CRAFT

Climate resilient value chains
for improved livelihoods

Annual Report
January – December 2022

Climate Resilient Agribusiness for Tomorrow Project

Submitted by SNV Netherlands Development Organization in collaboration with
Wageningen University & Environmental Research, Accelerating Impacts of CGIAR Climate Research for Africa , Agriterra and Rabo Partnerships

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List of Abbreviations

AGRF	Africa's Food Systems Forum
AICCRA	Accelerating the Impact of CGIAR Climate Research for Africa Project
AMFAT	Adaptation Feasibility Tool
ASAL	Arid and Semi-Arid Lands
ASDP	Agricultural Sector Development Programme
ASDP2	Agricultural Sector Development Programme Phase Two
BC	Business Case
CC	Climate Change
CC	Correlation Coefficients
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGIAR	Consortium of International Agricultural Research Centres
CHIRPS v2.0	Climate Hazards Group InfraRed Precipitation Version 2.0
CI	Climate Information
CIIF	Climate Innovation and Investment Facility
CIS	Climate Information Service
CO2	Carbon dioxide
COP27	27th United Nations Climate Change Conference of Parties
CORDEX	Coordinated Regional Climate Downscaling Experiment
CORE-Africa	COVID-19 Response & Resilience Initiative for Food Value Chains in Africa
COVID-19	Coronavirus
CRA	Climate Risk Assessment
CRAFT	Climate Resilient Agribusiness for Tomorrow
CRAFT	Collaborative Research and Adaptation for Food Security in Africa
CRDB	Cooperative Rural Development Bank
CRU	Climatic Research Unit
CRVA	Climate risks and vulnerability assessments
CS	Climate Smart
CSA	Climate-Smart Agriculture
CSA-EA	Climate-Smart Agriculture East Africa
CSA-MSP	CSA Multistakeholder Platform
D4A	Digital for Agriculture
DCCL	Dodoma Cement Company Limited
DFCD	Dutch Fund for Climate and Development

DFCU	Development Finance Company of Uganda Limited
DGIS	Directorate General for International Cooperation/MoFA
DLS	Diffused Light Stores
EABL	East Africa Breweries Limited
EAFFC	EA Fruits Farm and Company Limited
EE	Energy Efficiency
EKN	Embassy of the Kingdom of Netherlands
EKN	The Embassy of the Kingdom of the Netherlands
EOI	Expression of Interest
ESGF	Earth System Grid Federation
FAO	Food and Agriculture Organisation of the United Nations
FCDC	Foreign Commonwealth and Development Office
FDGs	Focus Group Discussions
FFD	Farmer Field Days
FFS	Farmer Field School
FGD	Focus Group Discussion
FIs	Financial Institutions
FLT	Farm-level training
FOs	Farmer Organisations
FtMA	Farm to Market Alliance
GAP	Good Agronomic Practices
GCM	Global Climate Models
GCMs	Global Circulation Models
GESI	Gender Equality and Social Inclusion
GHGE	Greenhouse Gas Emissions
Ha	Hectares
IAC	Investment Advisory Committee
ICPAC	IGAD Climate Prediction and Applications
ICSIAPL	Integrated & Climate Smart Innovations for Agro-Pastoralist Economies and Landscapes in Kenya's Arid and Semi-Arid Land's
ICT	Information and Communications Technology
IFDC	International Fertiliser Development Centre
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
IMEU	Inclusive Markets for Energy efficiency in Uganda
IR	Intermediate Result
KAIP	Kenya Agricultural Insurance Programme
KALRO	Kenya Agricultural and Livestock Research Organization
KAOP	Kenya Agricultural Observatory Platform
KCIP	Kenya Crop Insurance Project
KCSAIF	Kenya Climate Smart Agriculture Implementation Framework
KCSAS	Kenya Climate Smart Agriculture Strategy
KE	Kenya
KENAFF	Kenya National Farmers 'Federation
LoI	Letter of Intent
M&E	Monitoring and Evaluation
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MACs	Mobile Aggregation Centres
MADs	Ministries, Agencies and Departments
MAK	Makerere University
MAM	March April May
MCDA	Multiple criteria decision analysis
MEL	Monitoring, Evaluation, and Learning
MFIs	Micro Finance Institutions
MIS	Management Information System
MoA	Ministry of Agriculture (Tanzania)
MoFA	Ministry of Foreign Affairs
MoU	Memorandum of Understanding
MSP	Multi-stakeholder Platform
MSP	Multi-Stakeholder Platform
MTR	Mid-term review
MUARIK	Makerere University Agricultural Research Institute, Kabanyolo
MWE	Ministry of Water and Environment (Uganda)
NARO	National Agricultural Research Organisation
NBC	National Bank of Commerce
NDC	Nationally Determined Contributions
NDCPP	National Determined Contributions Partnership Plan

NDMA	National Drought Management Authority
NMA	National Meteorological Agency
NMB	National Microfinance Bank
OND	October November December
P'KWI	Popular Knowledge Women's Initiative Farmer to Farmer Coop. Society Limited
PhD	Doctor of Philosophy
PHH	Post Harvest Handling
PMU	Project Management Unit
PUE	Productive Use of Energy
QDPM	Quality-declared planting material
QDS	Quality Declared Seed
RCMs	Regional Climate Models
RCP4.5	Representative Concentration Pathways 4.5
RCP8.5	Representative Concentration Pathways 8.5
RE	Renewable Energy
RMSD	Root-mean-square-difference
RP	Rabo Partnerships
RPO	Rural Producer Group
SACCO	Savings and Credit Co-operative
SAGCOT	The Southern Agricultural Growth Corridor of Tanzania
SAL	Soybean Africa Limited
SD	Standard Deviations
SDGs	Sustainable Development Goals
SDM	Service Delivery Model
SHFA	Sustainable High-Value Agriculture
SHFs	Smallholder Farmers
SLS	Smart Logistics
SME	Small and Medium-sized Enterprises
SNV	Netherlands Development Organisation
SO	Strategic Objective
SOPs	Standard Operating Procedures
SoWs	Scope of Work
SP	Service Provider
Sub-IR	Sub-Intermediate Results
TA	Technical Assistance
TADB	Tanzania Agricultural Development Bank Limited
TARI	Tanzania Agricultural Research Institute
TMA	Tanzania Meteorological Authority
TOC	Theory of Change
ToT	Training of Trainers/Trainers of Trainers
TPB	Tanzania Postal Bank
TRAFORD	Transformation for Rural Development
TS	Time-Series
TZ	Tanzania
UDBL	Uganda Development Bank Limited
UG	Uganda
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNMA	Uganda National Meteorological Authority
VC	Value Chain
VSLA	Village Savings and Loan Association
WEnR	Wageningen Environmental Research
WFP	World Food Programme
WUR	Wageningen University and Research

Table of Contents

CRAFT in a nutshell in 2022

In May 2018, the Netherlands Ministry of Foreign Affairs awarded SNV[1] the Climate-Smart Agriculture East Africa project (CSA-EA – now known as the CRAFT) to be implemented in Kenya, Tanzania, and Uganda [2]. This five-year project, valued at approximately € 36 million, is being implemented by SNV in partnership with Wageningen University (WUR) and Wageningen Environmental Research (WEnR), Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA), previously Climate Change, Agriculture and Food Security (CCAFS), Agriterra, and Rabo Partnerships (RP).

The Climate Resilient Agribusiness For Tomorrow (CRAFT) project is private sector-led agribusiness intervention focused on promoting viable business cases (BCs) that are climate-smart (CS), inclusive, scalable and have a clear value proposition to all stakeholders, particularly smallholder farmers (SHFs).

The project applies science to understand how climate change impacts vulnerable value chains, namely soybean, sesame, potato, green gram, sorghum, common beans, and sunflower and assesses which risks affect them in East Africa. Whereas prolonged dry periods or high rainfall intensity are regarded as exceptional, they will likely become the new norm in the future. This type of information is used to raise awareness among agri-businesses about the risks are facing.
In summary, the project aims to:

1. Increase production and income for 300,000 SHFs through the adoption of climate-smart agriculture (CSA) practices & technologies in arable crop production farming systems.
2. Improve the business performance for 50 small and medium agribusiness enterprises (SMEs) and 30 cooperatives (25% of which are managed by youth and women) through accelerating investments and business growth in 5 selected value chains (VCs).
3. Promoting climate resilient and sustainable food production on 600,000 hectares (Ha) by creating an enabling environment for scaling CSA practices.

The CRAFT project is expected to leverage at least € 10 million in additional private sector investments. In 2020, as a response to the COVID-19 situation, the overall commitment was reduced by €3 million (from € 39 to € 36 million). This amount was repurposed upon request from SNV with approval from the donor, towards the COVID-19 Response & Resilience Initiative for Food Value Chains in Africa (CORE-Africa) project[3].

This annual report details the project performance and key achievements of 2022. During the reporting period, the project went through a learning process initiated by the Mid Term Review (MTR), and this generated lessons that have supported adaptive management at programmatic and program management side. The implementation learnings have generated evidence for advocacy and improvement of climate information service delivery, and increased VC actor engagement.

The implementation strategy of the CRAFT project is based on complementary interventions at three levels: (a) farming systems, (b) inclusive value chains, and (c) the enabling environment. Technical assistance and interventions target project stakeholders (farmers, SMEs, cooperatives, financial institutions, government agencies, etc.) at these different levels. The three levels are translated in the three workstreams guiding the implementation process to achieve the expected results at output, outcome and impact level. Then two cross-cutting workstreams: (a) Learning and Knowledge Sharing and (b) Gender and Youth inclusion will emphasize targeted interventions.

This year, project implementation focused on consolidating our efforts targets and working towards outcomes, learning through the MTR exercise, and taking corrective action where relevant. The project also continued to implement and offer support to active Business Champions (BCs) and facilitate the closure of some. While the project did not onboard new BCs, it issued an additional call for service providers in Uganda and Kenya. The project saw its influence increase on national and international platforms through evidence-based testimonies and documentation.

The COVID-19 pandemic had a significant impact on the local economies in the region, leading to an increase in food prices and production costs. This was exacerbated by the Ukraine Invasion, which, according to the World Food Programme (WFP), led to an increase (more than doubled) in fertiliser prices in the three countries. Additionally, fuel prices in the East African region rose by 17% - 75% in April 2022 year-on-year, further impacting farmers' ability to use farm machinery and transport and reducing their capacity to grow sufficient crops. These challenges have made it increasingly difficult for farmers to maintain sustainable agriculture practices and secure food for their communities.

[1] SNV- Netherlands Development Organisation
[2] Activity #4000000819
[3] COVID-19 Response & Resilience Initiative for Food Value Chains in Africa

Climate change had a significant impact on the weather patterns in different countries, affecting the cropping seasons. The eastern region of Kenya experienced its fifth consecutive drought in the last semester, while erratic rains in other parts disrupted farmers' cropping patterns. In Tanzania, the rainy season had a dry start, but there was an improvement in the second season, similar to Uganda. For more detailed country-specific information on the 2022 growing seasons, please refer to annexes I, II and III.

Key results

CRAFT works with a private sector-driven model, co-developing and co-funding climate-smart business concepts and cases with lead agribusiness small and medium enterprises (Agri-SMES) and cooperatives. Successful business case leads – 'Business Champions' (BCs) - implement the business case with project support. Business cases involve training and other extension services on CSA practices, technologies, and services, which are provided by the Business Champion to targeted SHFs. Each business case focuses on one of seven entry value chains- common bean, green grams, potatoes, sesame, sorghum, sunflower, and soybean. The value chains were selected based on their importance to the food system and climate risks.

The project interventions are designed to improve the climate resilience of the focus crops by supporting Agri-SMEs, cooperatives, and farmers to build resilient farming systems that increase productivity and reduce losses throughout the supply chain. The business cases serve various functions; aggregators, processors, or service providers (SPs) and enter into contract farming with SHFs to facilitate access to climate-smart inputs, services and technologies. The BCs' services are designed to advise, support and guide farmers from pre-planting to post-harvest handling.

