspect of this strategy is the proposal for a major reevaluation of seed delivery mechanisms, which is currently under review by broad multidisciplinary NARS teams to establish widely accepted principles and ensure effective delivery.

Impact Pathways Co-creation

- **8 AVISA countries** participated in an international workshop and **30 representatives** attended, involving socioeconomics and seed system leads from each country.
- Further in-country (domestic) consultations have taken place and are taking place in **10 countries:** Ethiopia, Kenya, Mozambique, Tanzania, Uganda (in ESA), and Ghana, Mali, Nigeria, Burkina Faso, and Senegal (in WCA), involving a total of **188 scientists.**

Impact gaps and opportunities

- Low adoption rates of new varieties are reported in the range of **20–30 percent** (depending on whether data is national or project-based).
- Rates of food poverty (food expenditures inadequate to buy a healthy diet) were high among dryland legume and cereal (DLC) producers, reaching as high as **85 percent** during the lean season.
- In Northern Uganda, we found significant reliance on roots, tubers, bananas, and cereals like maize for calories, with these sources providing approximately **50 percent** of calories even among consumers whose staples are sorghum and millet.
- Large impact opportunities exist to remedy the above using new approaches to breeding and seed business innovations as outlined below.

Seed business cases

- The seed profitability threshold identified was **US$1 in seed costs generating US$10 in value** attributable to the seed; this analysis shows this condition is not being consistently met.
- **Groundnut seed had the weakest business case** based on the above threshold; in 7 countries out of 8 analyzed, the cost of groundnut seed was no less than 8 times more expensive than what would be profitable.
- By the same measure, the recommended seed rates for sorghum and millet hybrids were 10 percent to 100 percent more expensive than what would be profitable.

These consultations have led to the proposal of the following models for ideation, validation, and scaling, depending on the maturity of each model in a country.The following are some examples of these strategic issues being discussed:

Generating Early Adoption Momentum:

- **Seed "Marshal Plans"**: Develop and implement programs that distribute large quantities of new and proven seeds of new varieties in targeted areas to stimulate awareness and demand, often through local businesses and farmer organizations. These should be one-off or announced as time-limited to maximize impact.
- **Peer-to-Peer Feedback Systems:** Support systems where farmers learn about new varieties directly from their peers, leveraging networks for faster information spread and adoption.
- **Advance Order Systems and Farmgate Delivery:** Implement advanced ordering systems paired with delivery to the farmgate to overcome the lack of reliable demand data, utilizing motorbikes and e-commerce systems for cost-effective seed distribution.

Stakeholder Led Variety Selection:

Engage multiple stakeholders in variety selection processes with farmers as leaders and prioritizing crop varieties that meet stakeholder needs and resources, using methods like the triadic comparison of technology options (tricot) that involve them in research and selection processes. We draw upon previous experience with participatory variety selection (PVS) to inform the development of data collection tools and guide in the identification of stakeholders for engagement in the processes.

Additionally, below are abstracts of some knowledge products under drafting:

Strategic Impact Pathways to Impact for Dryland Crops in Africa:

This report addresses the persistent low productivity and adoption of improved varieties in African agriculture, particularly in dryland crops like millet and sorghum. It proposes strategic imperatives for breeding programs, seed and grain systems, and organizational approaches to boost research efficiency and impact. These include:

Breeding and Genetic Strategies for Enhanced Productivity:

- *In the short to Medium Term (3–10 years),* focus on varieties that are compatible with low-input conditions. This calls for developing varieties able to be more productive than existing ones under low-input challenges while simultaneously building transitional pathways to sustainable intensification toward optimum input production systems with complementary investments in input markets and agronomy.
- *Integrate recommended cereal-legume cropping patterns in breeding strategies: T*his is in line with the emerging paradigm breeding for cropping systems. This approach would call for integrating cereal-legume mixes into breeding strategies to address diverse agricultural and nutritional needs, enhance soil health and promote a more sustainable agricultural ecosystem.

Process and Organizational Efficiencies for Sustained Impact:

- *Innovation clusters in critical dryland systems:* maximize impact through clusters of business and sector innovations (in addition to breeding) that drive innovations across sectors. In fact, some these clusters could primarily be post-innovations (e.g. the previously mentioned seed and grain business micro-ecosystems).
- *Routine scaling and investment analysis:* Regularly evaluate the effectiveness of breeding, seed delivery, and other interventions to identify, refine, and scale up successful models, informed by both quantitative and qualitative data.
- *Structured approach to impact goals:* Adopt a methodical framework for organizing and achieving impact, focusing on one primary goal out of the CGIAR's five Impact Areas to prevent mission drift and enhance resource and effort efficiency.

Food Basket Impact Approach:

This study suggests that an important DLC impact pathway is based on ensuring these cereals remain cost-competitive in both consumption and production portfolios. Both growers and consumers must find the new varieties to be economically superior when integrated in their production mixes or food baskets. This strategy requires that:

- Increasing their productivity lowers the share of household income, land or labor needed to acquire their preferred food baskets.
- Productivity gains in cereals should promote diet diversification by allowing income savings from cheaper calories to be used to acquire or produce diverse and nutrient-dense diets (animal proteins, fruits, and vegetables).

WP2: Prioritize resource investments and provide benchmarks for CGIAR collaborative breeding programs (trait discovery and early testing)

● On track

Output

- Target Population of Environment (TPE) information/data generated to support population improvement and product development.
- Prioritized trait discovery portfolio (trait-wise investment plan) by crop and region identified.
- Novel variation made available to network partners for traits with limited variability.
- Fit-for-purpose, crop-wise genomic resources, processes, methods, and tools are available for marker-assisted breeding.
- High-throughput phenotyping methods and infrastructure developed for screening of prioritized traits.
- Strategic early discovery and germplasm development institutions engaged / identified.
- Regular monitoring and evaluation of trials.
- Capacity development training on good performance trial practices.
- Breeding schema optimized for high priority breeding pipelines to deliver high rate of genetic gains.
- Standard operating procesures for high throughput phenotyping methodology operationalization at network partner locations (artificial and hot spot) for screening of priority traits.
- Scalable implementation of marker-assisted breeding activities in breeding pipelines implemented.
- High-quality and on-time testing data generated for early generation material for recycling parents.
- Essential infrastructure framework complementing EiB-CtEH investments developed and implemented for key network sites.
- Annual and seasonal advancement meetings conducted in country and at network level to identify country specific and regional products.

Outcome

- One CGIAR-NARS-SME networks adopting high throughput platforms for trait identification and/or phenotyping.
- CGIAR Institutes develops partnership with Advanced Research Institutes to access germplasm.
- Network partners generate reliable performance data for late-stage material.
- National partners breeding programs using modern population improvement approaches.
- National partners joining regional trialing networks.
- National partners modernizing their breeding infrastructure.
- National partners undertake infrastructure investments for rapid recycling of segregating generations.

EOI 2

- One CGIAR-NARS-SME networks use market segments, product profiles and pipeline investment cases to orient variety development and deployment towards those that provide larger scale benefits across the five Impact Areas.

Work Package 2 progress against the theory of change

During the reporting period, significant progress was made for each of the target crops: sorghum, pearl millet, finger millet, groundnut, pigeon pea, chickpea, cowpea and common bean. Notable achievements from the CIMMYT-NARES team include the formation of national/country-level PDTs to define crop-level and country-specific MS and TPPs for each of the defined MS as guided by the identified key traits. The PDTs are composed of multidisciplinary researchers and representative actors across all crop value chains. Complementing the PDT work was the formation of the regional-level network approach to breeding, detailed in the summary table below.

REGION	CROP	NUMBER OF COUNTRY MARKET SEGMENTS	NUMBER OF REGIONAL/ UNIQUE MARKET SEGMENTS	NUMBER OF PRIORITY REGIONAL SEGMENTS	NUMBER OF REGIONAL SPILLOVER SEGMENTS	NUMBER OF REGIONAL PIPELINES
ESA	Sorghum	30	6	4	2	4
ESA	Finger millet	21	4	3	1	3
ESA	Pearl millet	9	3	1	2	1
ESA	Groundnut	23	5	3		3
ESA	Pigeon pea	13	3	3		3
ESA	Chick pea	21	4	4		4
WCA	Sorghum	36	14	5	1	5
WCA	Pearl millet	22	7	3		3
WCA	Groundnut	24	12	2		2

The participating breeding programs in ESA and WCA were assessed using the Accelerated Breeding Initiative Transform Breeding Program Questionnaire that helped identify the comparative advantage of each participating program in terms of supporting the development of regional-level breeding pipelines, in addition to their country needs. Country-level MS and TPPs were consolidated into regional market segment and TPPs, the basis for identifying shared regional breeding pipelines. More than 50 PDT meetings were conducted across two regions and six crops. The PDTs identified 58 MS, out of which 28 were prioritized for regional breeding pipelines. Regional pipelines targeting the regional segments were assigned to CIMMYT-NARES centers with the objective that these centers work together in developing breeding populations and in genetic evaluation in regional trials.

Concurrently, CGIAR-NARS partnerships built collaboration with institutions in the USA and Australia to assemble germplasm to support the establishment of breeding programs for the six target crops. The collected germplasm is undergoing phenotyping, characterization, and genotyping to develop new populations that are targeted at developing cultivars with traits that will address regional and country-specific MS. Sorghum, pearl millet, and groundnut germplasm collected were also fingerprinted with a mid-density genotyping platform and marker-assisted quality assurance tests were conducted on the material. The pearl millet WCA team made additional notable progress; they conducted regional trials of 50 OPVs in 8 countries and 12 locations to identify founders for their 2 regional OPV breeding pipelines.

Similarly, the team developed and harmonized standard operating procedures (SOPs) that are being adopted by network partners (CIMMYT and NARS) to screen/phenotype crop-specific priority abiotic and biotic traits in WCA and ESA. Optimized breeding schemas have also been developed and adopted across breeding programs. The adoption of harmonized SOPs and breeding schemas will increase efficiency and foster cross-country and regional collaboration. Besides the SOPs, key equipment was procured to upgrade ISRA/CNRA's Bambey Research Station in Senegal (planter, threshers, digital tools, etc.). The irrigation system, cold room and glasshouse are being improved too, in collaboration with CtEH. Like Bambey Research Station in Senegal, similar undertakings have been implemented at the Kenya Agricultural and Livestock Research Organization's (KALRO) Kiboko Research Station. These types of equipment and infrastructural facilities will contribute to enhance the quality of breeding data, shorten breeding cycles, and, ultimately, increase genetic gain.

In collaboration with the Market Intelligence and Accelerated Breeding Initiatives, progress was made in defining MS for common beans (CIAT), based on seed color, to correspond with the market needs and the bean corridor approach ([Adjustments to bean market segments based on color and size- CGIAR](#)). Regional product profiles were developed and uploaded on the CGIAR breeding portal. The TPP's highlight fast cooking, nutrition content (iron and zinc grain content and bioavailability) and yield as essential traits to improve, while other traits are also prioritized for improvement as essential threshold traits. The development revision of the MS was based on the insights from Work Package 1 and Eastern and Central Africa Bean Research Network (ECABREN) physical and online meetings. A process to review and update country-specific product profiles is in progress. To date, in-country meetings have been conducted to review and refine country-specific TPP's for the different bean market classes. Through the Accelerated Breeding Initiative WP3-Transform, costing of breeding operations using the University of Queensland Costing Tool (supported by the Initiative) was initiated for Kawanda and Arusha CIAT breeding hubs. BPAT was also performed for TARI, NARO and CIAT breeding hubs in Uganda and Tanzania. With CtEH funding, some breeding infrastructure is being established at these hubs. The CIAT-NARES bean network has successfully implemented a robust breeding system (BRIO) for common beans. This initiative is a component of ECABREN and involves regional testing in six partner countries. The fourth year (2023) of the project yielded significant genetic gains, closely aligning with the project's original objectives. These included a 30 percent reduction in cooking time, a 15 percent increase in seed iron, and a 10 percent increase in zinc. Despite some unfavorable genetic correlations, the MateSel software predicted positive genetic gains. Six- PABRA member partners including TARI, the Ethiopian Institute of Agricultural Research (EIAR) and NaCRRI have selected early-generation materials in varying quantities (ranging from 79 to 415) that align with their respective product profiles from a network breeding program (BRIO). They have also continued to advance previously selected early-generation materials to fix genes for extensive testing. To bolster data collection and processing capabilities, each of the NARS has been equipped with data loggers and a computer. This technological support is expected to significantly enhance the efficiency and effectiveness of their research efforts. Three PABRA yield trials (stage 6 nursery, incorporating more than 700 breeding lines from national programs and CIAT) are being multiplied for the 2025 regional trial. In 2023, 122 trials were designed using BMS and distributed to 15 countries, with 87 successfully planted. Data from 26 trials have been shared via BMS, promoting transparency and collaboration. Preliminary analysis revealed moderate heritability for yield. In September

2023, a five-day bean breeders' workshop was held in Kampala, Uganda, with the participation of approximately 50 scientists (75 percent being bean breeders). The annual bean breeders meeting provided a pivotal platform for reviewing the Common Stage Gate System, fostering collaboration and knowledge sharing among network members. In addition to this meeting, other subject-specific meetings were held at various levels, including project, program, country, and regional levels (ECABREN). These meetings served as platforms for continuous dialogue and collaboration among the common bean network members.

At the regional workshop in Ibadan in July 2023, IITA and seven NARS teams, with support from colleagues at CIMMYT and Market Intelligence, confirmed the key MS for WCA. These were identified based on cowpea end use as homemade flour, boiled grain, and dual-purpose (fodder and grain). By combining these with maturity groups and agroecological zones or target population of environments (TPEs), 20 specific MS have been identified. Different NARS partners are currently prioritizing these MS. Each country team then developed its major TPPs. Priority traits were identified and ranked as a network, and key traits were categorized as essential or nice to have. The following traits were identified as essential in the TPPs: aphid resistance, bruchid resistance, maruca resistance, bacterial blight resistance, Fusarium wilt resistance, macrophomina resistance, seed size, days to maturity, *Striga* resistance, grain yield, flour yield, fodder yield, cooking time, oil absorption capacity, swelling capacity, ease of coat removal, testa color, iron content, zinc content, and growth habit. The NARS partners have also identified their PDT. Current efforts are focused on conducting a program assessment and establishing a national PDT for each breeding program and country.

IITA and NARS reviewed the SOPs developed during the previous phase of the AVISA project and concluded that protocols for screening or recording more of the key traits are well developed. Most of the cowpea breeding programs have skilled technicians, and basic facilities such as experimental fields and screenhouses exist in all the cowpea breeding programs. Hotspots for key traits like *Striga* or drought resistance are available in most programs. The Institute for Agricultural Research (IAR), in Nigeria, and the Institute of the Environment and Agricultural Research (INERA), in Burkina Faso, have the capacity to implement the basic processes for discovery, such as skill, hotspots, and germplasm, for the phenotyping of most traits. IITA will support with some equipment after the completion of the breeding program and infrastructure assessment.

WP3: Expand on-farm testing networks and scale up the pre-release trials (late testing and variety release)
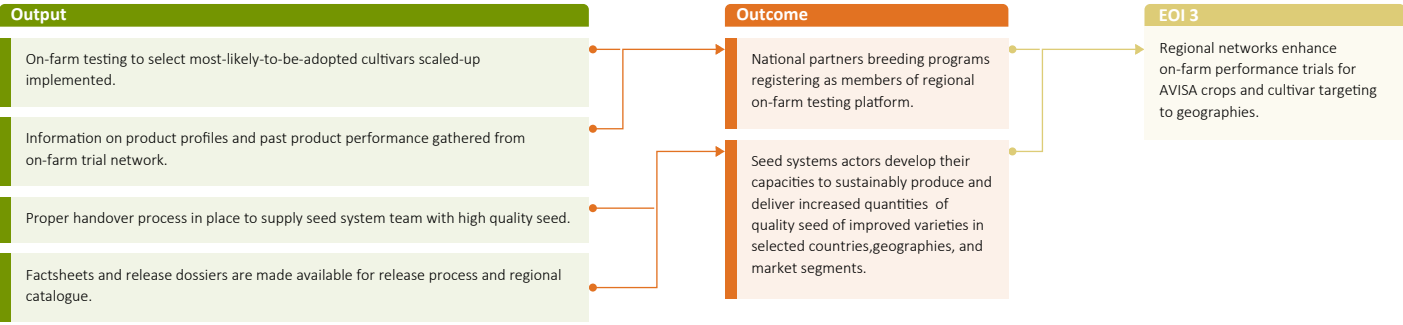
Work Package 3 progress against the theory of change

Regional trialing networks have been formed and operationalized across crops and regions. As a first step, CIMMYT and NARES teams mapped currently available trial locations for all six crops in both regions. A total of 357 locations were reported by NARES partners across these crops and regions. On the other hand, a strategy was developed for regionally coordinated trials in ESA, including commonly agreed trial designs, identification of check entries, testing locations based of TPEs, biotic and abiotic stresses, data analysis and decision-making, etc. For example, for each crop by region the team identified key locations for stage 1 trials. It was agreed that CIMMYT will lead overall trial coordination, product advancement, and on-farm-testing strategies. Currently, we are mapping all the trial locations against known agroecology. CIMMYT is initiating TPE analysis process and later these locations will be mapped against TPEs. The WCA and ESA sorghum team also conducted regional trials for the red and white set of hybrids obtained from Purdue University. In WCA this was the second year of testing of these hybrids.
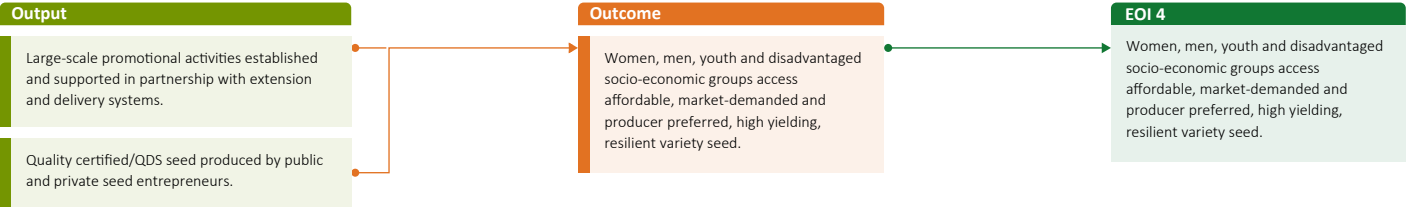
Tricots were established for common bean (252), cowpea (448), groundnut (775), pearl millet (16), and sorghum (970). The total figure in 2023 (2,461) decreased from the 2022 figure of 3,399 but is projected to increase in 2024. In 2023, new crops and countries conducted tricots. Training sessions on the operationalization of tricot trials were conducted in selected participating countries in ESA (Kenya, Malawi, and Mozambique). Specifically, pigeon pea tricot trials were piloted in Kenya and Malawi, with Kenya having 180 trials with 8 test entries and 2 checks in 6 counties, and Malawi having 120 trials with 7 short duration lines including one check in 3 districts in close collaboration with 1,000 farms and the Innovation Lab for Crop Improvement at Cornell University. About 3,200 pigeon pea farmers in Kenya received a small seed pack of 200-g seed as part of awareness creation and promotional activity for improved crop varieties. Tanzania was the leading country in implementing tricots at scale. A total of 1,804 tricots were conducted in 2023 in Tanzania: sorghum conducted 953 trials, followed by groundnut with 599, and common bean with 252. In 2022, the first sorghum tricot test was designed using a smaller sample size as a learning process for the implementing team. From this trial, one sorghum line was submitted for release in 2023 with information from tricot trials and PVS. TOSCI completed the DUS test in 2023, and the candidate variety entered NPT in 2024. The results are expected to be issued at the upcoming National Performance Trial Committee meeting at the end of the year. The groundnut program in Tanzania started to implement tricot in 2020 by including the pre-released and released varieties in the trial. Robust data collected in tricot for 2020 and 2021 resulted in the recommendation of two varieties for release (ICGV-SM 16592

and ICGV-SM 16593); the lines have passed through the technical committee and now are waiting for a decision from the variety release committee. In ESA, variety descriptors were developed for selected released groundnut varieties as part of the process of prioritizing varieties for commercialization at scale. PVS and OFTs were conducted in partner countries of WCA and several lines were selected for release. Similarly, factsheets were drafted for selected newly released sorghum, pearl millet, and groundnut varieties in WCA. Also, some lines have been identified for OFTs in 2024 based on on-station evaluations.