The Climate Innovation and Investment Facility (CIIF) portfolio supported 56 business cases of which 15 are cooperatives and 41 are SMEs. Of these, 56 business cases, 20 are either women or youth-led SMEs. In 2022, CRAFT onboarded six additional business cases, including two SMEs, three SPs, and one cooperative. Due to the closure of business cases in previous years, the number of business cases in 2022 stands at 36 SMEs (including six SPs) and 15 cooperatives. Through the facility, CRAFT has triggered private sector financing of CSA technologies and practices amounting to €10,680,106 (not fully audited yet), against the target of €10 million.

At business level, the project works with trainers of trainers (TOTs) and agribusiness management to cascade CSA practices and technologies to smallholder farmers in their supply chain. To continuously improve the skills of extension workers and lead farmers, 1,586 ToTs and extension workers were trained. Climate change adaptation practices and technologies are promoted through 1,785 farmer field schools. To improve access to good quality seed, selected business champions supported the development of quality declared seed (QDS) plots to boost availability of the right varieties in their localities.

Figure1: CRAFT cumulative impact in numbers by 2022

This year, the project has achieved significant results and gained valuable lessons. A more detailed overview of the lessons is presented in section 5.

Results and lessons at the farmer level:

- A total of 116,555 SHFs trained, out of that, 53% (62,317) SHFs increased their income and 91,800 SHFs applied two or more climate resilient farming practices in the past 12 months.
- CRAFT reached a total of 81,210 ha of farmland under production, of which 44,835 have become more resilient to climate shocks.
- A total of €6,821,434 was invested by BCs in 2022 in implementing their CRAFT supported business case

- "Last mile delivery challenges" affect the adoption of CSA practices even though there is a positive trend in the adoption of CSA practices and technologies.

- The increased use of weather information is helping farmers make more informed decisions, with 25% of smallholder farmers reporting that they utilize weather information now. This is a crucial CSA practice to promote, particularly as performance of crops was affected by severe weather variabilities, affecting markets and production.

- Iimproved climate-resilient varieties are becoming more popular among smallholder farmers, with 26% reporting their use according to a recent farmer survey. However, the availability of sufficient quantities remains a concern.

- To enhance resilience, it is important to take a broader view of cropping systems. The CRAFT project has reinforced this by training 116,555 smallholder farmers on CSA practices and technologies for their cropping systems. Responses from farmers during focus group discussions conducted showed spill over from CSA practices and technologies to other crops grown by SHFs.

- Farmers reported improved capacity to deal with changing climatic and weather patterns through adoption of CSA technologies and practices. This is evidenced by the 70,049 of whose farming enterprise have become more resilient to possibleshocks. Additionally, 44,835 hectares of farmland have become more resilient to possible stresses and/or shocks, indicating the effectiveness of CSA practices in enhancing resilience.

Results and Lessons for SME/Cooperatives

- Input credit arrangements have expanded business revenue streams and built trust with farmers.

- The contract farming arrangement has guaranteed farmers' access to markets.

- Cooperatives 'service provision model strengthens the connection with farmers and is more inclusive.

- Working with and through agri-businesses is key to sustaining CSA interventions, especially seed companies respond well to increased demand for their products.

- Agribusinesses play a vital role in increasing the availability of CSA technologies to smallholders in the areas where they operate. In recognition of this, 480 SME representatives have been trained on CSA practices and technologies relevant to their company and/or value chain. This training helps ensure that agribusinesses are better equipped to support the adoption of CSA practices and technologies by smallholders in their area of operation.

Results and lessons for scaling and policy influence

– Based on implementation experience, the project has identified barriers to scaling such as inadequate quality of inputs, as well as constraints in accessing finance. These barriers have provided a basis for dialogue, such as the financial sector dialogue that was organised in Uganda to increase investment in CSA. As a result, the government-owned Uganda Development Bank launched its climate financing portfolio.

Summary of the main key CRAFT activities implemented during the year

The achievements above were accomplished through the implementation of key project activities, which are outlined below:

Workstream One:

Various CSA practices and technologies are promoted through the farmer field school approach. This year 1,785 farmer field schools were established training 116,555 farmers in the following topics:

- Use of climate-resilient improved inputs like drought-tolerant, pest-resistant, early maturing, high-yielding varieties of seed and seedlings by smallholder farmers.

- Soil testing (ensures localized soil amendment and resource utilization) and to ensure safe use and application of fertilizers and agriculture lime.

- Harvest and post-harvest management practices promoted, such as the use of threshers, tarpaulins, pics bags, collapsible dryers.

- Seasonal forecast and weather information dissemination which assists farmers in making decisions throughout the production season.

- Mechanization to improve production efficiency and effectiveness.

- Use of bio-stimulants (rhizobia) to boost productivity.

- Land and soil management practices and technologies (minimum tillage, nitrogen-fixing cropping, crop rotation, erosion control, reduced bush burning practices

Climate change mitigation practices and technologies include,

- Productive use of clean energy to preserve and conserve ecosystems (solar irrigation, solar or hybrid post-harvest handling technology, energy-saving processing equipment, vacuum storage– pics bags and silos).

Providing advice and training to smallholder farmers on climate smart practices, technologies, models, and climate smart services for the different actors in the value chain.

Workstream Two

- Supporting BC scaling and co-investment through CIIF with private sector SMEs, and farmer cooperatives, as well as leveraging investments by facilitating access to finance in collaboration with FIs. 51 BCs were active in 2022 and implementing their business case. Additional services providers were onboarded to deliver CS services to SHFs.

- Rabo partnerships conducted financial landscape scans in the three countries leading to identification of financial institutions to work with.

- Link with FIs for sustainability and scaling of the climate smart investments and strengthening capacity of FIs in integrating climate adaptation in their policies.

Workstream Three

- CRAFT is a member of the Kenya CSA-MSP and is integrating project learnings and training into five thematic working groups across a wide range of counties. In addition to this, CRAFT has supported the formation of ten sub-national MSPs within CRAFT's BC catchment areas to support the creation of an enabling environment for large scale roll-out of CSA. CRAFTs involvement in Kenya's CSA-MSP process has resulted into several outputs, including the launching of the CSA-MSP five-year Strategic Plan 2022-2026 (CSA-MSP Strategy) and CSA M&E Framework developed with input from the CRAFT consortium.

- CRAFT, the National CSA-MSP, and AICCRA organised the Gender responsive climate-smart agriculture science policy dialogue for Eastern, Central, and Southern Africa in Mombasa. A great emphasis was put on gender-responsive and socially inclusive answers with a specific focus on CSA further to address the needs of the most vulnerable societies.
- CRAFT organised a Climate talk dialogue 'Building Resilient Food Systems in Tanzania' which was hosted by The Embassy of the Kingdom of Netherlands (EKN) in Dar es Salaam. The dialogue involved various stakeholders from the Government of Tanzania, embassies, academia, research institutions, private sector and university students.
- To understand the available policies linked to agriculture in relation to climate change, a 'CSA policy landscape analysis' was conducted. The analysis aimed to support CRAFT's CSA policy influencing and advocacy agenda in Tanzania. It established strategic linkages with relevant stakeholders and project interventions for future sustainability.
- In Uganda, the consortium team spearheaded the formation of the Climate Smart Agriculture Multistakeholder Platform (CSA-MSP) , together with MAAIF Uganda and other key stakeholders.

Workstream Four

- Evidence and lessons from the project are documented and shared with the project team, partner organizations, and other key stakeholders for scaling and policy influencing both at local and national government level.

- Using scientific data and climate models, to perform climate risks analyses of targeted value chains and identifying business opportunities addressing climate change adaptation in the agri-food sector.

Workstream Five

- Inclusion is increasingly recognised by BCs. 44 BCs have taken actions to improve gender equality and have taken deliberate action around equal employment opportunities and creating a supportive work environment.

- 20 BCs are women and youth led.

- To-date, 248,883 smallholder farmers have been trained in CSA practices, with 54% women and 36% youth participation across the three countries.

Project Mid-Term Review: Main findings and adaptive action taken.

The CRAFT MTR was conducted from February to June 2022 and served a informative and learning-oriented purpose, rather than being summative and accountability-orientated. The review aimed to contribute to the understanding of the potential of the CRAFT approach using an innovative blend of climate science, capacity building at various levels, private sector subsidy and development, strategic/policy level engagement, and technical assistance to increase climate resilience in the selected value chains. The primary audience of the review was the consortium partners and the donor. The constructive feedback from the external reviewers was appreciated, although some findings required more contextualizing and a more in-depth understanding of the stage of implementation, especially regarding Business Champions (BCs) of the project.

The data available at the time of the MTR was only a relatively small and partial sample for the 24-month review, as only a few BCs had been involved in the project for at least 2 years. This had an impact on some of the findings and conclusions from the MTR team. The status of most of the visited BCs has changed dramatically in the past year due to longer participation in the project, whereby farmers show higher adoption rates of CSA practices and technologies.

Based on the MTR report and project management response and action plan, feedback from Ministry of Foreign Affairs (MoFA) suggested several areas for improvement and attention, such as understanding the changes at the farmer level and within their farming system, the sustainability of BCs who work with farmers, and the economic added value of their collaboration.

The MTR also helped the project identify gaps within the Monitoring, Evaluation, and Learning (MEL) processes, which were addressed through additional support and a MEL checklist, where the processes and data were checked to identify the gaps and an action plan developed to address them. Additionally, the team conducted a deeper reflection on the Theory of Change (TOC) and defined learning questions and analysis needs, including assessing whether the CRAFT project had achieved its objectives in the pathway to Sustainable High-Value Agriculture (SHVA). The team also analysed the CRAFT CIIF model to determine whether it was the appropriate approach and identified lessons learned around inclusive business cases. There was also a renewed focus on documentation to tell the CRAFT story more effectively, with a review of existing tools and plans to roll out additional tools in early 2023. The status of follow-up to the MTR recommendations is included in annex V.

Monitoring and data collection

CRAFT continued with close support and capacity building to BC staff to strengthen the monitoring process. The three countries worked with additional resources (interns, junior consultants) to enable closer follow-up and timely reporting by the BCs in the project's online database system. In 2022, the CRAFT M&E team conducted baseline surveys of BCs onboarded in 2022.

To track performance and outcomes of farmers, yearly annual surveys are conducted. This year, a sample of 12,202 (46% were females and 54% males) farmers were interviewed, with support from 38 BCs. To address observations and comments made by EKNs and MOFA, additional qualitative tools were developed to gather information that was not addressed in the earlier developed annual farmer surveys, and to answer some of the learning questions identified during this year.

Partner Contributions

CCAFS changed to AICCRA: The CCAFS programme of International Livestock Research Institute (ILRI) came to a close in December 2021 and was succeeded by a new programme, AICCRA. in January 2022. The AICCRA programme, which is supported by a grant from the International Development Association (IDA) of the World Bank, builds upon the achievements of CCAFS and leverages the expertise of former CCAFS staff. The programme aims to generate and share knowledge, develop climate-informed agricultural advisory services and decision-making tools, strengthen partnerships to deliver climate-smart innovations in agriculture and validate innovations in CSA through pilot projects.

AICCRA contributed to three major components of the CRAFT Project, namely 1) Climate information; 2) Policy alignment and advocacy; and 3) Scaling CSA. AICCRA, together with the other consortium partners, also contributes to regional capacity-building efforts across the three components, providing skills and knowledge to Agri-SMEs, farmer cooperatives, service providers and other stakeholders, to enhance the climate-proofing of selected value chains. Under policy alignment and advocacy, the team 1) catalysed

and facilitated CSA policy implementation (through workshop sensitizations and Multi-Stakeholder Platform (MSP) engagements and cascading policies), 2) identified implementation barriers for CSA policy advocacy and, 3) generated evidence for influencing policy reforms where necessary.

Agriterra's contribution to CRAFT in 2022 was focused on building bankable farmer organizations (FOs) and cooperatives. This was done through a combination of business plan development and capacity development based on the key institutional gaps identified within the FOs based on the cooperative assessments. The focus in 2022 was also on developing sustainable extension plans to ensure the continuation of services provided to members after the CRAFT project.