Simulation modeling under another linked project showed that incorporating common bean on-farm data for stage 1 trials can likely accelerate the genetic gain rate under on-farm conditions. F4:5 breeding lines of three grain types (yellow, red mottled, and large red grain types) were tested with networks of 93 on-farm sites at three major bean growing environments in Tanzania. An extensive socioeconomic and gender survey was conducted for 10 days at 93 farm sites. A blog was published: [Gender-responsive genomic selection on farmer's fields for accelerating genetic gains](#). A multicrop OFT network coordinator was hired under the 1000FARMS project and has interacted with NARS and CIAT breeders to develop annual crop trialing, data reporting, analysis, and advancement calendars. The OFT coordinator is also developing a RACI framework for the teams involved in OFTs. Trial designing has been completed for TARI and is ongoing for NaCRRI and EIAR bean programs. In the quest to enhance OFTs and establish a seamless handover process for supplying the seed system team with high-quality seeds, NaCRRI aligned with the Seed Equal Initiative and produced 3 metric tons (MT) of breeder seed and 0.2 MT of nuclear seed for newly released varieties, specifically NAROBEAN 6 and NAROBEAN 7. TARI produced a total of 1,000 kg and 6.2 MT of breeder seeds and basic seeds of newly released varieties (Selian 13, Uyole 16, Uyole 18, TARIBEAN 1, 2, 3, 4, and 5), respectively. In terms of variety release, NaCRRI submitted two promising lines for variety release (UGKT-KSI 1073-1 and UGKT-B157-4) and four superior varieties are in the process of DUS authorization, setting the stage for potential release. TARI has submitted six varieties to TOSCI and is awaiting a decision. In terms of variety release, NaCRRI submitted two promising lines for variety release (UGKT-KSI 1073-1; UGKT-B157-4) and four superior varieties are in the process of DUS authorization, setting the stage for potential release. EIAR identified four candidates for release; two of these are small whites and two are large red mottled. Release data has been submitted to the EIAR variety release authorities. TARI has submitted six varieties to TOSCI and is awaiting a decision.

WP4: Strengthen currently successful impact pathways and validate innovative approaches to seed production and delivery of recently released varieties (seed systems)

● On track

Output	Outcome	EOI 4
Large-scale promotional activities established and supported in partnership with extension and delivery systems.	Women, men, youth and disadvantaged socio-economic groups access affordable, market-demanded and producer preferred, high yielding, resilient variety seed.	Women, men, youth and disadvantaged socio-economic groups access affordable, market-demanded and producer preferred, high yielding, resilient variety seed.
Quality certified/QDS seed produced by public and private seed entrepreneurs.		

Work Package 4 progress against the theory of change

Building on other investments, both previous and current, the project supported mainly the national partners and other actors along the seed value chains to create awareness, to generate demand and to increase access to quality seed of superior improved varieties (not older than 10 years since their release) or to target dryland crops among men, women, and youth farmers in communities in WCA and ESA countries. Awareness and demand creation activities (seed fairs, demonstrations, field days, radio talks, exhibitions, PVS trials, printed materials, and small seed packs) were conducted by NARS and non-NARS partners. Tricot trials integrating recently released varieties introduced these varieties to famers, enabling them to make choices on the best in class and giving useful feedback on varieties to be scaled up. A total of 159,966 farmers were reached during the reporting period against a target of 201,709 in 2023. Of this number, 54,780 farmers were reached with promotional activities on cowpea through SFSA and IITA in collaboration with NARS partners in WCA. Working with the NARS in 15 WCA and ESA countries, 37,243 farmers were reached through field days, demonstrations, seed fairs and distribution of small seed packs of sorghum while 18,321 farmers benefited from activities on new varieties of groundnut. Furthermore, 5,262 and 16,897 farmers benefited from outreach programs organized for finger millet (only in ESA) and pearl millet, respectively. Lastly, in the target ESA countries, new varieties of pigeon pea and chickpea were promoted among 17,127 and 7,182 farmers, respectively. Common bean varieties were also promoted in Tanzania by SFSA in collaboration with TARI and private seed companies reaching 3,154 farmers. In collaboration with CIAT on common bean, 51,012 individuals (41 percent women) were reached through different promotional and training activities, including 1,857 demos, 22 field days, 26 seed fairs, and 27 exhibitions. Engagement of at least 176 seed value chain actors is happening through digital multistakeholder platforms for sharing information and orders for seed and grain, market information such as prices, advisory information on production, and variety choices. Under "train-the-trainer" workshops, New Markets Lab (NML) in partnership with TARI trained 35 personnel from TARI, the Agricultural Seed Agency (ASA), and TOSCI, including legal officers, breeders, administrators, and seed inspectors on key aspects of licensing, and plant breeders aimed at building capacity on promotion of commercialization and adoption of TARI varieties through licensing. This resulted in TARI resuming licensing of its varieties to seed companies using a model licensing agreement previously developed by NML under AVISA. TARI had licensed two seed companies as of February 2024. NML also drafted and facilitated the negotiation of a cooperation agreement among TARI, ASA, TOSCI to enable TARI to trace both authorized and unauthorized use of its protected varieties and to improve oversight and implementation of licensing agreements.

Seed of superior crop varieties, resilient to many biotic and abiotic stresses and having a high market demand, were produced to improve farmers' access. A total of 6,648 MT of certified or quality declared seed of cereals (sorghum, pearl millet and finger millet) and legumes (groundnut, chickpea, and pigeon pea) were produced during the reporting period. This was about 39 percent higher than the target due to good crop management practices resulting from human capacity enhancement, increased interest of the private sector in dryland crops, stronger partnerships, and increased participation of women and youth in the seed value chain as producers and distributors. It is envisioned that increased access to improved crop varieties will lead to enhanced productivity on farmers' fields, higher incomes, and better livelihoods. For the cereals, 931.5 tons , 684.3 tons and 167.4 tons of sorghum, pearl millet, and finger millet, respectively, were produced through partners while 4,865.3 tons of legume seeds comprising 2317.1 tons of groundnut, 2534.2 tons of common bean, 2 tons pigeon pea, and about 12 tons of chickpea were produced. The production was accomplished through collaborative efforts involving other CGIAR Centers, public- and private-sector partners, including youth and women's groups, in 18 countries located in WCA and ESA regions. On the common bean seed front, 994 MT of quality declared seed was produced by community seed producers in 3 countries — Uganda, Ethiopia, and Tanzania — while certified seed produced by private and public partners in these countries was 1667 MT. NARS partners in the 3 countries produced breeder and foundation seed amounting to 94 MT and 241 MT, respectively.

These interventions (awareness creation, seed production and delivery) increased demand-driven, gender-equitable and timely access to quality seed and other inputs by smallholder producers. Additionally, the supply of high-quality seed of improved varieties was increased through enhanced seed production, business, and management skills; infrastructural support to small-scale seed entrepreneurs; and public- and private-sector seed enterprises. Several in-country multistakeholder seed system workshops were conducted to understand existing MS and to identify varieties that fit into different MS and assess the readiness of the seed supply system to respond to grain demand. Information gathered through the multistakeholder engagements aided variety prioritization for promotional efforts and devising seed delivery models that support closing the seed-grain nexus. In summary, CIMMYT and its partners

in the project supported production and delivery of 209 tons of breeder, 2,121 tons of foundation, and 9,308 tons of certified seed across all the target crops (Table 1). The certified seed will be used in the coming season, potentially planting 377,257 ha of land based on the seeding rate of each crop, reaching 1,886,286 smallholder farmers with an average holding of 0.2HA.

Table 1. Seed production (tons), area covered (ha) and number of smallholder farmers reached with quality seed of dryland legumes and cereals

CROP	VOLUME OF SEED (TONS)	AREA UNDER THE CROP (HA)	NUMBER OF FARMERS REACHED
Sorghum	932	116,440	582,199
Pearl millet	684	114,045	570,225
Finger millet	167	33,480	167,400
Groundnut	2,317	23,171	115,855
Common bean	2,660	26,600	133,000
Cowpea	2,534	63,355	316,775
Pigeon pea	2	67	333
Chickpea	12	100	498
Total	**9,308**	**377,257**	**1,886,286**

Use of a Scaling Scan tool identified six of the most innovative seed system models to pilot in different countries in a context-specific manner and mapped scaling partners. The six models were:

1. The adopted villages concept of Nigeria,
2. Youth and women quality centers in Tanzania and Kenya,
3. Pre-secured seed market model in Uganda,
4. Traveling weekly market days in Malawi and Ghana,
5. Large-scale demonstrations in Ethiopia, and (
6. Bundled technologies in Ken ya.

Behavior change interventions were implemented in 21 Tanzanian villages targeting 4,313 smallholder farmers. Four Youth and Women Quality Centers were activated; a digital platform was implemented to share information; 45 youth champions and last-mile agents from the community were trained, registered, and linked with early-generation seed sources; and 2 local radio stations reached about 2 million listeners. Adoption of new varieties in 2023 was 26.3 percent for sorghum and 24.7 percent for groundnuts compared to 6.3 percent and 2.0 percent in 2022, respectively, in the intervention areas.

WP5: Co-develop and implement modern data management principles, governance, and strategy (data and bioinformatics for decision support)

● On track

Output	Outcome	EOI 5
Breeding-informatics working groups formed and network level data management policy put in place.	Crop improvement teams across network formalized into Breeding Informatics Working groups equipped with contemporary network-based data management protocols and tools for effective and enhanced decision making towards optimized breeding programs.	CGIAR and NARES Crop Improvement teams taking data driven decisions.
Network partners have access to digital data management system software for phenotypic and genomic data.		
Routine use of statistically-sound experimental designs enable hypothesis testing and data driven decisions by network partners.	Crop improvement teams across network implementing best practices in experimental design and analyses.	
Network partners' capacity built in use of advanced data analysis processes, selection indices and workflows designed for product advancement and selection decisions.	CGIAR and National breeding programs applying quantitative genetics analyses to assess the effectiveness of current breeding procedures and recommend improvements.	
Network partners sensitized on implementing bioinformatics analysis workflows (use of QC markers, mid-density panels, MABGC tools etc.) for scalable implementation of markers in breeding program.		
Network partners breeding program assessed for genetic gains in their breeding programs.		
Network partners' capacity is developed, enabling improved effectiveness of their breeding programs.		
Network partners' capacity is developed, enabling improved effectiveness of their breeding programs.		
Improvements recommended through simulation of network breeding programs to enhance genetic gain.		

Work Package 5 progress against the theory of change

Under Work Package 5, significant progress was made during the reporting period on data-driven innovations empowering CGIAR and NARES crop improvement teams and enabling them in data-driven decision-making. Key processes, crop calendars, trial SOPs, data analysis needs, and advancement criteria were developed by crop-level community of practice (CoP) groups.

The ADCIN rolled out a series of data science innovations and initiatives aimed at advancing the crop improvement process within dryland agricultural research. The network is leading the transition to data-driven decision-making by employing modern quantitative genetics principles, sophisticated experimental designs, cutting-edge data analytics, and the establishment of centralized breeding informatics platforms across the network. The ADCIN data team is also operationalizing digitalization across crop breeding activities and developing modern visual analytic systems for easy decision-making. Through the integration of these data-centric methodologies, ADCIN

has enhanced the capacity for evidence-based, data-driven decision-making in its agricultural research efforts. Some of the key outputs achieved as part of collaborative efforts are highlighted below.

Established ADCIN Breeding Informatics Teams (BITs) Framework: The network established the framework for breeding informatics teams (BITs), which features a three-tier structure. The focus of this group is to foster adoption of modern quantitative genetics and data science methodologies to reinforce decision-making processes in crop breeding. The composition of BITs includes data champions from various NARES crop breeding programs and CIMMYT including crop scientists, research technicians, research scholars, and students. The establishment of BITs has significantly helped to identify critical focus areas for data science, enhancing data consciousness among crop improvement research teams, and coordinating targeted capacity building efforts throughout the network. The structure of the three BIT tiers has helped cater to the specific data needs

of research leaders, crop operation executives, and data analysts. As part of capacity building activities, we conducted 6 blended workshops: 2 for Breeding Informatics working group B on breeding data management system, 2 for working group C on statistical analysis, and 2 on trait ontologies, and trained more than 200 participants across 14 countries in ESA and WCA. This approach of BITs drew the attention of the Accelerated Breeding Initiative and CGIAR and has been adopted as part of their core strategies for capacity building and data support.

Optimization of Crop Breeding Programs: Based on a recommendation by BIT, the network data team undertook a comprehensive review and optimization of crop breeding programs for all six ADCIN crops. Network partners were sensitized and empowered to refine their breeding pipelines, incorporating advanced quantitative genetics and statistical principles in alignment with the latest scientific advancements and market demands. This strategic approach ensured that all breeding pipelines are at their best and contributing to accelerated genetic gains across the network.

Advancements in Trial Data Analysis and Support: Partners across ADCIN received high-level breeding informatics support, facilitating the analysis of trial data spanning more than 288 datasets across 5 crops, 8 countries, and 9 institutes. This extensive trial data was analyzed using the most modern methods, and the insights were encapsulated in a dynamic web-based application. This application has made it easier for researchers to access critical data and results to make informed decisions regarding breeding advancements. Such support is contributing to streamline the decision-making process and enhancing the efficacy of breeding programs in taking data-driven decisions. Also, partners were actively engaged and trained on the adoption of best practices in experimental design and analyses within their breeding programs. This focused effort is designed to maximize outputs, ensuring that breeding practices are both efficient and effective, and to pave the way for significant improvements in decision-making.

Use of Molecular Markers and Advanced Bioinformatics: ADCIN has placed significant emphasis on the routine application of molecular markers, bioinformatics analysis, and forward breeding. In alignment with this, processes for F1 verification and parental quality control workflows have been streamlined and implemented. To support network partners in the use of low-density molecular markers for both F1 verification and parental quality control, ADCIN introduced a structured approach. This includes a standard report template developed to ensure consistency and clarity in reporting results. Additionally, an online tool was also made available to assist in these activities. It provides a user-friendly interface for managing and analyzing data related to F1 verification and parental quality control.

Another additional comprehensive activity involving use of molecular markers and advanced data analysis is defining heterotic pools by employing mid-density genotyping techniques for groundnut, sorghum, and pearl millet. These efforts involve a detailed examination of the genetic diversity present within these crop species and are aimed at understanding the patterns of grouping among different genetic materials. The initial phase of data analysis has been completed and focuses on assessing the diversity present within these species.

Enhancing Research Data Management: To enhance research data management across the network breeding programs, NARES and CIMMYT embraced a centralized data management system accessible to all network partners. This system runs on BMS and

plans are under way to systematically migrate to the Enterprise Breeding System (EBS). Currently, over 65 percent of network partners have access to some form of data management system, including CIMMYT's BMS server for its Dryland Crop Program and the CIAT BMS server for common bean. IITA and NARS partners are using BMS for data management. Actions are being finalized to migrate all IITA cowpea data to EBS by July 2024. The expectation is to initiate the migration of NARS data into EBS immediately after the IITA data migration. Efforts are under way for genotypic data management, and the BIT is ready with the Genotype Investigator for Genomewide Analyses (Gigwa) server (https://gdata.cimmyt.org/) for the Dryland Crop Program, which is under testing to be rolled out for ADCIN partners. The CIAT bean team was invited to a Gigwa exploratory session, organized by the CGIAR's Integrated Breeding Platform team. Efforts are under way at CIAT to explore the adoption and use of the seed inventory platform of BMS. Overall, ADCIN partners are making extensive use of the research data management systems and BMS to generate trials and nurseries. As of 2023, there are 116 studies recorded in the CIMMYT BMS, including 90 trials and 26 nurseries, showcasing the system's integral role in streamlining data management practices.

Digital Transformation of Breeding Programs and Visual Analytics: The digital transformation of network breeding programs is progressing with the procurement and distribution of digital equipment. This initiative includes distributing seed counters, digital weigh-scales, and data collection devices like tablets to modernize and streamline breeding operations. Additionally, a comprehensive capacity building exercise is under way to ensure that staff are fully equipped to leverage these technological advancements effectively.

The ADCIN data team has also developed several visual analytics tools/solutions to support breeding programs, including the following.

Trial Information System: This comprehensive platform serves as a central hub for capturing, hosting, and providing access to information on the trials conducted by network breeders. It streamlines the dissemination and access of trial data, enhancing collaboration and efficiency.
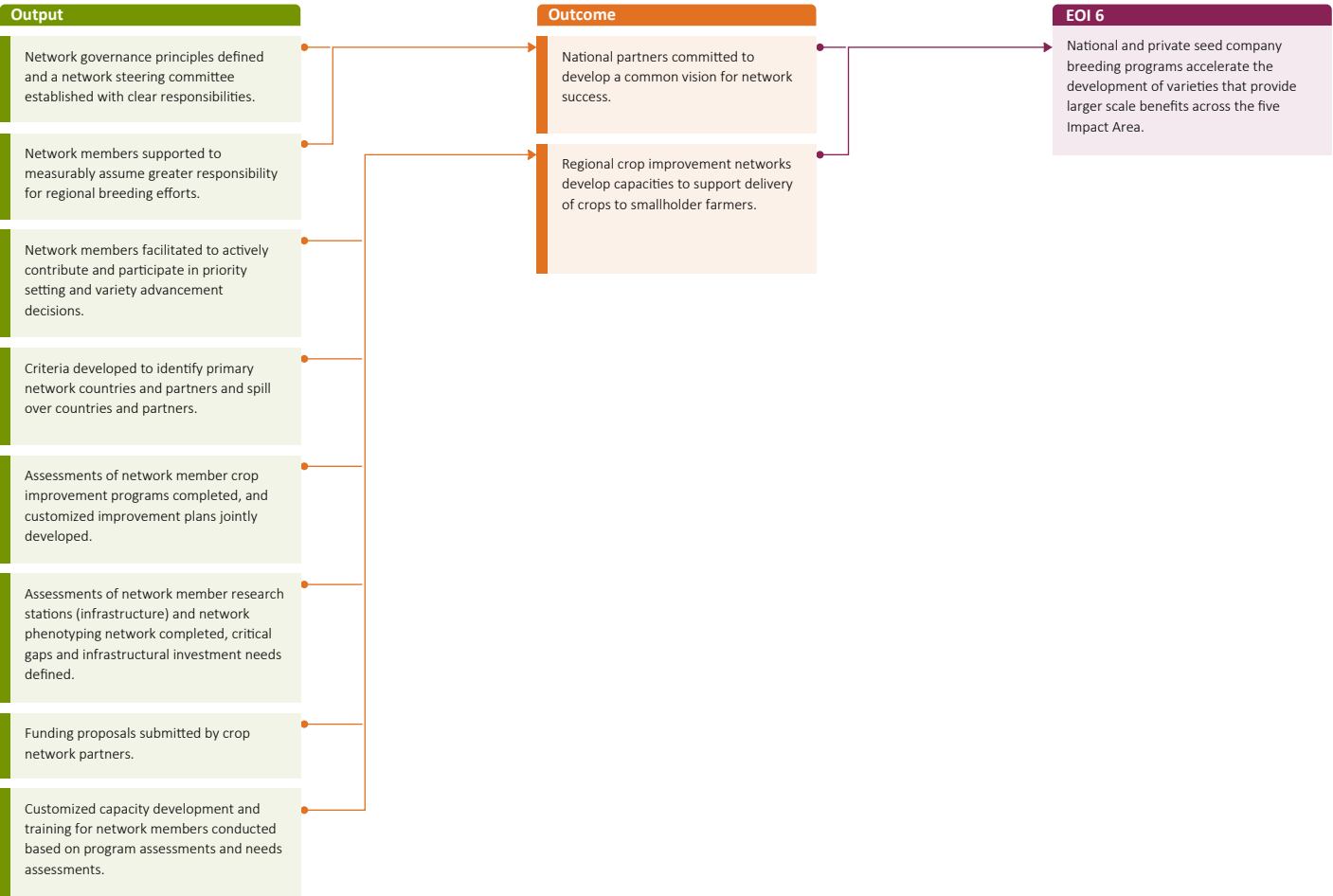
Crop Data Touch Points Dashboard: This innovative interactive tool designed for breeding data informatics activities assists breeders in planning and managing agricultural operations with a visual calendar, aligning activities with crucial farming stages. This dashboard facilitates precise scheduling and operational oversight.

DCP Quality Assurance/Quality Control System: This modern application is tailored to empower researchers with the use of molecular markers for quality assurance and quality control in molecular-based tests. It is an easy-to-use tool for network researchers to ensure the integrity and reliability of breeding material and crosses.

Establishment of Data Governance Body (Data and Informatics Core Committee [DICC]): To enable a larger governance model and develop holistic and clear direction toward data and informatics interventions within the network, ADCIN established a Data and Informatics Core Committee (DICC) composed of NARES and CIMMYT research leaders from ESA and WCA. The DICC plays a crucial role in guiding the data management vision, brainstorming data governance, identifying analytics protocol, and ensuring application of data to drive strategic decision-making in crop breeding. The current major focus of DICC is around developing a well-accepted data management policy and governance framework.

WP6: Establish sustainable regional collaborative crop improvement networks with responsibility-based sharing of resources (inclusive regional crop improvement networks)

🟢 On track

Output

- Network governance principles defined and a network steering committee established with clear responsibilities.
- Network members supported to measurably assume greater responsibility for regional breeding efforts.
- Network members facilitated to actively contribute and participate in priority setting and variety advancement decisions.
- Criteria developed to identify primary network countries and partners and spill over countries and partners.
- Assessments of network member crop improvement programs completed, and customized improvement plans jointly developed.
- Assessments of network member research stations (infrastructure) and network phenotyping network completed, critical gaps and infrastructural investment needs defined.
- Funding proposals submitted by crop network partners.
- Customized capacity development and training for network members conducted based on program assessments and needs assessments.