WEnR continued to support CRAFT by incorporating a climate change impact perspective. WENR worked on the development of suitability maps for all value chains (except for common beans) which were updated with the latest climate change projections. The potential of two relevant adaptation strategies that mitigate the effect of climate change on potato has been mapped out for the three countries. The combination of suitability maps with financial information to better understand the risks and exposures to clients of collaborating financial institutions was a new output and was presented at the COP 27 "Relevance of climate services to financial institutions for making climate smart investments decisions." In addition, WENR supported the MTR process, representing consortium partners, participating in interviews with the consultants, commenting on draft versions of the MTR and participating in different MTR presentations by the consultants.

Rabo Partnerships (RP) conducted financial landscape scans which led to the identification of finance institutions (FIs) to work with. This enabled the demonstration of the impact of climate change on FIs' loan and investment portfolio, credit processes, policies, and product design in the three countries.

WUR was supported by two PhD students assigned to the project, one based in Kenya and the other in Uganda. After completing their fieldwork in the first half of 2022, both students returned to the Netherlands during the second semester to engage in training activities, modelling, data analysis, and manuscript development.

Collaboration with other stakeholders and initiatives

The CRAFT consortium strives to work in collaboration with other stakeholders and initiatives. In line with this, the AICCRA team was able to access additional technical expertise from other projects that ILRI leads in Eastern and Southern Africa. For example, the AICCRA project formed linkages with IGAD Climate Prediction and Applications Centre (ICPAC) and other relevant stakeholders to access high-quality climate information to predict, manage, and respond to climate-related disasters and long-term climate change.

The links with the Dutch Embassies in the three countries were strengthened through a variety of activities and field visits, including shared visits to other projects. CRAFT Uganda has consistently supported business champions to exhibit their products and CSA technologies during the EKN-supported 'Orange pavilion' at the annual harvest money expo. In Tanzania, the Dutch embassy and CRAFT work closely in supporting interventions in the potato sector.

Relatedly, SNV teams in the three countries have applied the climate risk assessments (CRA) and climate information in other projects to make strategic decisions. For instance, in Kenya, the ICSIAPL (DESIRA) project - shared the CRA results with their MSP to inform interventions on fodder production and policy development issues. In Tanzania, the CRA results, and suitability maps were shared with WFP Food to Market Alliance. The climate smart projects multistakeholder forum in Uganda was used to share several CRAFT products including the CRA and suitability maps among others.

CRAFT linked with stakeholders in the finance space like AGRA, and ACELI at country and regional level, through SNV and RP. BCs which met the criteria of Aceli were linked to discuss possible funding and technical assistance options.

In Uganda, CRAFT contributes to National Initiative on Climate Change Adaptation and Resilience Building in Agriculture through Uganda's National Determined Contributions Partnership Plan (NDCPP). CRAFT reports on the quarterly achievements that feed into the adaptation implementation and capacity-building outcomes of the Uganda's NDCPP, coordinated by the climate change department under the Ministry of Water and Environment.

CORE-Africa, which was implemented by SNV, aimed to strengthen responses to the COVID-19 situation through nine MOFA-funded projects across Africa. In 2022, CRAFT collaborated with CORE-Africa around strengthening the resilience of farmer service delivery models, discussions around informal markets, and operationalizing resilience. More information about CORE-Africa is in workstream four.

WENR engaged in productive dialogues with different stakeholders. They presented the CRAFT program to the Ambassador of the United Republic of Tanzania to The Netherlands, H.E. Mrs. Irene F. Mkwawa-Kasyanju, and her staff members on March 10, 2022.

Project Implementation

1.0 Work Stream 1: Practices and Technologies for Farmer Systems and SMES

The project will test and facilitate the introduction of CSA practices and technologies and build the capacity of value chain partners to ensure that smallholder farmers and Agri-SMEs adopt CSA innovations.

SO 1 - Increased income for SHFs and SMEs
IR 1.1 – Increased adoption of CS practices and technologies among SHFs, SMEs and Cooperatives

In 2022, the primary focus was on supporting the granted business champions in promoting the adoption of CSA practices and technologies, climate services, and climate information at the farmer level, while building their business resilience against the challenges presented by climate change. The emphasis remained on improving access to climate-resilient seed varieties, promoting the adoption and application of recommended CSA practices and technologies, and providing access to climate-smart agricultural services and technologies. Progress against impact indicators is presented in table 1 below.

Table 1: Increased adoption of climate smart agriculture practices and technologies among smallholder farmers, SMEs, and Cooperatives

Indicator	Result period	Kenya	Tanzania	Uganda	Total
Ind.1 Reached number of smallholder farmers with increased income	Achieved in 2022	19,819	11,035	31,463	62,317
	Cumulative achievement up to 2022	33,293	29,366	68,690	131,349
Ind.2 Percentage increase in yield for selected crops due to application of CSA practices	2022	Common beans-(+66%) Green grams (-34%) Potato (+48%) Sorghum (-21%)	Potato (+15%) Common beans (-43%) Sorghum (-+16%) Sunflower (-+12%)	Soybean -(+16%) Sunflower - (-5%) Potatoes- (-38%) Sesame-(0)	N/A
Ind.3 Reached number of smallholder farmers whose farming enterprise become more resilient to stresses and/or shocks	Achieved 2022	21,837	11,308	36,904	70,049
	Cumulative achievement up to 2022	36,701	30,093	80,569	147,363
Ind.4 Number of smallholder farmers that have applied 2 or more climate resilient farming practices in the past 12 months	Achieved 2022	31,025	22,096	38,6781	91,800
	Cumulative achievement up to 2022	52,119	58,802	84,441	195,362
Ind.5 Reached number of hectares of farmland with agroecosystems that became more resilient to possible stresses and/or shock	Achieved 2022	15,133	8,335	21,367	44,835
	Cumulative achievement up to 2022	15,769	28,438	46,650	90,857

Ind.6 Number of SME business and cooperatives applying at least 2 climate smart practices and technologies within their business and/or value chain	Achieved 2022	9 SMEs, 5 Coops	13 SMEs, 4 Coops	14 SMEs, 6 Coops,	36 SMEs, 15 Coops

1.1 Indicator 1: Reached number of farmers with increased income

The proportion of farmers with an increase in income grew from 4% in 2021 to 51% in 2022. Uganda had the highest proportion of farmers with increased income at 58% followed by Kenya and Tanzania at 55% and 42% respectively. It should be noted, however, that the costs of production also increased during the year. In 2023 the project will specifically look closer and net income increases by farmers. In the table below one can observe that different value chains have a different impact on income increase due to various factors of which CSA adoption is one.

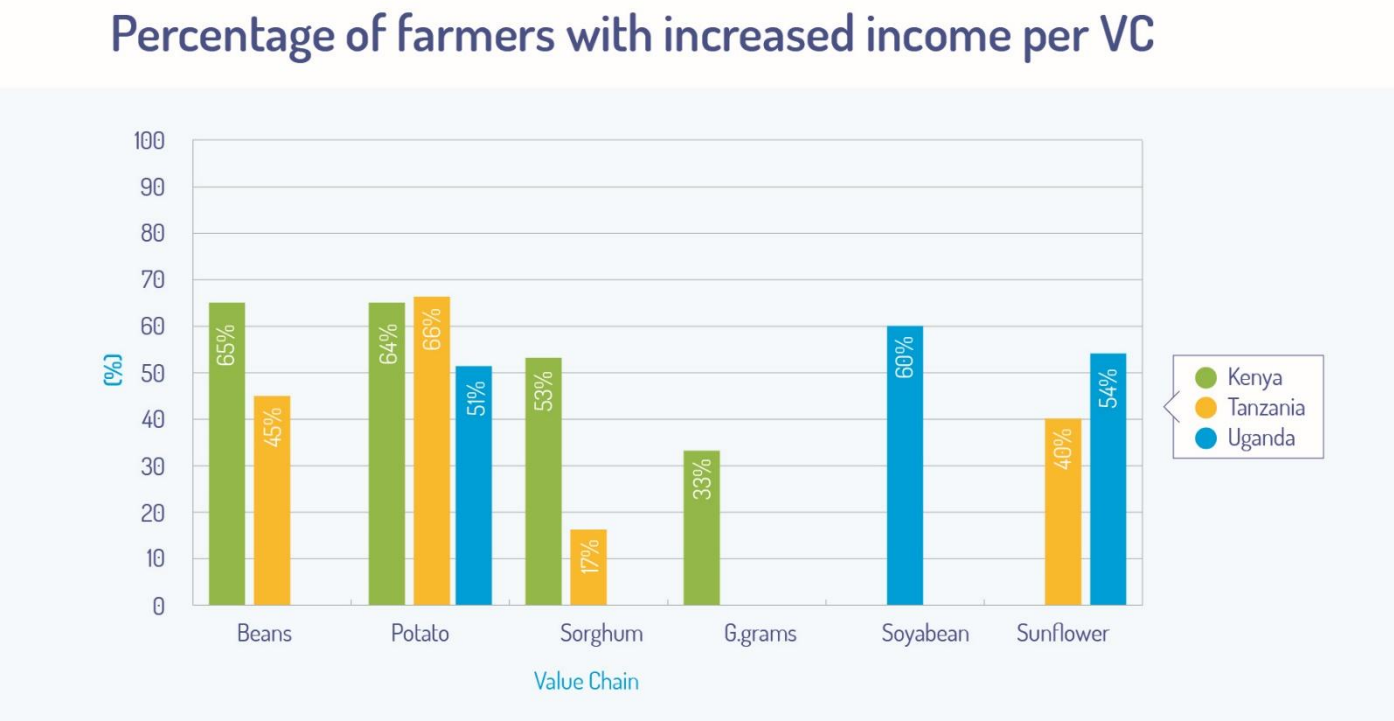

Figure 2: Percentage of farmers with increased income per value chain per country

In Kenya, all VCs experienced an increase in farmgate prices of 13%, 9%,34% and 32% in the common beans, green gram, potato, and sorghum VCs respectively. This was partly due to drought, resulting in produce scarcity in the market, pushing farmgate prices. However, the common beans and potato VCs had increased yields, which also contributed to the proportion of farmers with increased income. Market demand for sorghum for feed from other pastoral counties in North-eastern Kenya forced East Africa Breweries Limited (EABL), which is the main sorghum buyer, to increase prices to avoid farmer's side selling. It was noted that there were price differences based on market availability to farmers in different regions in the same value chain hence price variations were significant, especially in the potato VC. For example, farmers in Elgeyo Marakwet were affected by poor prices from brokers due to difficulties in accessing the market caused by hilly topography and poor roads with limited means of transportation.

In Tanzania, the increased income for farmers in the potato value chain was due to the high adoption of CSA practices and technologies, such as improved seeds, which resulted in increased yields. However, there was a decrease in farmers' incomes in the common bean, sunflower, and sorghum value chains. This was due to fluctuating weather patterns, particularly prolonged rainfall in the sunflower and common bean growing areas, which limited productivity4. In the sorghum growing areas, there were prolonged dry spells that affected crop yield.

4 In 2023, CRAFT plans to conduct a study that compares the average crop yields between CRAFT farmers and non-CRAFT farmers. This study will provide concrete data to support the anecdotal testimonies that the adoption of CSA practices can result in better yields even in the face of weather fluctuations.

In Uganda, Potato farmers revenues per unit area were highest and this is attributed to the high margins of the potato crop compared to other value chains. The acreage per farmers is however affected by the hilly topography along which potato is cultivated. The hilly terrain makes it difficult to cultivate large pieces of land due to land management activities involved. Marketing was also affected by produce transportation challenges as the hilly terrain does not permit accessibility by vehicles or motorcycles. Transport of potato to bulking centers is done by foot. Sesame value chain market was highly affected by quality of seed which resulted in mixing different varieties at planting. The buyers could only procure a pure variety. Farmers resorted to consuming sesame in the households. Although this contributed to food security, it affected BC and farmer income streams. Drought in the sunflower producing regions of Uganda affected crop performance although compared to other crops, the promoted drought tolerant sunflower variety withstood the harsh conditions. The drought affected the expected yield and hence income of the farmers especially in Eastern and North-eastern parts of Uganda.

1.2 Indicator 2: Percentage increase in yield for selected crops due to CSA application

The target for all countries per value chain was to achieve an increased yield of 20%. The table below shows a wide variation in yield change among the various crops and between countries. The yield is influenced by many factors such as climate variability, dry spells, flooding, availability of improved climate resilient seeds, agro inputs. This section of the report will show that adoption of CSA practices and technologies have a positive influence on yield, but sometimes extreme weather events can set farmers back5.

Table 2: Percentage change in yields by value chain and country

Value chain	% increase/ decrease in yield		
	Kenya	**Tanzania**	**Uganda**
Common beans	66%	-43%	-
Green grams	-34%	-	-
Potato	48%	15%	-38%
Sorghum	-21%	-16%	-
Sunflower	-	-12%	-5%
Soyabeans	-	-	10%

In Kenya, the Arid and Semi-Arid Lands (ASAL) areas where sorghum and green grams are predominantly grown were severely affected by drought due to failed rains despite farmers adopting improved varieties. With the use of improved seeds, coupled with water and soil conservation practices such as ripping, farmers were able to avoid total crop loss. However, it was noted that most farmers growing green grams kept the produce for household consumption and as seed for the next growing season. Compared to the baseline period, common beans and potatoes saw a significant increase in the adoption of improved varieties from 21% to 69% and 24% to 52% respectively. This was due to the use of improved varieties which were relatively new to the value chains, which is a major contribution of CRAFT. It is noted that regions perceive first and second season differently with some areas such as Eastern

"I used to practice local farming methods on 8 acres and only harvest 600kgs-800kgs of sunflower until I learned good agricultural practices through the farmer field schools, including the use of improved seeds, space planting, following a crop calendar with weather information, timely planting, and pesticide use. Now, I can harvest 800kgs-1000kgs on just 3 acres, a significant increase in yield and income," says a farmer from Tanganyika DC.

Kenya considering the OND season as the more reliable rainfall season and other areas preferring the MAM long rains season. The second season in potato growing areas starts early around July/August and has early cessation around November.

In Tanzania, the potato value chain has shown an increase in yield per acre compared to the other value chains. The improved yield in the potato value chain can be attributed to increased awareness among farmers of the importance of using improved seed varieties and appropriate fertilizers. However, other value chains experienced a decrease in productivity, mainly due to weather fluctuations such as extreme drought in Dodoma and Singida and floods in Mtwara, Ruvuma, and Njombe.

In Uganda, the 16% increase in yield for the soybean VC is attributed to the technologies that have been promoted during project delivery. Use of improved soybean seed varieties that are drought tolerant, early maturing and high yielding and the application of

5 In 2023, CRAFT plans to analyse the relationship between the increase in crop yield and the adoption of CSA practices and technologies.

biofertilizer (rhizobia) facilitated yield increase. Among the soybean SHFs, adoption rate of these technologies was faster due to availability of services. CRAFT partnered with soybean seed breeder and distributor (Soyabean Africa Limited) which distributed foundation seed to local seed businesses and improved seed to SHFs. Availability and subsidizing inputs (seed and fertilizers) significantly increased productivity and adoption rates of these technologies. Equally, bundling of services by service providers scaled their access and availability.

1.3 Indicator 3: Reached number of SHFs who become more resilient to stresses/shocks

Overall, 60% of farmers became resilient to possible stresses and/or shocks which was measured by farmers who reduced crop loss against the climate risks they were facing. 79% of farmers adopted 2 or more CSA practices and technologies. In Kenya, out of the farmers who became resilient in 2022 from baseline, 26% were from the potato value chain, 50% were from sorghum value chain and 14% from the common beans value chain and 10% were from green grams value chain. In Tanzania, out of farmers who became resilient in 2022 from baseline, 69% were from potato value chain, 50% were from sunflower value chain, 47% were from common bean value chain and 34% were from sorghum value chain. In Uganda out of the farmers who became more resilient in 2022, 73.9% were soyabean farmers 16.4 % were sunflower farmers and 9.6% were potato farmers. This percentage validates the adoption rates under each value chain.

Table 3: Percentage of farmers experiencing climate risks

	Kenya		Tanzania		Uganda	
Climate risks farmer experience	**Baseline**	**Review 2022**	**Baseline**	**Review 2022**	**Baseline**	**Review 2022**
Flooding before the end of growing season	19.5%	13.0%	12.5%	1.9%	16.3%	10.2%
Drought (increased dry days)	54.9%	70.9%	17.7%	56.8%	28.1%	34.6%
Prolonged rainfall during wet season	37.9%	25.3%	28.9%	9.9%	20.5%	14.7%
Prolonged drought during drought season	50.2%	66.9%	11.5%	26.7%	25.9%	29.7%
Storms during wet season	21.9%	19.2%	9.8%	8.6%	12.6%	7.0%
Pests and diseases during wet season	74.4%	66.0%	51.4%	44.8%	29.9%	25.8%
Pests and diseases during dry season	53.9%	53.2%	19.4%	19.8%	25.8%	26.0%
Landslides	4.5%	4.1%	5.4%	3.4%	0.9%	1.4%
Bushfires	3.5%	5.8%	0.9%	1.5%	4.8%	4.8%

The main CSA practices and technologies promoted by CRAFT have been based on the main climate risks that farmers are experiencing. The adoption of different CSA practices and technologies contributes to the farmers' economic, ecological, and social resilience. Hypothetically those who perceive changes in climate risks adopted one or more CSA practices and technologies to reduce the negative impacts associated with climate change.

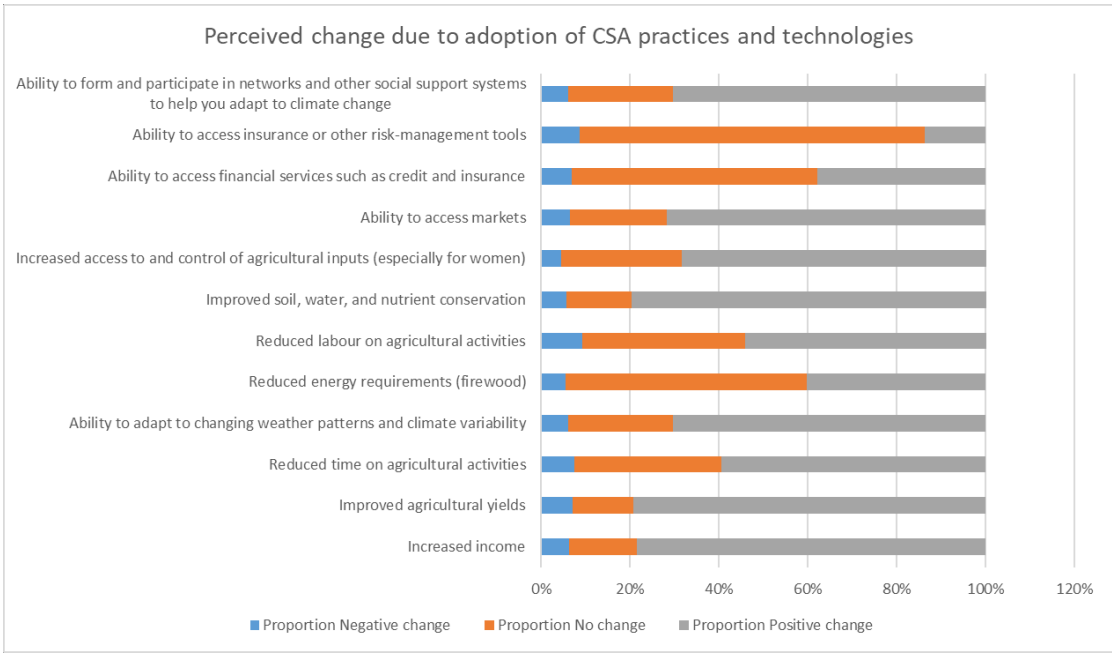

Figure 3: Perceived changes from the adoption of selected CSA practices and technologies

APPLICATION OF CSA LEARNINGS BY SHFS TO OTHER CROPS

Most of the farmers report a mixed farming system applied over the past year. The farmers and BCs report a clear spill over to other crops within their farming system or business. The main CSA practices and technologies that have spilled over to the whole farming system are mulching, integrated soil fertility management, integrated pest and disease management, the use of improved varieties,

soil testing and use of mechanized services such as threshers, planters, harrowers, rippers, chisel, and disc ploughs. Understanding of the changes at farmer level adapting to the changing weather patterns, includes their farming system. Therefore, the project has been given more attention understanding the overall farming system, and decisions farmers make within the farming system. Farmers decide to grow different crops or change seasons. In Uganda through a workshop on farming systems, the project supported the business champions to understand and classify, within their supply chain, the typology of farmers and their farming systems to understand how a farmer can switch between crops considering the changing weather variability and practices.

In Kenya, 97% of farmers in 2022 had more than one crop in their farms. This highlights the importance of intercropping, which is a key CSA practice that helps to improve household food and nutritional security. To reinforce the value of intercropping, the project integrated it into the CSA curriculum, emphasizing the benefits of having different crops interact with each other. Farmers indicated that despite the impacts of climate change, maize is a major part of their household's food security, and they will continue planting. In the Rift Valley where long series maize is mainly planted and farmers through CRAFT became aware of short series maize which are early maturing, and some farmers adopted these new varieties and others are willing to adopt based on access to seed. Some farmers are also opting to venture into high valued crops such as Canola and pyrethrum which can be harvested more frequently to increase their on- farm incomes. Overall, availability of reliable markets with fair commodity prices was seen to be the driving factor to what crops farmers chose to plant.

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BEANS ARE A POTENTIAL COMPLEMENTARY CROP IN A POTATO FARMING-BASED SYSTEM.

Plant growth and development depend on nutrient sources, making nutrient management crucial to maintaining or increasing crop yields on a single agricultural parcel. Consistent soil fertility is necessary throughout the growing season, requiring regular soil testing to determine available and limited nutrients. Vibinjo, which operates in Igoma and Iyungilo villages in Njombe TC, conducted soil testing to raise awareness and enable appropriate farming input application. The test results informed members on the right dosage of fertilizers, chemicals, and other necessary input.

Vibinjo members are potato farmers who use all sets of fertilizers, including basal dressing-DAP and NPK, and top dressing such as CAN, Urea, and NPS. These fertilizers have a long residual effect in the soil, benefiting other short-cycled crops like common beans. To better manage soil, Vibinjo members use crop rotation, emphasizing the use of common beans in early March after harvesting potatoes. The nitrogen fixation traits of beans enrich the soil with this key nutrient, enhancing crop productivity.The system has boosted the yield of farmers visited in Igoma and Iyungilo villages, who reported a yield of 450kg from just a 0.5-acre farm size, unlike the normal yield of about 300Kg/acre. This approach has the potential to complement climate resilience for smallholder farmers, with potatoes leaving residue fertilizers that could benefit beans and beans contributing to productivity enhancement as nitrogen fixers.

1.4 Indicator 4: Application of climate resilient farming practices in the past 12 months

In 2022, 79% of farmers adopted more than two CSA practices and technologies, up from 75% in 2021, across all three countries. Kenya had the highest adoption rate at 86%, followed by Tanzania at 84%, and Uganda at 71%. The challenges reported by farmers to apply the promoted practices included lack of finances to buy seeds and inputs, the timing of training and seed provision (especially after farmers have already planned or planted), and unfavourable weather patterns. Below are the top five CSA practices and technologies among smallholder farmers, as determined by the results of the annual farmer surveys.