Outcome

- National partners committed to develop a common vision for network success.
- Regional crop improvement networks develop capacities to support delivery of crops to smallholder farmers.

EOI 6

National and private seed company breeding programs accelerate the development of varieties that provide larger scale benefits across the five Impact Area.

Work Package 6 progress against the theory of change

2023 was a significant year for the development of the CGIAR-NARES network for dryland crops in Africa — the Africa Dryland Crops Improvement Network (ADCIN). The year started with an event where more than 200 scientists and members of the CGIAR-NARES team gathered in Ghana and agreed to form the governance structure for ADCIN. Subsequently, two steering committees were formed, one each for ESA and WCA. The steering committee for ESA has 12 members, while WCA has 15 members, mainly consisting of scientists from NARES centres (9 and 12, respectively) and 3 members from CGIAR. These members represent all key countries of each region, all crops and major disciplines. Since their formation in August 2023, the steering committees have met twice face to face and every month virtually. These steering committees are operational, with elected officials (chair, vice-chair, secretary, and finance secretary–WCA) and four sub-committees (capacity

development, finance, monitoring and evaluation, and network sustainability) for each region. The committees have also developed bylaws and terms of reference to ensure transparent operation. CIMMYT has developed a quarterly newsletter — Dryland Crops Partners Newsletter — co-led by the CGIAR-NARES team. One of the major purposes of the ADCIN-SC is to help develop the human and infrastructure capacity of the members and network sites. CIMMYT has allocated US$ 1 million for the year 2024 for the development of these capacities in the network for six crops. Both steering committees are in the process of allocating this budget through a competitive call for proposals. These proposals are being evaluated by capacity development teams of the steering committees. CIAT and IITA are expected to contribute to this pool of funding starting in 2025.

Work Package progress rating summary

WORK PACKAGE	PROGRESS RATING & RATIONALE
1 🟢	**Progress rating** Following data gathering and analysis, all intended reports have been drafted and are being finalized. "Reaching the Hard to Reach" report was finalized. The Strategic Impact Pathways document has been drafted and shared with 10 NARS teams and is currently under review by multidisciplinary NARS teams involving breeders, seed systems, agribusiness, economists, and gender experts.
2 🟢	**Progress rating** Leveraging on different CGIAR Initiatives and non-pooled projects, most of the planned activities were achieved and these will be consolidated and enhanced in 2024.
3 🟢	**Progress rating** Regional trialing networks were formed, and initial trials initiated. These will be enhanced in 2024.
4 🟢	**Progress rating** Awareness creation activities were successfully carried out and significant amounts of early-generation seed and certified and quality declared seed produced for smallholder farmers in target geographies.
5 🟢	**Progress rating** Key working groups (Breeding Informatics Working Groups A, B and C) and communities of practice (Data and Informatics Core Committee) across the Africa Dryland Crop Improvement Network (ADCIN) were formed and members of these groups are receiving technical backstopping for data-driven improved decision-making.
6 🟢	**Progress rating** The Africa Dryland Crop Improvement Network (ADCIN) governance structure and mechanism were formed.

Definitions

🟢 **On track**

✅ Annual progress largely aligns with Plan of Results and Budget and Work Package theory of change in key areas.

✅ Can include small deviations/issues/delays/risks that do not jeopardize success of Work Package.

🟡 **Delayed**

⚠️ Annual progress slightly falls behind Plan of Results and Budget and Work Package theory of change in key areas.

⚠️ Deviations/issues/delays/risks could jeopardize success of Work Package if not managed appropriately.
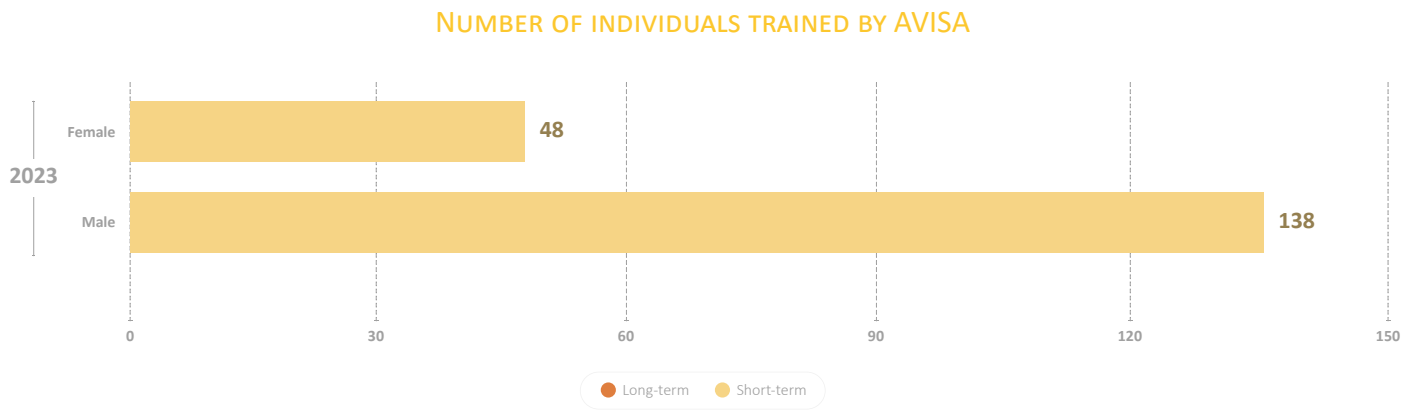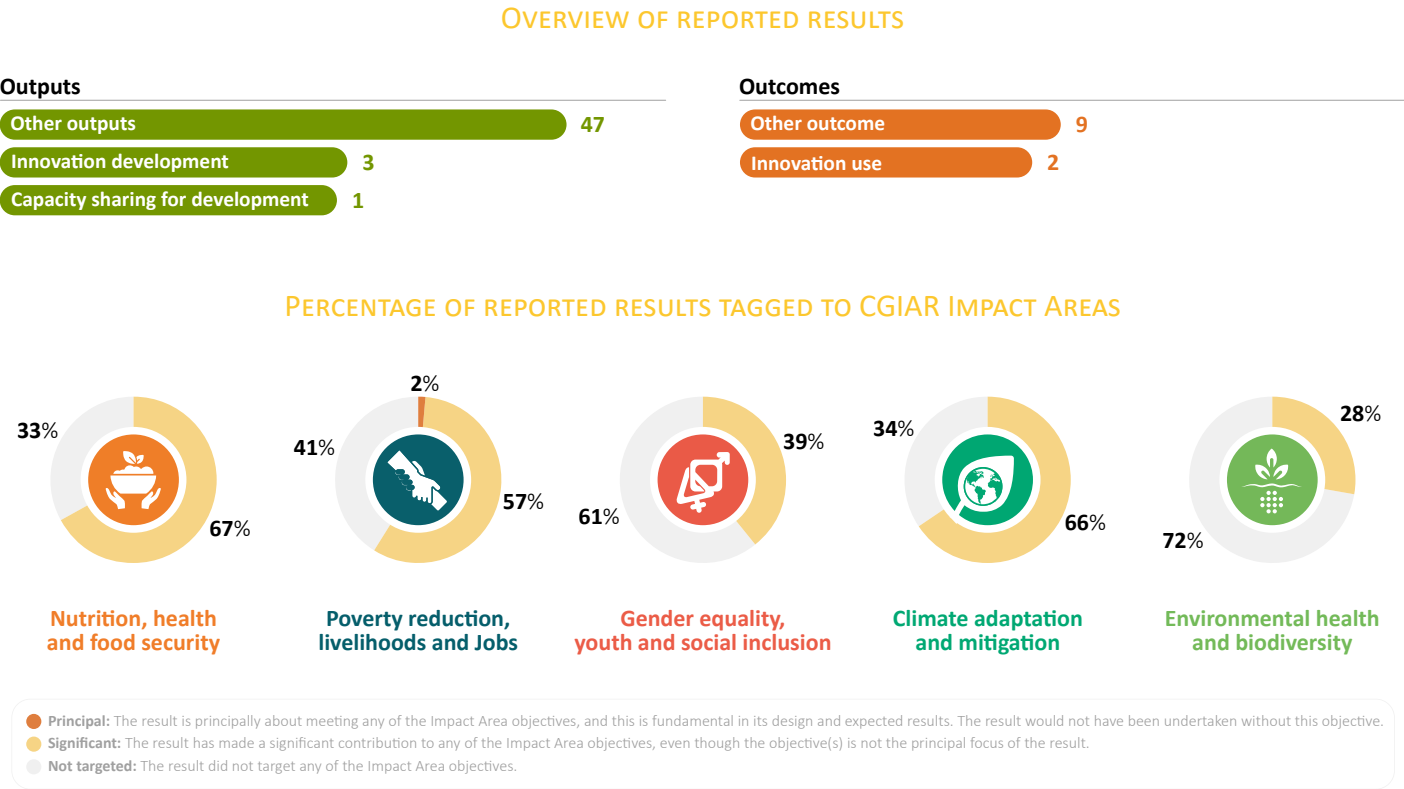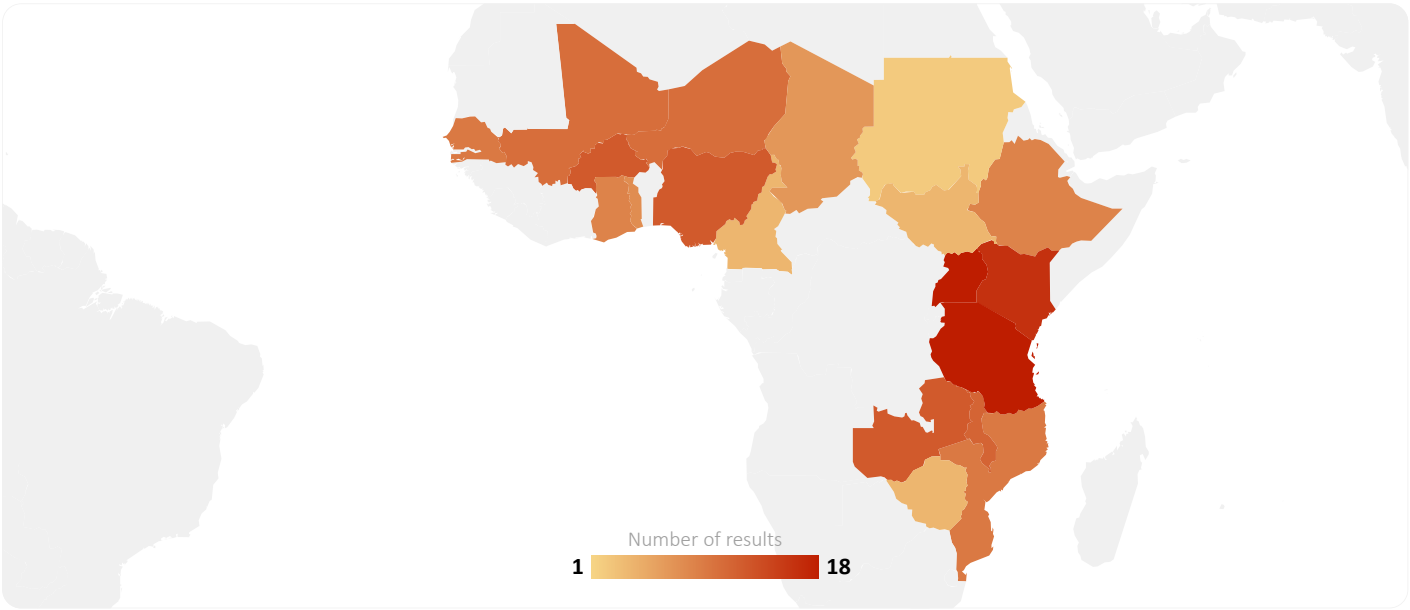
🔴 **Off track**