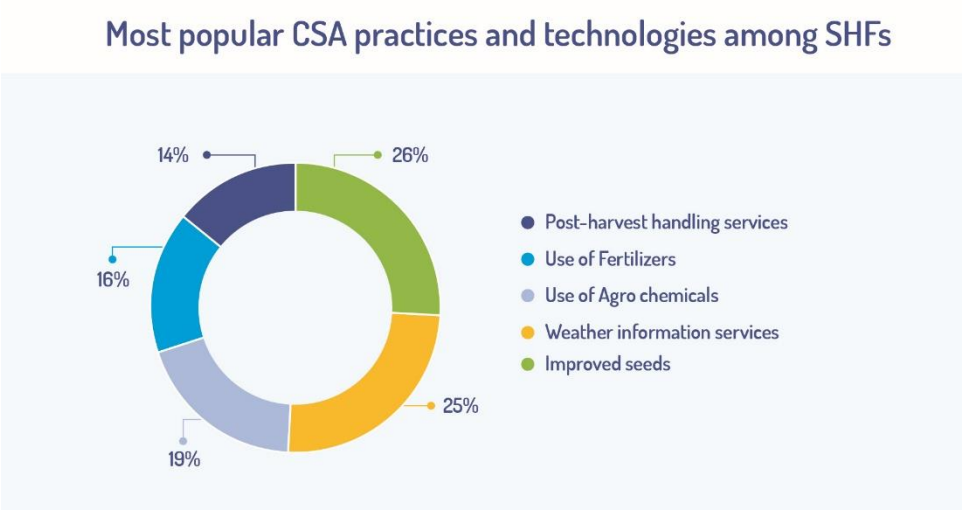

Figure 4: Five most popular CSA practices and technologies among SHFs

The CSA practices were grouped into five categories:

- use of improved varieties,

- soil and water conservation and management (e.g., conservation agriculture, land opening technologies, terracing, irrigation),
- soil fertility/nutrient management (e.g., soil testing, growing of nitrogen-fixing legumes, using a combination of fertilizer and manure),
- post-harvest practices and technologies (e.g., appropriate storage equipment, mechanized threshers, cold storage),
- Crop and field management practices, including agroforestry.

USE OF IMPROVED VARIETIES

Table 4: Use of improved varieties per value chain

VALUE CHAIN	EVALUATION PERIOD	% OF FARMERS USING IMPROVED VARIETIES		
		Kenya	Tanzania	Uganda
Potato	Baseline	24%	62%	30%
	Review 2022	52%	95%	27%
Sorghum	Baseline	66%	17%	
	Review 2022	80%	38%	
Common beans	Baseline	21%	6%	
	Review 2022	69%	54%	
Sunflower	Baseline		24%	72%
	Review 2022		62%	85%
Soyabeans	Baseline			72%
	Review 2022			85%
Green grams	Baseline	25%		
	Review 2022	53%		

In the table above, we observe an increase in the use of improved climate resilient seeds across the various crops. Also, when farmers are interviewed, they mention the adoption of climate resilient varieties as the number one technology they practice.

POST-HARVEST MANAGEMENT PRACTICES AND TECHNOLOGIES

In Kenya, the use of improved varieties increased across all VCs. Decentralization of seed multiplication sites through the BCs near farmer locations led to an increase in adoption of improved varieties of seed potato and common beans. However, demand for seed potato exceeded supply limiting the use of improved varieties by farmers. Due to drought and unreliable rainfall in 2022, use of drought tolerant and early maturing varieties of sorghum, common beans and green grams value chains increased as farmers could harvest crops that reached maturity stage without being severely affected by early cessation of rainfall. For common beans, Nyota, Angaza and Faida were the new improved iron-rich bean varieties that CRAFT promoted. Due to high demand and reliable market for sorghum, farmers adopted drought-tolerant seed varieties to maximize production. As green grams are the preferred crop in the ASAL areas, farmers adopted even more drought-tolerant varieties such as Biashara and Ndengu tosha as opposed to the known N26 and KS20 varieties.

In Tanzania, there was high use of improved potato varieties. Despite the high prices of clean quality seed potatoes, farmers still invest since the profit margins in potatoes are good. The use of improved varieties at baseline was still high at 62% but there was a significant increase to 95% in 2022. Availability of drought tolerant sorghum varieties increased due to collaboration between three business champions, of which one was a seed company supplying the seeds to the contract farmers of the two sorghum aggregators.

In Uganda, comparatively, uptake of improved seed for the potato value chain is significantly low compared to other value chains. This is partially attributed to low seed potato availability from the breeder/research station which affected accessibility to smallholder farmers. Potato farmers who have access to credit are adopting much faster than farmers who have no credit due to the high cost of production. Sunflower and soybean value chains realised 13% increase in uptake of improved seed variety. This is attributed to extension approach model of demonstration of priority climate smart technologies that have high results, are accessible and affordable for SHFs.

WATER AND SOIL CONSERVATION AND MANAGEMENT

Water harvesting and management have been the most feasible and affordable water conservation technologies among smallholder farmers. This is due to their affordability, given the low margin crops were prioritised. Some technologies such as irrigation were affected by water table variations, cost of equipment and availability of the equipment in most rural settings. Through the local service providers, farmers were exposed to land management techniques such as soil ripping, terracing, water traps which are being practised at smallholder level.

Image 1: A farmer in Nakuru observing soil and water conservation practice (mulching) ahead of potato planting season.

In Kenya, conservation agriculture and terracing were the main water conservation techniques adopted across all value chains. Mechanised land opening (ripping, subsoiling, chiselling) for water conservation purposes was highest in the sorghum and potato value chains. There was also a high adoption of earthing up in the potato VC. The use of mulching was reduced in 2022 in the sorghum and green grams VC due to competition of the practice with crop residues for livestock feed with the increasing drought. The use of zai pits and planting basins was more commonly adopted by farmers in the sorghum VC. There has been a general upward trend in irrigation except for the common beans VC. This might be linked to the increase in dry days and reduced seasonal rainfall that was experienced in 2022.

In Tanzania, an increase in adoption of ridges and contour farming has been vivid in most parts of southern highlands, especially in areas which are prone to erosion and receives high rainfall at the start of the production season *i.e.,* mid-December to end of February. For the past three years such practices were mostly in common bean production areas, however in 2022/2023 season, the practice appeared to have been adopted by sunflower and potato farmers; the main reasons being to improve nutrition around the root zones, creating a drainage channel to protect plants from root-air suffocations during heavy rains, and lastly as a control to soil erosion. Inter-cropping has increased across all the value chains whereby common bean and groundnuts are preferred to provide green manure and/or a cover to maize, sunflower and coffee. The reason for increased adoption is that farmers consider intercropping as a risk-management practice to the changing weather which may sometimes result in complete loss of one crop. In southern highlands of Tanzania, two BCs, Isowelu and EAFFC supported farmers piloting two types of irrigation technologies; furrow and drip systems to supplement the required amount of water to support plants to maturity.

In Uganda, soil and water conservation and management practices were implemented according to the environment, soil condition and topology. The extension training message and advisory for SHFs in Kisoro focused more on crop management and land management- contour farming, terraces, strip cultivation and crop rotation with cover crops (climbing beans), to reduce and slow down runoff due to the slopy land terrain. This explains the 21% adoption of water management and soil conservation practices among potato farmers in Uganda. Majority of farmers for Sunflower, Soybean and Sesame in the eastern, northern and central regions prioritised soil fertility management to improve soil nutrients r.

SOIL FERTILITY AND NUTRITION MANAGEMENT

CRAFT has put effort into training farmers on improving the overall soil health. Beside the safe use and handling of agrochemicals, farmers have applied organic manure in their field to improve soil structure, mulching has also been used to preserve soil nutrient, water, and increase soil structure. Leguminous crops have been favoured during crop rotation since they add nutrients to the soil and do not require the use of inorganic manure. In all applications, the project ensured that the agro-chemicals were safely stored and applied by trained people. This helped in reducing deleterious effects of the chemicals on the environment as well as protecting humans from related health risks.

In Kenya, there has been an increase in the uptake of soil testing services for all VCs and optimal use of inorganic fertilizers in the green grams and sorghum value chain. Overall, 6% of farmers have adopted soil testing with 98% being from the sorghum and potato value chain. The availability of the services and the affordability of the service remains a challenge. Moreover, the technical understanding of the importance of soil testing, although emphasized through training, needs to be reinforced for most farmers. Linkage of soil-testing service providers to BCs has enabled easy facilitation of providing the service to farmers by the ToTs. ToTs work with the service providers in collecting the soil samples from the farmers and delivering the results of the tests to the farmers. Soil testing has contributed positively to soil nutrition as farmers can now optimally use fertilizers that are suitable for the specific crop grown to maximize production. CRAFT Kenya signed an MOU with Cropnut Laboratories; a soil health and nutrition company that has been training ToTs on soil health and nutrition to support improvement in crop productivity and sustainable land use. For the green grams and sorghum, 18% of farmers in both VCs are now using inorganic and organic fertilizers with 16 % of them combining the use of fertilizers with manure.

In Tanzania, Soil fertility management aims to store more water and sequester carbon in soil; In potato production area the use of fertilizers has drastically increased due to several efforts done by the project including farmers trainings conducted through FFS and input pre-finance scheme promoted by CRAFT through engaged partners like Isowelu cooperative in 2022 whereby 50% of cooperative members benefited from the input loan. Unlike potato, sunflower, sorghum, and common bean growing areas the use of

farmyard manure is still high. Farmers used manure during planting as the main source of nutrients and later supplemented it with foliar fertilizers. In Southern highlands the soils are mainly characterised with a low Ph which hinders the uptake of nutrients by the crop. This year a lime company was contracted to offer soil testing and lime to selected farmers. This led to opening up of a new market for the lime company who normally only supplied large scale farmers.

CROP AND FIELD MANAGEMENT PRACTICES

As part of its learning agenda, the project in the recent farmer reviews sought to establish the best extension model, which the farmers consider helpful in understanding climate-smart agricultural practices and technologies. The farmers' response indicates that practical field training is most appreciated. The project has also observed higher participation rates by women in field training and higher participation rates by men in classroom-type activities. Trainers who are local and understand local challenges are most appreciated by farmers.

The TOT model is also appreciated by farmers as a good approach of reaching many farmers, but the project recognizes the importance of providing sufficient practical exposure and training to the TOTs to adequately transmit climate-smart practices and technologies to farmers.

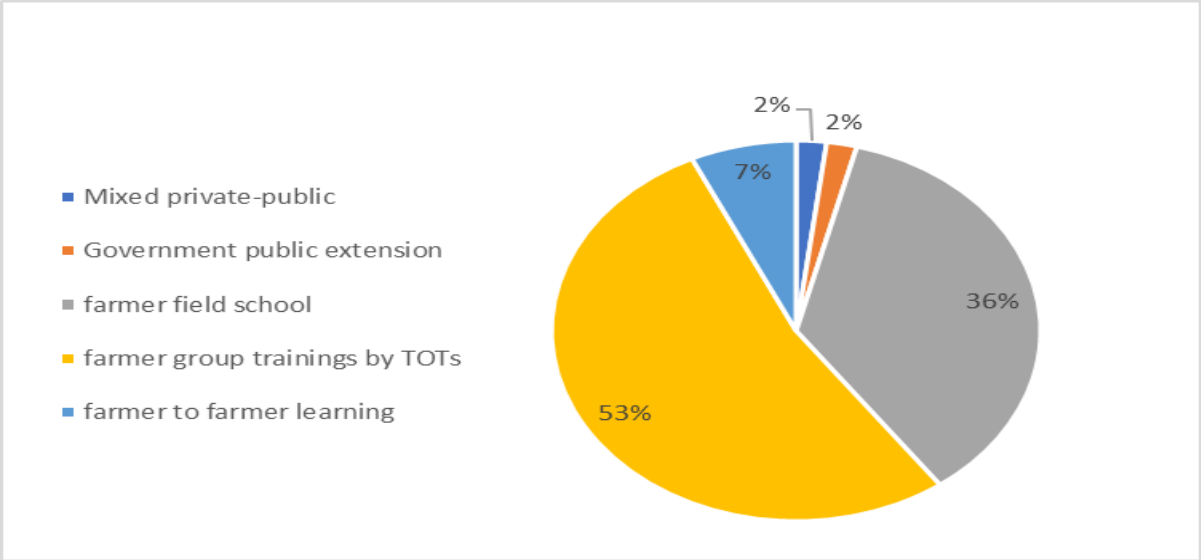

Figure 5: **SHFs preferred extension model**

This has been promoted by use of improved and stress-resilient crop varieties, recommended planting methods and land preparation through minimum soil disturbance and use of mechanization where applicable, proper agrochemical handling, integrated pest and disease management, proper application of herbicides and use of bio stimulants. Agronomic practices including early land preparation, early planting and seed selection were said to be very critical in terms of crop performance. Some farmers especially those that could not afford investing in expensive CSA practices, adopted GAP and crop management practices including timely weeding, crop inspection to detect pests and diseases, planting in rows and ensuring that the crop achieves the expected maturity. These management practices have been embraced by most soyabean and potato farmers and their contribution towards crop yield has been observed and reported by SHFs. Early planting significantly contributed to enabling crops especially soyabean to escape drought and pest attacks.

In Kenya, 43% of farmers practiced agroforestry with many more having trees in their farms. Farmers in Mau Narok specifically noted the impacts of deforestation on the local climate sighting reduced rainfall and frost.

In Tanzania, Agroforestry at farm level is used to counter the effects of high intensity and poorly distributed rainfall. According to TEMNAR, farmers mentioned adaptation and mitigation factors in the CSA components. In sunflower fields, farmers introduced tree varieties from the manuka family (attracting bees and its leaves decompose quickly to release nitrogen), this practice was introduced to boost pollination hence contributing to the overall increase in productivity.

In Uganda, agro-forestry was more adopted in Kisoro to prevent soil erosion on steep slopes.

POST-HARVEST MANAGEMENT PRACTICES AND TECHNOLOGIES

In Kenya, post-harvest loss was mainly experienced by farmers in the potato value chain. For potatoes, at the time of maturity, de-haulming becomes a challenge to the farmers during harvest as the brokers like to see green crops in the farm before they bargain the purchase price. Most potato VC farmers prefer to sell immediately after harvest to avoid post-harvest losses. Depending on the variety grown, varieties with long dormancy periods have reduced losses. The common variety grown, Shangi, is highly susceptible to PHL and farmers who keep the harvest for market speculation often lose out on quantity sold from rotten potatoes. Only a few farmers use the recommended aerated storage bags. The use of the recommended storage facilities is also limited due to unavailability and the high cost of setting up the storage facilities. In common beans, green gram and sorghum value chains, deterioration of grain occurs due to increased moisture level and improper storage. Due to demand of aflatoxin free produce of sorghum, BCs such as Quinam and Sopa have been linked with the service producer and county governments to supply aflasafe; an

aflatoxin control product, to farmers. This has reduced rejection of the produce by buyers, hence increasing volumes purchased from farmers.

In Tanzania, farmers were supported with various equipment and technologies such as moisture-meters, weighing scales, pallets and tarpaulins that were mainly used in the quality control mechanism and assisted farmers in the minimization of post-harvest losses. Other business champions trained farmers on post-harvest handling practices, which started at the harvesting period through storage. Such practices included proper harvesting, sorting, bagging, transporting and storage.

Image 2: Potato farmers working with Starlight Cooperative learning about pest management and control practices in Nakuru.

In Uganda technologies like use of tarpaulins, pic storage bags, potato storage on shelves and pallets, motorised threshers, collapsible driers, having modern storage facilities were promoted and adopted so that grains are free from moisture, contaminants, insects that would affect them during storage.

BRINGING CSA TECHNOLOGIES, PRACTICES, AND SERVICES CLOSER TO SHFS In the year under review, the project made significant progress in providing climate-smart solutions to farmers through Business Champions. The solutions included a range of technologies and services, such as improved drought-tolerant seed, soil and water conservation measures, improved grain drying technologies, rainwater harvesting pans, weather information services, and mechanization services like harvesting, threshing, sorting, among others. The project created linkages between service providers and farmers, ensuring that farmers have access to services they need for adoption of CSA practices and technology by training 267 service providers on sustainable service provision, ensuring that farmers' needs are met and any gaps to accessibility bridged. Those trained included service providers of agro inputs and services such as silos, tarpaulins, seed, fertilizer, soil testing, (crop/index) insurance among others. To date 1,374 service providers have been trained in their respective service areas. To improve climate smart products and service delivery, 6 service providers were supported to deliver services to SHFs.

One of the key strategies that the project has employed to enable BCs to boost uptake of climate-smart inputs, technologies and services is the co-organization of farmer field days and trade shows. These events have been instrumental in raising awareness and matchmaking among market actors, including service providers, smallholder farmers, SMEs, cooperatives, financial institutions, and public and private agricultural extension staff. Through these events, the project has created opportunities for all stakeholders to engage and learn from one another, facilitating greater collaboration and knowledge sharing.

To address the ongoing challenges of accessibility and affordability, the project i focused on engaging more service providers directly or indirectly in project activities. The project adjusted its CIIF criteria, allowing for the inclusion of service providers in the digital space and seed business as direct partners of the project, enabling greater access to climate-smart inputs and services for farmers. The project has also invested substantial effort in engaging and exploring collaborations and sought out knowledge sharing opportunities to enhance its impact.

Overall, CRAFT's efforts have been successful in driving climate adaptation, with the last mile delivery of private sector climate-smart services proving to be key. Additionally, the project's focus on sustainability and partnerships with service providers and market actors have resulted in better access to climate-smart solutions for farmers, though there is still more work to be done to ensure that all farmers have access to the timely and quality services they need.

The results of the Annual Review Surveys of 2022 indicate that the project supported BCs have made significant strides in promoting the adoption of climate smart agriculture practices among smallholder farmers. According to the surveys, 90% of farmers trained by the end of 2022 are using at least one climate-smart input or service, a significant improvement compared to the baseline of 70%. When asked to rank their satisfaction with the service, 65% (which extrapolates to approximately 77,152 farmers) reported that they were satisfied with the quality and affordability of the service. Table 5 presents the level of satisfaction by value chains across these three dimensions.

Table 5: Satisfaction with quality, affordability and availability of CSA inputs and services by value chain

Country	Value chain	Quality	Affordability	Availability
Kenya	common beans	93%	42%	80%
	green grams	88%	32%	58%
	potato	87%	40%	59%
	sorghum	75%	47%	57%
Tanzania	Sunflower	63%	61%	68%
	Sorghum	65%	42%	47%
	Potato	72%	66%	49%
	Common Beans	95%	59%	85%
Uganda	Soyabean	81%	75%	80%
	Sunflower	72%	61%	62%
	Potato	75%	45%	43%

Farmers lauded the training from CRAFT-supported TOTs as the most effective and appreciate training through demonstration, field days, and exchange visits more as they were able to see the CSA practices and technologies being applied real-time. They, however, would like to see more on-farm follow-up and asked for more TOTs to be trained so that they can support a smaller area as well as smaller number of farmers for effective training and service provision. In 2022, 1,785 farmer field schools were established by the various BCs and 116,555 farmers were trained in various CSA practices and technologies and PHH.

Availability of improved varieties remains a challenge in all three countries. In Kenya, the availability of improved varieties, especially in the potato and beans value chain is a challenge, Farmers have identified the use of improved varieties as a major contributor to reducing climate risks and are willing to buy based on availability, but the demand for these varieties exceeds the supply. For sorghum, the varieties which are more pest and disease tolerant, are unavailable in the market in some areas such as Western Kenya. In addition, the high production cost for the potato value chain remains a challenge for most farmers. This is exacerbated by the unavailability of mechanized services in some areas.

In Tanzania, the project's impact has been variable across different crops. For example, potato farmers have shown a higher level of engagement and awareness of climate-smart practices, leading to higher quality services and better adoption rates. However, the sorghum value chain has shown lower levels of adoption due to the lower value of the crop, and sunflower adoption rates have been moderate due to the low quality of government-subsidized seeds. Despite these challenges, the project has made progress in increasing availability of quality seeds and engaging business champions to distribute them.

In Uganda, fast adoption rates have been observed among the soya bean value chain and Sunflower farmers for technologies such as improved varieties due to their quick return on investment through increased yield and incomes.90% of SHFs are knowledgeable about CSA technologies and practices and have strategies to absorb shocks. However, there is a need for additional deliberate efforts geared towards strengthening services and market linkage. The seed system for potato value chain calls for further development and market strengthening through collaboration with the private sector players to influence prices. The project has adopted the Gross Margin Analysis (GMA) approach to increase understanding of the cost of production, cost-revenue ratio, and to compare new and traditional practices. GMA has been applied in the FFS and training but has not been sustainably documented. The project staff agreed on a GMA method and a pilot was implemented with one of the BCs (Isowelu AMCOS ltd) in Tanzania. A plan has been put in place to roll out GMA to other BCs in the project in 2023.

In 2022, the 51 active Business Champions were promoting a range of climate-smart agriculture practices and technologies. The business champions have focused on providing climate services, including agricultural extension on climate-smart solutions, improved seeds, agrochemicals, finance and/or insurance, and a variety of specific services such as mechanized tillage services, weather information, soil management services and mechanized post-harvest handling services. In Kenya, for instance, the adoption of mobile aggregation centres and decentralized seed systems has increased the availability and adoption of certified seeds by farmers, while the use of mechanized land opening and planting has reduced labour and costs while conserving the environment and harvesting and post-harvest handling methods has reduced post-harvest losses and labour costs. In Tanzania, farmers have adopted practices such as ridges making, minimum tillage, and active reuse of waste organic matter to conserve moisture and maintain soil

health, leading to increased yields. In Uganda, the project has supported access to climate information services, linked with financial institutions for sustainability, and used scientific data to identify business opportunities addressing climate change adaptation in the agri-food sector.

All the BCs (41) interviewed reported to prioritize improved seed, followed by extension services (35) and PHH services (34) to small holder farmers in their areas. Figure 5 shows the CSA products and services prioritised by the business cases based on the newly developed BC survey tool.

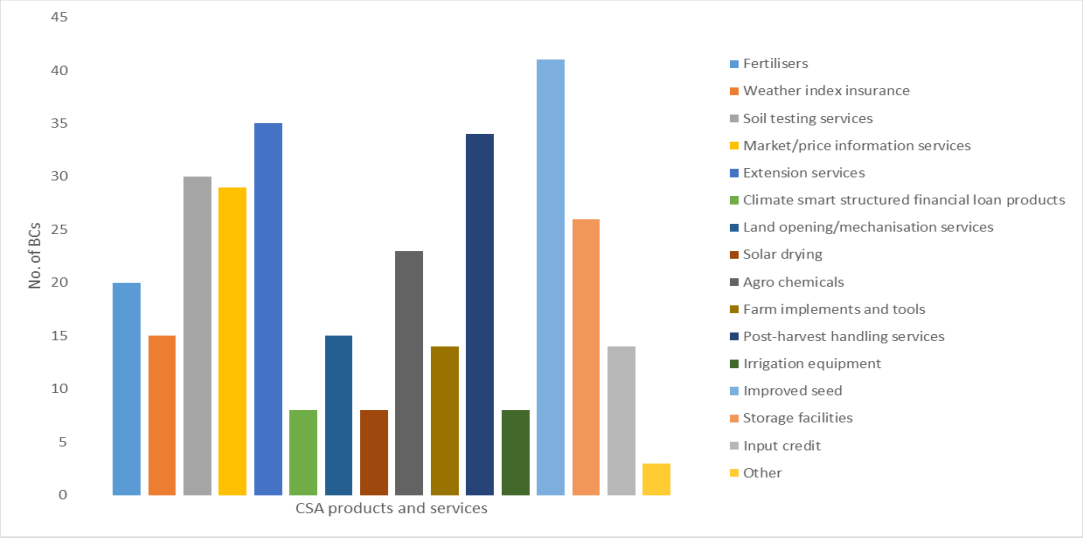

Figure 6: CSA products and services prioritized by business champions.