❌ Annual progress clearly falls behind Plan of Results and Budget and Work Package theory of change in most/all areas.

❌ Deviations/issues/delays/risks do jeopardize success of Work Package.

Section 4: **Key results**

This section provides an overview of 2023 results reported by the AVISA. These results align with the CGIAR Results Framework and AVISA's theory of change. Source: *Data extracted from the* CGIAR Results Dashboard *on 10 April 2024.*
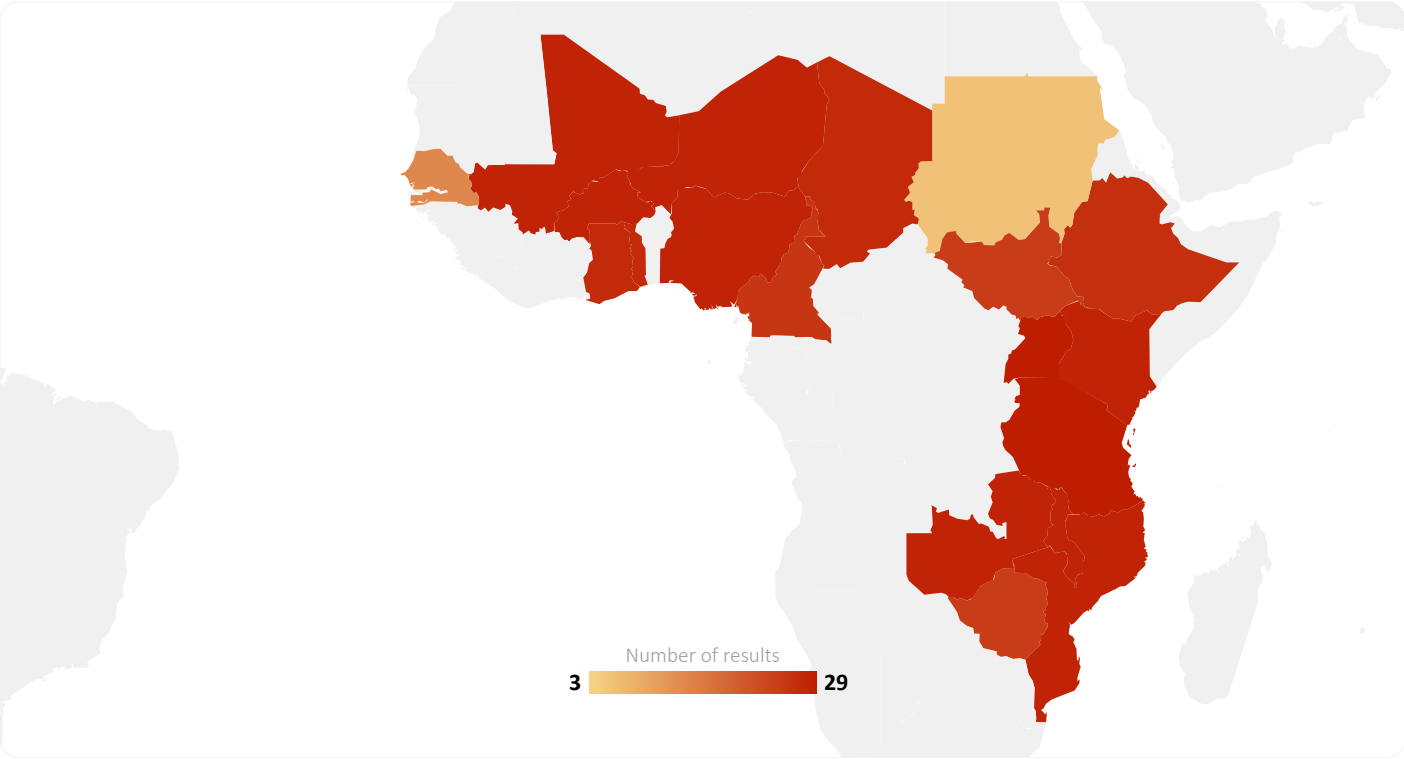
OVERVIEW OF REPORTED RESULTS

Outputs

Other outputs	47
Innovation development	3
Capacity sharing for development	1

Outcomes

Other outcome	9
Innovation use	2

PERCENTAGE OF REPORTED RESULTS TAGGED TO CGIAR IMPACT AREAS

33% / 67%
Nutrition, health and food security

2% / 41% / 57%
Poverty reduction, livelihoods and Jobs

39% / 61%
Gender equality, youth and social inclusion

34% / 66%
Climate adaptation and mitigation

28% / 72%
Environmental health and biodiversity

● **Principal:** The result is principally about meeting any of the Impact Area objectives, and this is fundamental in its design and expected results. The result would not have been undertaken without this objective.
● **Significant:** The result has made a significant contribution to any of the Impact Area objectives, even though the objective(s) is not the principal focus of the result.
● **Not targeted:** The result did not target any of the Impact Area objectives.

NUMBER OF INDIVIDUALS TRAINED BY AVISA

2023

Female	48
Male	138

0   30   60   90   120   150

● Long-term   ● Short-term

Number of results
1 — 18

NUMBER OF INNOVATIONS BY READINESS LEVELS

Pipeline overview
# of innovations ⌄

Level		#
9	**PROVEN INNOVATION** The innovation is validated for its ability to achieve a specific impact under uncontrolled conditions	0
8	**UNCONTROLLED TESTING** The innovation is being tested for its ability to achieve a specific impact under uncontrolled conditions	0
7	**PROTOTYPE** The innovation is validated for its ability to achieve a specific impact under semi-controlled conditions	1
6	**SEMI-CONTROLLED TESTING** The innovation is being tested for its ability to achieve a specific impact under semi-controlled conditions	0
5	**MODEL/EARLY PROTOTYPE** The innovation is validated for its ability to achieve a specific impact under fully-controlled conditions	1
4	**CONTROLLED TESTING** The innovation is being tested for its ability to achieve a specific impact under fully-controlled conditions	1
3	**PROOF OF CONCEPT** The innovation's key concepts have been validated for their ability to achieve a specific impact	0
2	**FORMULATION** The innovation's key concepts are being formulated or designed	0
1	**BASIC RESEARCH** The innovation's basic principles are being researched for their ability to achieve a specific impact	0
0	**IDEA** The innovation is at idea stage	0

Section 5: **Partnerships**

EXTERNAL PARTNERS CONTRIBUTING TO RESULTS, PER COUNTRY

Number of results
3 — 29

Colors represent the number of different partners which collaborated on results achieved in a specific country. One result can impact different countries and therefore the same partner can be associated with more than one country. Source: Data extracted from the Results Dashboard on 10 April 2024.

Partnerships and Accelerated Varietal Improvement and Seed Systems in Africa's impact pathways

AVISA is implemented in 16 countries, 9 from WCA and 7 from ESA, and in each country, the main partners are NARS.

This includes 11 NARS from WCA:

Council for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI/Ghana) · Institut d'Economie Rurale (IER/Mali) · Institute of the Environment and Agricultural Research (INERA/Burkina Faso) · L'Institut National de la Recherche Agronomique du Niger (INRAN/Niger) · Institut de Recherche Agricole pour le Développement (IRAD/Cameroon) · Institut Sénégalais de Recherches Agricoles (ISRA/Senegal) · Institut Togolais de Recherche Agronomique (ITRA/Togo) · Institut Tchadien de Recherche Agricole pour le Développement (ITRAD/Chad) · Institute for Agricultural Research (IAR/Nigeria) · Lake Chad Research Institute (LCRI/Nigeria) · Bayero University Kano (BUK/Nigeria).

AVISA's main partners in ESA are:

Ethiopian Institute of Agricultural Research (EIAR/Ethiopia) · Kenya Agricultural and Livestock Research Organization (KALRO/Kenya) · National Agricultural Research Organisation (NARO/Uganda) · Tanzania Agricultural Research Institute (TARI/Tanzania) · Zambia Agriculture Research Institute (ZARI/Zambia) · National Research Council of Malawi (NRCM/Malawi) · South Sudan, Zimbabwe, and Mozambique .

NARS are working closely with farmers' organizations, seed companies, NGOs and other value chain actors.

- AVISA's partners were selected using criteria established by CGIAR to prioritize collaboration. Thus, for each crop, the area occupied by the crop based on recent data from the UN Food and Agriculture Organization was used to select priority countries:

- Level 1 countries: area covered by the crop is more than 1m ha, with available market segments and willing to collaborate.

- Level 2 countries: 200,000–1,000,000 ha, with available market segments and willing to collaborate.

- Level 3 countries: less than 200,000 ha, or country with civil unrest.

In addition to area occupied by the crop, a second criterion—the capacity of the partner— was considered. Each NARS program was assessed using the "ABI-Transform Breeding Program Questionnaire", available on the Excelling in Breeding platform. The data from these assessments present the comparative advantages of each partner. These results combined with the area of the crop in each country were used to define the contribution of partners to the regional activities, especially for population development and material testing.

The NARS partners are co-designing and co-implementing crop improvement activities with CIMMYT. Based on the two criteria above, some NARS, such as IER/Mali, INERA/Burkina Faso, ISRA/Senegal, ITRA/Togo, and IAR/Nigeria for sorghum, are co-sharing the development of regional pipelines.