CRAFT project applies private sector-led model to training smallholder farmers on profitable climate-smart agricultural practices and technologies. The project has reached a significant number of farmers in Kenya, Tanzania and Uganda. During the year under review the project trained 116,555 smallholder farmers and, to-date, 248,883 smallholder farmers have been trained in CSA practices, with 54% female and 36% youth participation across the three countries. Of the total trained farmers, 60,533 are from Kenya, 69,919 from Tanzania, and 118,431 from Uganda.

Based on the average acreage of each country, which is 0.693 hectares for Kenya, 0.945 for Tanzania, and 0.579 for Uganda, the CRAFT project has reached a total of 176,594 hectares of farmland in the three countries. Kenya has seen 41,949 hectares of farmland reached, Tanzania has reached 66,073 hectares of farmland, and Uganda has reached 68,572 hectares of farmland.

1.5 Cooperative training for sustainable service strategies and action plans

The linkage with seed suppliers to SMEs and establishing working agreements was an important step for the cooperatives. For example, access to sunflower seed by Sebei Sacco, foundation seed by P'KWI and potato seed by Kisoro Union. To improve market access for potato farmers, a supply contract was signed between Kisoro Union and Psalms Food Processing Industries ltd focusing on the supply of specific varieties demanded by the market.

SUSTAINABLE SERVICES

During the reporting period substantial effort went towards establishing sustainable extension system within the 15 cooperatives and overall 36,098 farmers were trained. In the CRAFT project, Agriterra uses a sustainable services trajectory to provide coaching to the coops to help them address the readiness of members to pay for the services via a simplified model that cuts across all the members for costs sharing. Emphasis is sustainability of the services; and this refers to three aspects:

1. Farmer-led: The system is based on the needs of farmers and farmers play an active role in the services system; not only as the receiver but some farmers will also act as be an active service provider in the system.
2. Financially sustainable: investments in service systems are directly or indirectly paid for by the members (= receivers) of the farmers organisation/ cooperative
3. Future Proof: Services offered are 'climate clever'; the organisation is aware of the effect and impact of climate change and responds to this by offering customised services and climate clever solutions to improve climate change resilience among its members.

Future proof is also about continuously reviewing and adjusting the internal structure of the organisation, as a response to an ever changing (macro and micro) environment. To ensure visibility in the organization, service provision should be included as a separate unit or department in the organogram and treated as a cost-center.

To achieve the Group Approach, the coops deployed the following technics (services to the members) as well:

- **Setup demonstration plots** – the coops set up demo plots to demonstrate to farmers how the CSA practices and technologies work, and to show what effect it can have on increasing their crop production. The demonstration was an invaluable method in the Group Approach and was a particularly powerful method to use with farmers who do not read easily. It gave such farmers the opportunity to observe, at first hand, the differences between recommended CSA practices and traditional practices.
- **Disseminate weather forecast –** the coops also utilized mobile technology to deliver extension information to their SHFs using SMS services. Four coops partnered with Tanzania Meteorological Agency (TMA) to collect, compile, and disseminate weather forecast to 1,763 members.
- **Conduct Farmer Field Days (FFDs) -** the coops carried out field days to demonstrate best CSA practices and results on a slightly larger scale. The purpose of FFDs was to stimulate the interest of as many farmers as possible.

"There was an increase in potato price and production in Kisoro, which was mainly a result of the training on GAP including line planting, fertilizer application, use of improved seed and post-harvest handling technology. Our farmers used to mix cut and uncut potatoes and harvest immature potatoes, which negatively affected the final price from buyers. Previously, we would sell a kilogram of potatoes for UGX 900 (€0.22) to UGX 1000 (€0.24). But now, thanks to the training, our farmers sort the potatoes before selling them and know how to harvest mature potatoes, resulting in a price range of UGX 1300 (€0.32) to UGX 1500 (€0.37) per kilogram," shares a representative from Kisoro Union.

SME PRODUCTIVITY: ENERGY AUDITS OF SELECTED BUSINESS CHAMPIONS

The project has supported the business champions with an assessment of the potential opportunities for investment in energy efficiency and renewable energy technologies and practices. Both preliminary and detailed energy audits have been undertaken for agro-processing business cases in Uganda (2), Kenya (4) and Tanzania (3). The audits highlighted several energy management opportunities with the potential to reduce energy cost for drying, roasting, milling and other auxiliary services such as lighting, water pumping and compressed air utilization. In addition to cost reduction, such improvements lead to reduced carbon emissions. The audits highlighted behavioural change actions, energy management (systems), and technology retrofits or improvements.

The project will continue to support the implementation of the recommended energy management opportunities that include energy efficiency process retrofits as well as shifting to renewable energy technologies such as solar photovoltaic (PV), which has a specific interest of two of the KE business cases.

One of the BCs is in the process of installing a Grid-Tied Solar PV system (Hybrid – both Grid and Solar PV) to meet the company's energy needs. A more detailed study has already been conducted and details of the components and costs provided. The Solar PV will have a capacity of 30KWp, this will be for purposes of lighting and running a section of the motors in the production unit, estimated energy saving is 32670kWh and costs annually is KES.721,047 (€ 4,808). The total cost of installation is approximately KES. 3,000,000 (€ 20,000) with a payback period of 4 years.

1.6 Updating and further development of climate information

UPDATING CLIMATE IMPACT ASSESSMENTS: AICCRA completed refining the existing climate projections for each of the countries and for all the selected value chains (potato, sorghum, green grams, beans, soybeans, sesame, and sunflower) using multi-model analysis from CORDEX dataset for both RCP4.5 and RCP8.5 scenarios with a focus on the periods 2030s, 2050s and 2080s. This refinement was necessary to continue assessing the climate risks and vulnerability profiles using the most recent data and scenarios across all the priority value chains and strengthening the climate smartness of business cases. The multi-model CORDEX data was provided to the WENR team to continue the climate change impact analysis. The multi-model data included rainfall, daily average temperature, maximum and minimum temperature, solar radiation, wind speed and specific humidity for the three CRAFT focused countries. See Annex VIII for a summary of the climate projection work under CRAFT.

WENR updated the climate change impact assessments based on the updated newly developed climate change projections for all CRAFT supported value chains. Likewise in 2020, the impact assessment was carried out for two growing seasons (MAM; OND) for 2050. The updated impact assessment was used: to update training manuals and aids, in presentation during the CRA light workshops and as basis for the suitability maps. An infonote regarding the models and data underpinning the climate change impact assessments will be developed in 2023.

DEVELOPMENT OF SUITABILITY MAPS: Climate change is altering suitable areas of crop species worldwide, with cascading effects on sourcing strategies of businesses or business champions and on ecosystems or forests that are converted for agricultural production. For such businesses, it is important to identify potential sourcing areas where specific crops can best be grown sustainably even under a changing climate without producing additional environmental problems such as deforestation. Crop suitability assessment provides valuable information to identify optimal land uses in a changing climate, support a more efficient use of

resources and to reduce the rate of biodiversity and ecosystem services loss. It provides a harmonized approach that combines both climate change, biophysical and socioeconomic underpinnings of agricultural production.

Also, use is made of the (updated) climate change projections data for the development of suitability maps. This updated information in combination with biophysical, land use and socioeconomic data has been used to create new suitability maps for the four selected value chains per country. Suitability maps were used as input for the CRA light workshops in all three countries.

PREPARATION AND IMPLEMENTATION OF THE CLIMATE RISK ASSESSMENT (CRA LIGHT) WORKSHOPS: In close collaboration among the consortium partners, 6 CRA light workshops were organised in 2022. The results of the updated climate change impact assessment on crop yield for 2030 and 2050 were presented and discussed as well as the updated / newly developed suitability maps. To trigger climate action, a worse case climate scenario was chosen (RCP8.5). In both the Ugandan and Tanzanian workshops, the presentations also included the risks and exposures to clients of collaborating financial institutions as well as the risks of these FIs themselves. Discussions on adaptation strategies to address climate change impact were facilitated. Specific attention was paid to the legal, technical, economical, and biophysical feasibility of the adaptation options. The CRA workshops were very well received.

DEVELOPMENT OF CLIMATE CHANGE RISKS AND OPPORTUNITIES FACTSHEETS (UPDATED CRA 4-PAGERS): Climate risk and opportunities fact sheets are essential as they provide visual and text interpretation about the potential risks and impacts of climate change in addition to available opportunities (list of adaptation measures), which can help individuals and organizations make informed decisions and take action to mitigate or adapt climate change. 12 Climate change risks and opportunities factsheets have been developed for various value chains in the 3 CRAFT countries. The factsheets target business champions, governmental organizations (extension workers, ministries), NGOs, and embassy staff members.

Table 6: Factsheets for Climate Risk and Opportunities with assessment of change

Countries	Crops	The climate change risks and opportunities factsheets include:
Kenya	Common bean	**1) Highlights of current and climate change projections** The current climate and changes in the future (the 2050s) from the current has been added in the fact sheet, mainly seasonal rainfall (OND, MAM), seasonal temperature, onset days, heat wave days, and extreme rainfall events.
	Green gram	
	Potato	**2) Impacts of climate change on crop yield** The impacts of yield in the format of future crop yield changes from the current have been added in the fact sheets. Mechanistic models have projected crop yields.
	Sorghum	
		3) Drought risk maps The frequency of drought events has been added based on the drought indicator Standardized Precipitation Index (SPI) in the factsheets.
Tanzania	Common bean	
	Potato	**4) Suitability maps** Crop suitability assessment provides valuable information to identify optimal land uses in a changing climate, support more efficient use of resources, and reduce the rate of biodiversity and ecosystem services loss
	Sorghum	
	Sunflower	
		5) Description of adaptation options for the most important climate risks The information that has been derived and added in the factsheets are from the CRA light workshops and climate change adaptation literature.
Uganda	Potato	
	Sesame	
	Soybean	
	Sunflower	

ADAPTATION FEASIBILITY TOOL (AMFAT)

The Adaptation Feasibility Tool (AMFAT) is designed to assess the feasibility of implementing climate change adaptation and mitigation measures in a location by analysing the risks and opportunities present. It provides information on the feasibility of existing/projected resources and risks for implementing adaptation measures, helping SMEs, cooperatives, and FIs to avoid maladaptation investments. AMFAT works via a weighted overlay with the ranking and impacts of identified risks and opportunities in the location and is best used before the implementation of any adaptation/mitigation measure or climate financing. AMFAT has been further developed and discussed with consortium staff, and ongoing discussions about training and a possible pilot are in progress. A glossary has been created to clarify its function. The basic prototype was developed based on household surveys, and the tool will undergo full functional development.

ADAPTATION POTENTIAL MAPPING

Adaptation potential maps could facilitate understanding and the identification of regions where adaptation measures could be used or could provide potential benefits based on the specific location's resources and factors. WENR uses Multiple criteria decision analysis (MCDA) to derive potential adaptation maps. MCDA provides a formal, quantitative means of evaluating agricultural decisions by considering possible factors. In this tool, we consider the resource availability of the location in implementing adaptation measures. This tool focuses on weighing the criteria and the steps used to quantify the relevance of the selected criteria. Other advantages can include: 1. more transparent decision-making, 2. providing a focus for discussion, 3. providing a means of problem structuring and working through the information, and 4. breaking the decision down so that people better understand the decision both from their own and from others' perspectives. For the MCDA-analysis, available resources in spatial format have been used including data and information of economic stability, infrastructure facility, and ecological conditions under climate change conditions.

In consultation with the country leads adaptation-potential maps have been prepared for the adaptation measures relevant to mitigate climate change impact on potato yield: irrigation and climate-smart warehousing for three CRAFT countries (Kenya, Uganda, and Tanzania). The adaptation potential maps have been used in discussion with financial institutions and their clients to support climate-smart investments of banks and business champions.

2.0 Work Stream 2: Investments in Inclusive Value Chains

The project will co-invest and assist in building up the business cases and financing solutions necessary for the wide-scale adoption of climate-smart practices in selected crop-specific value chains.

SO 2 - Increased business performance for agribusiness SMEs and cooperatives due to climate-smart investments
IR 2.1 – Increased investment and business growth in climate smart value chains

2.1 The Climate Innovation and Investment Facility (CIIF)

The Climate Innovation and Investment Facility (CIIF) is a tool to drive investments in climate smart agriculture. CIIF is a significant instrument for the project to mobilise private sector co-investments and promote CSA related innovations at farming systems and value chain level.