Use of this model of collaboration is helping to develop the capacity of NARS in terms of their human resources, infrastructure, equipment, and technical expertise, which helps to sustain CGIAR's interventions.

IITA in Nigeria hosted the Dryland Crops Program partners, led by Kevin Pixley, for a visit to the cowpea experimental field in Wudil, Kano State, Nigeria.
Credit: Ousmane Boukar/IITA

Section 6: **CGIAR Portfolio linkages**

ACCELERATED VARIETAL IMPROVEMENT AND SEED SYSTEMS IN AFRICA'S INTERNAL PORTFOLIO NETWORK
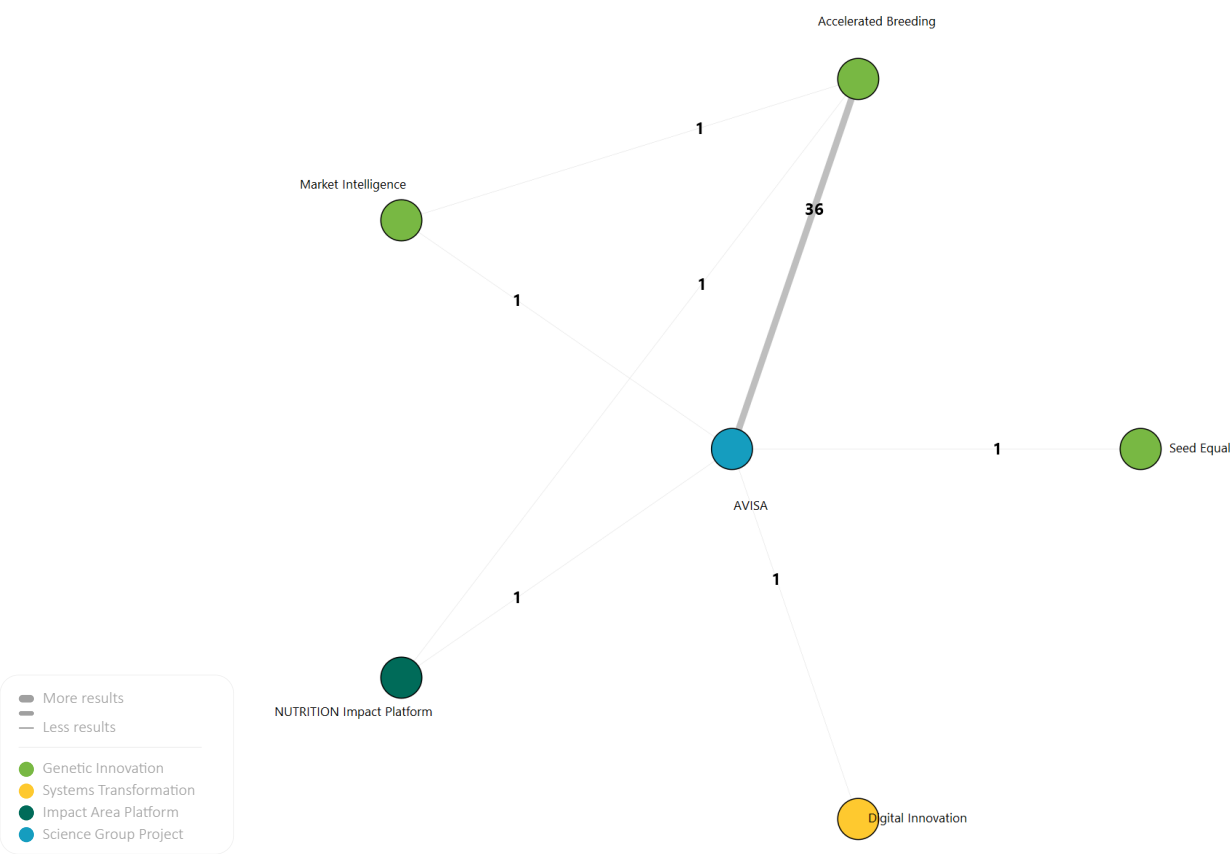
Connections are sized by the number of reported results. Collaborations where only one result was reported with a linkage between two Initiatives are excluded.

Portfolio linkages and Accelerated Varietal Improvement and Seed Systems in Africa's impact pathways

The AVISA-Transition Science Group Project has strong links with CGIAR's four Initiatives from the Genetic Innovation action areas. SGP WP1 has links to the Market Intelligence and Seed Equal Initiatives. WP2 and WP3 have links to specific Work Packages of the Accelerated Breeding Initiative. WP4 has links to the Seed Equal initiative. WP5 has links to the Breeding Resources Initiative. WP6 has links to the Transform Work Package of the Accelerated Breeding Initiative.

Halimatou Tinbin is a Research Assistant in Plant Pathology at the Institute of Rural Economy (IER), Mali. She is at the forefront in managing and understanding plant diseases to ensure crop health, yield and sustainability. Credit: Credit: Marion Aluoch/CIMMYT

Section 7: **Adaptive management**

RECOMMENDATION	SUPPORTING RATIONALE
Communication and Learning Enhance the use of multimedia approaches and other learning platforms for documenting and sharing project results	Incorporate a robust communication strategy in the project plans to facilitate the regular identification and dissemination of success stories and lessons learned. This strategy should encompass deliberate mechanisms for extracting noteworthy achievements and valuable insights from project activities. The use of multimedia approaches will allow partners and stakeholders to stay informed about the project progress and glean actionable insights from shared experiences. Different forms of multimedia will be useful as part of the knowledge management processes. We have limited learning platforms that bring stakeholders together . It is important that we encourage the sharing of innovative approaches/successful models.
Oversight and Monitoring, Evaluation and Learning at Work Package (WP) level A WP-level oversight of key performance indicators based on established baselines, set targets, and progress toward targets is needed. Develop a Work Package strategy, including a digitized reporting platform.	Communication of these aspects to implementers enables them to adapt their implementation strategies effectively. Moreover, it fosters an understanding of how their individual efforts contribute to the overarching project objectives and how these align with the work of other stakeholders toward a common goal. Facilitating such communication through project planning meetings ensures coordinated efforts and maximizes synergy among team members.
Strengthen Resource Efficiency and Innovation	Enhancing the skills and capabilities of NARS, junior scientists, and project partners through targeted capacity building initiatives is essential for the sustainability and effectiveness of the project. Collaboration with other institutions and leveraging CIMMYT programs fill existing skill gaps, ensuring a robust foundation for innovative research and implementation. Encouraging cross-disciplinary teams and cross-learning opportunities among different crops and CGIAR approaches enriches the knowledge pool, fostering a more integrated and innovative project environment.
Integrate and Enhance tricot Training and Utilization across All Partners	Expanding tricot training and its application among all partners is essential to enhance the scale and impact of on-farm trials. This approach not only broadens the scope of collaboration across different disciplines but also leverages success stories, like the ESA-groundnut tricot implementation, to build in-house capacity. Engaging partners in comprehensive training ensures a widespread adoption of tricot, fostering a robust framework for on-farm trial execution and data utilization, including the identification of gender-sensitive traits and the tracking of farmer adoption rates for tricot-selected materials.
Strengthen Data Management, Quality Control, and Infrastructure Support	Improving data utilization and coordination can be achieved by establishing clear hand-off processes and conducting regular advancement meetings. These practices ensure seamless communication and alignment across teams, enhancing overall efficiency. Streamlining data utilization and implementing robust data analysis are crucial for the integrity and effectiveness of breeding programs. By establishing clear processes and regular reviews, incorporating real-time feedback from field trials, and promoting a culture of modern analytics, we can continuously refine breeding practices. This ensures breeding programs remain efficient, relevant, and at the forefront of crop improvement research, fostering an ongoing culture of innovation and learning.
Promote Gender Equity and Policy Reform	Building gender-disaggregated data and enhancing the capacity for gender-sensitive agricultural policy research are critical. This recommendation underscores the need for empirical evaluations of gender gaps in technology adoption, food security, and market access. It also highlights the importance of structuring policies and support systems that address structural challenges to market access and resource allocation. Such efforts are essential for ensuring that AVISA interventions are inclusive and equitable and lead to broad-based improvements in livelihoods among women and all rural households.

Youth and Women Quality Centre (YWQC) Model for Enhanced Adoption of New Varieties in Tanzania

Youth observe a sorghum pinnacle at a farm in Tanzania. Through the Youth and Women Quality Centers (YWQC), the Centre for Behaviour Change and Communication (CBCC) promotes the demand for and adoption of improved seed varieties using social behavior change approaches. Credit: CBCC

Primary Impact Area

Other relevant Impact Areas targeted

Contributing Initiative

Accelerated Varietal Improvement and Seed Systems in Africa

Contributing Center

International Maize and Wheat Improvement Center (CIMMYT)

Contributing external partners

The Tanzania Agricultural Research Institute, The Centre for Behaviour Change and Communication · Five seed companies: Palvic Agro Co., Rieta Agroscience Co., Zasse Agricultural Seed and Food Co. Ltd, Mbozi Highland Economic Group Ltd., and Singidan Seed Co., Ltd.

The result builds on previous youth engagement work by the CGIAR Research Program on Grain Legumes and Dryland Cereals and by the "SEED Revolving Fund Initiative, Youth Engagement and Gender Inclusion" funded by the Bill & Melinda Gates Foundation.

Geographic scope [UPDATE MAP]
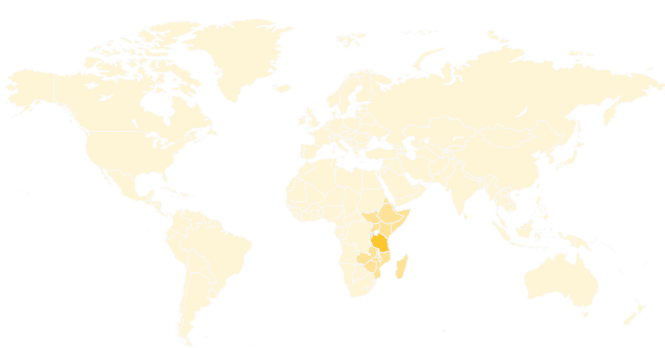
Region: Eastern Africa

Country: Tanzania

Low adoption of quality seed of new and improved groundnut and sorghum varieties is attributed to inadequate awareness among farmers, inadequate linkages to, and collaboration with, key value chain actors, perceptions on cost, limited participation of smallholder farmers in seed production, inadequate infrastructure for seed production and storage, and weak regulatory frameworks, among other factors.

To address these gaps in Tanzania and other African countries, and in partnership with the Centre for Behaviour Change and Communication (CBCC), we are operationalizing the Youth and Women Quality Centers (YWQC) concept in the Momba and Mbozi districts of southern Tanzania. The YWQC is a last-mile behaviour change community-led hub with the goal of increasing demand for and adoption of improved varieties through social and behavior change approaches. Currently, there are four operational centres targeting 21 villages and more than 4,313 smallholder farmers, mainly youth and women in rural underserved communities. Enhancing access to improved seeds is poised to create a lasting and beneficial impact on food security and poverty alleviation.

Key functions of the YWQCs in seed sector development include:

1. Creating and aggregating seed demand
2. Improving access to seeds, inputs, and modern technologies
3. Facilitating extension support and demonstrations
4. Supporting local seed production (e.g., using quality declared seed, a seed-producer implemented system for production of seed that meets at least a minimum standard of quality but does not entail formal inspection by the official seed certification system)
5. Facilitating business links with various stakeholders
6. Building the capacity of farmers and local seed multipliers/enterprises
7. Facilitating collective marketing of agricultural produce, enabling aggregators, off-takers, and processors to access quality produce
8. Collection and analysis of marketing information
9. Allowing farmers to access reliable and accurate market information. The YWQCs are managed by registered groups of youth and women champions under the guidance of dedicated extension officers.

YOUTH AND WOMEN QUALITY CENTERS' LAST-MILE BEHAVIOR CHANGE MODEL

The YWQC- behaviour change model, that puts the farmer at the centre and responds to their needs such as information, motivation, skills, access, linkages, opportunities, alignment with government, coordination, building synergies.
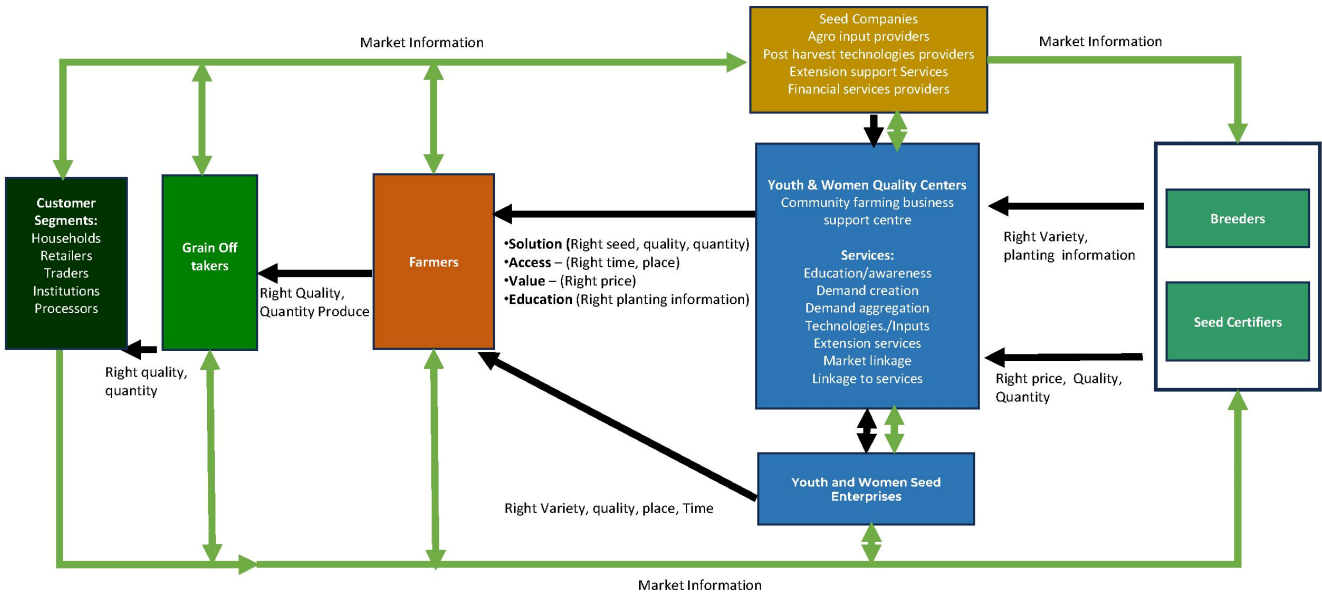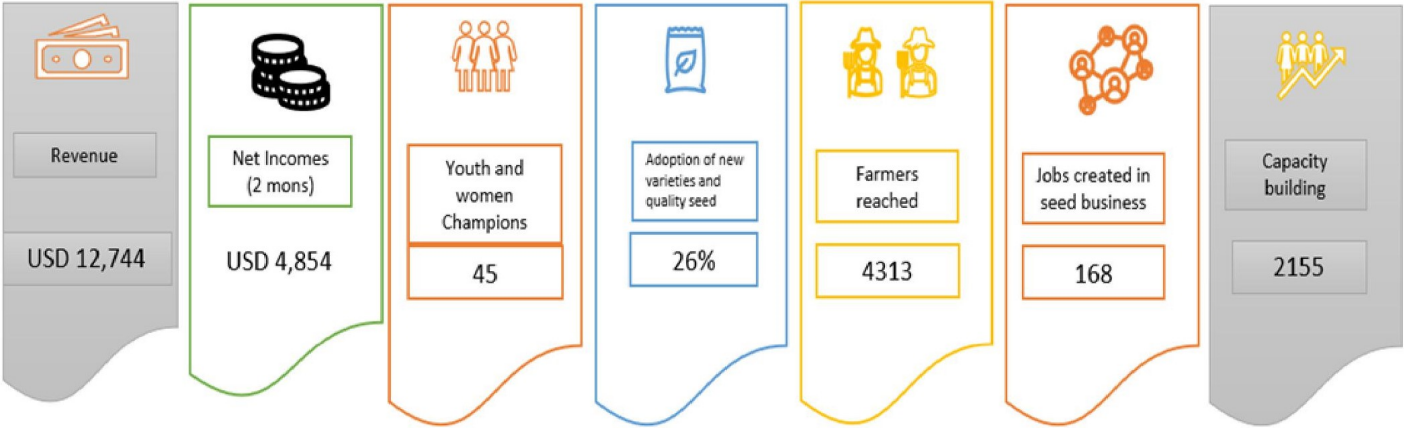

The project recruited and built the capacity of 45 women and youth champions to disseminate innovative farming techniques and technologies. They reached 4,313 farmers (44 percent male, 56 percent female) through social behavior change interventions led by youth champions. To increase the availability of seed of improved varieties at the last mile, 18 youth and women representatives received training on seed production protocols and guidelines and were certified to produce seed at "quality declared seed" levels, producing 8,872 kg (4172 kg groundnuts, 4700 kg sorghum) of quality declared seed in the 2022/2023 season. By availing seed to farmers in the project sites, the YWQCs created and consolidated demand for 10,000 kg of improved groundnut seeds from 1,660 farmers and 3,200 kg of improved sorghum seeds from 1,109 farmers. Partnerships have been forged with five seed companies, supplying 2,200 kg (1,200 kg sorghum, 1,000 kg groundnuts) of certified seeds, and collaborations with the Tanzania Agricultural

Research Institute (TARI) supplied 450 kg of certified groundnut seeds. In 2023, the YWQCs facilitated the establishment and supervision of 107 demonstration and tricot plots on sorghum and groundnut in conjunction with extension officers, TARI, and seed companies. The YWQCs also established partnerships with 15 social institutions including churches, schools, and farmer organizations to advocate for new, quality, and improved seed varieties in hard-to-reach last mile areas.

The tangible effects of these interventions were assessed through a cross-sectional study conducted in 2023 involving 1,194 farmers. The study revealed significant improvements in the adoption rates of quality seeds for sorghum, rising from 6.3 percent to 32.7 percent in the 2022/2023 season. Similarly for groundnut, there was a notable increase in adoption from 2 percent to 26.7 percent. Additionally, there was a discernible influence observed among women farmers, as evidenced by a slight rise in land allocation for these crops, with acreage increasing from 0.5 to 1 acre. Further, by enhancing the skills and knowledge of 2,155 women and youth in good agronomic practices, financial literacy, and postharvest management, 168 jobs were created in the seed business. The collective net income from the four YWQCs recorded in the last quarter of 2023 was US$ 4,854 from five revenue lines:

1. Equipment rental services

2. Commissions from marketing and sales of quality seed

3. Quality declared seed production and distribution

4. Commissions from marketing and sales of postharvest equipment

5. Commissions from marketing and sales of crop protection products.

Revenue	Net Incomes (2 mons)	Youth and women Champions	Adoption of new varieties and quality seed	Farmers reached	Jobs created in seed business	Capacity building
USD 12,744	USD 4,854	45	26%	4313	168	2155

The implementation of this project has provided insights into programs seeking to intervene at a community level using a social and behavior change approach that incorporates such models as the Youth and Women Quality Centre. To increase demand, adoption, and investment in seeds of improved varieties, it is vital to design a context-specific model that places farmers at the centre by addressing information needs, motivations, norms, and access, among other key concerns or our stakeholders.

Press release

https://www.kenyanews.go.ke/harnessing-innovation-and-data-to-ensure-seed-delivery/

Harnessing Innovation and Data to Ensure Seed Delivery

> Demand for new seeds of improved varieties among farmers, especially women, has increased. Initially, our farmers believed that only maize requires new seeds. After getting training from youth champions and the extension officers, in the last season farmers showed a great demand for improved seeds.
>
> District Agricultural Officer

> The Youth and Women Quality Centre has enhanced proximity to seeds and services. . . . Before, I had to spend Tshs. 3,000 (Kshs. 1,500) each way to travel to town to buy seeds; the Centre is close by and I only have to walk to the Centre to get the seeds.
>
> Woman farmer

> Through the Youth and Women Quality Centre, we expanded markets because it linked us with farmers who need improved seeds.
>
> MD, Rieta Agro-Science Tanzania

> When I came here, I didn't know there exist many names for groundnuts, I only knew about white groundnut and red groundnut. When I came to hear of Mnanje Naliendele varieties, I realized there are various varieties of groundnuts, each with a specific name.
>
> Youth in a focus group discussion

Front cover photo

A farmer proudly displays a harvest of groundnuts during a farmers' field day at the groundnut demonstration plot in Tanga Region, Tanzania.
Credit: Justin Butindi/TARI

Back cover photo

Hamath Diop is a seed producer from Senegal. He is also a member of COPAM cooperative which is involved in producing and selling foundation and certified seeds of sorghum and other crops.
Credit: Marion Aluoch/CIMMYT

CGIAR