Figure 7: Summary of the CIIF portfolio by December 2022

Table 7: Overall Cumulative CRAFT CIIF Portfolio

Overall Cumulative CRAFT CIIF Overview: Status by December 2022											
Country	**No.of BCs**	**Targeted SHFs**	**SHFs reached**	**%**	**CRAFT Contribution committed (Eur)**	**CRAFT Contribution accounted as by Dec 2022 (Eur)**	**%**	**Grantee Contribution Committed (Eur)**	**Grantee Contribution by Dec 2022**	**%ge**	**Total committed Activity Funds (Eur)**
KE	15	74,311	60,533	81	1,767,202	1,465,594	83	4,600,820	3,785,049	82	6,368,022
TZ	21	91,298	69,919	77	2,565,581	2,023,910	79	4,953,176	2,413,303	49	7,518,757
UG	20	109,386	118,431	10	2,627,699	2,476,550	95	5,062,875	4,481,754	89	7,690,574
Totals	**56**	**274,995**	**248,883**	**91**	**6,960,482**	**5,966,054**	**86**	**14,616,871**	**10,680,106**	**73**	**21,577,353**

CRAFT continued with BC onboarding processes in Q1 of 2022, with 7 grants (3 SMEs, 1 coop, 3 SPs). The project expanded its portfolio to include CS service providers, to enhance provision of the critical CSA practices and technologies. These services included: digitalization of BCs to support records management and CS seed multiplication among others. During the period under review, CRAFT modified contractual arrangements for 24 BCs to support scaled implementation. CRAFT committed €998,064 through the new and modified awards in 2022, against € 2,232,404 co-investment value. Further, the grant amendments realized an additional 26,400 SHFs. A total of 25 (22 SMEs, 3 Coops) BCs grants were concluded in 2022.

Image 3: A section of the soybean cleaning facility at Okeba Uganda Limited, that was purchased as a result of CRAFT partnership.

SMEs and cooperatives under CRAFT have played a vital role in improving the business environment in their areas of operation. They have achieved this through a range of activities such as promoting and practicing CSA, providing credit facilities, sensitizing farmers on production needs, and ensuring the adoption of CSA practices and technologies. The SMEs and cooperatives have also facilitated the establishment of strong farmers' organisations through crowding in, provided extension services to smallholder farmers, and enabled access to improved inputs. In addition, they have engaged in processing and distributing nutritious foods to address malnutrition, employed youth as casual workers, and advocated for and practiced climate-smart agriculture. The cooperatives have facilitated access to quality planting material, inputs, and extension services to smallholder farmers, and offered favourable prices of produce depending on the market condition. The SMEs have increased the production of raw materials,

facilitated the establishment of strong farmers' organisations, and stimulated access to and availability of CSA practices, including improved seed varieties and critical services and technologies. Both SMEs and cooperatives have contributed to the reduction of post-harvest losses, advocated for better policies, created better marketing channels, and provided employment opportunities to the youth. Moreover, they have promoted CSA and introduced critical services and technologies through radio programs. They have also facilitated farmers' relationships with other value chain actors, such as agro-input dealers and business development service providers.

Table 8: Changes in CIIF portfolio in 2022

	Kenya	Tanzania	Uganda
Number of Active BCs in 2022	14 (8 SMEs, 5 Coops, 1 SP)	17 (10 SMEs, 4 Coops, 3 SPs)	20 (12 SME, 6 Coops, 2 SPs)
Number of BC awards extended into 2023	12 (7 SMEs, 4 Coops, 1 SP)	8 (5 SMEs, 3 Coops)	6 (2 SMEs, 4Coops)
Amount invested in extensions (in Euro)			
CRAFT	163,583	486,502	347,979
Co-investment (in Euro)	709,146	1,182,139	341,119
Additional SHFs (due to grants' adjustments)	9,939	10,461	6,000

CO-INVESTMENTS FROM THE PRIVATE SECTOR

Co-investment from the private sector was one of the key requirements of the CIIF facility. By the end of December 2022, the CRAFT committed contribution to the BCs was €6,960,482 of the €7 million (99%), with a realized co-contribution from the private sector amounting to **€10,680,106** [6]out of the committed €14.69 million (indicator 18). By end of 2022, CRAFT had attained its contractual co-investment target (€10,000,000), with a 107% achievement. In Tanzania there was a lower achievement in own contribution and farmers reached (as part of the total target, due to early closure of three BCs (all leading to not fully reaching farmer targets and own contribution levels), especially two out of three had very high own contribution levels.

The resources used for co-contribution come from a combination of sources, as reported by the BCs in 2022. The most frequent source used was equity/retained earnings, loans, and in-kind contribution, which is mainly (63%) fixed assets and rest work time (figure 6).

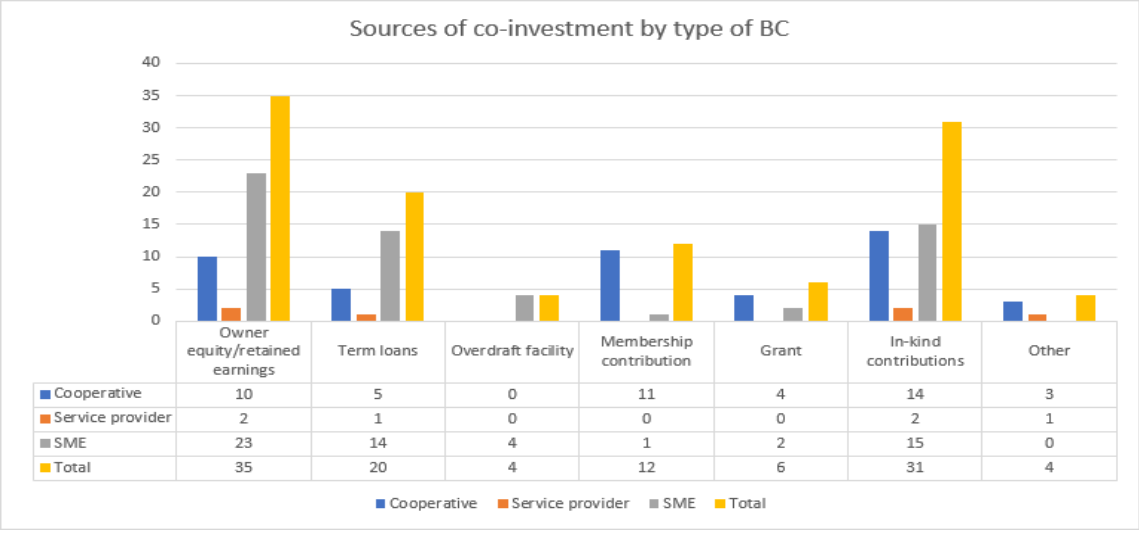

Figure 8: Sources of co-investment by type of BC

[6] Partially audited, 2022 co-contribution audits for BCs are ongoing.

ACCESS TO FINANCE

CRAFT SME and cooperative partners leveraged CIIF support to access additional financing from commercial banks, SACCOs and impact investment ventures (figure 7). CRAFT played an active role in facilitating linkages to sources of finance by engaging financial institutions (FIs) to leverage financing for CSA interventions. For example, in Uganda, CRAFT signed MoUs with four FIs, and supported linkages between BCs and FIs.

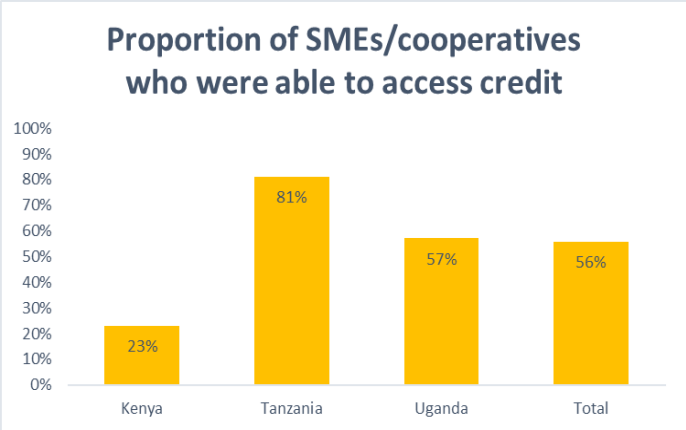

Figure 9: Proportion of SMEs/Cooperatives who were able to access credit

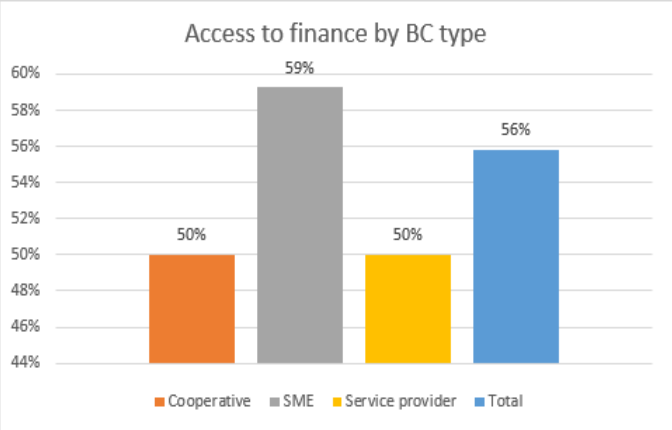

Figure 10: Access to finance by BC type

In Tanzania, although no MoUs were signed, CRAFT built strong relationships and linkages with FIs (e.g., CRDB, Tanzania Agricultural Development Bank Limited (TADB) and Tanzania Post Bank) which supported BCs with access to Agri-finance products.

Based on the BC survey, SMEs, and cooperatives in the three countries face significant challenges when it comes to accessing finance. High interest rates charged by FIs are identified as one of the major barriers, coupled with the high cost and lengthy procedures for accessing financing. Some BCs noted that FIs did not understand the nature of their businesses and were not willing to provide loans due to the perceived risks. Women and youth-owned BCs also face challenges in accessing financing due to inadequate collateral such as land or buildings. This limits the amount of financing they can access. Delayed disbursements of loans and inadequate loan processing are also significant challenges as they affect the performance of agricultural loans, which follow the crop calendar. In addition, lack of proper guidelines for accessing credit facilities and bureaucracy in loan application processes were also identified as barriers.

The survey suggests that CRAFT has had a positive impact on the SMEs and cooperatives' access to finance from FIs. SMEs/cooperatives were able to use the assets they acquired through CRAFT to act as collateral for bank loans, enabling them to purchase equipment and scale up production. CRAFT also helped improve financial management and compliance capacity, which made it easier for these SMEs/cooperatives to respond to the needs of the bank. CRAFT also created linkages with commercial banks, which improved the BCs' images and built internal systems that attracted banks to fund them. However, not all BCs were successful in accessing finance, and some were still in the process of developing their business plans and financial reporting. *"Through assessment with a consultant and Agriterra, the organisation was viable to access loans to up to 2 million Kenyan shillings (13,350 euros),"* says a representative from Marakwet Highland Marketing Cooperative Society.

Some of the BCs diversified their funding mechanisms to include flexible financing interventions, such as seed financing to the SHFs to support production and build loyalty among SHFs, and/or signing forward contracts with off takers. In turn, companies and cooperatives increased their buy back potential, and business growth – and thus, ability to co-invest.

TURNOVER AND GROWTH OF THE BUSINESS CHAMPIONS

Most active BCs experienced a growth in turnover during the reporting period with 35 out of 51 reporting an upward trend (indicator 15). Of the 44 BCs that accessed finance, 24 reported an increase in turnover from the baseline. The partnership with CRAFT played a significant role in the growth of these BCs, with 41 out of 44 reporting an increase in turnover since the start of the partnership. The reasons cited for the growth in turnover included improved produce quality, strengthened relationships with farmers through contract farming, and better post-harvest handling practices facilitated by the use of improved seed varieties. Generally, the BCs in Kenya had the highest increase in turnover.

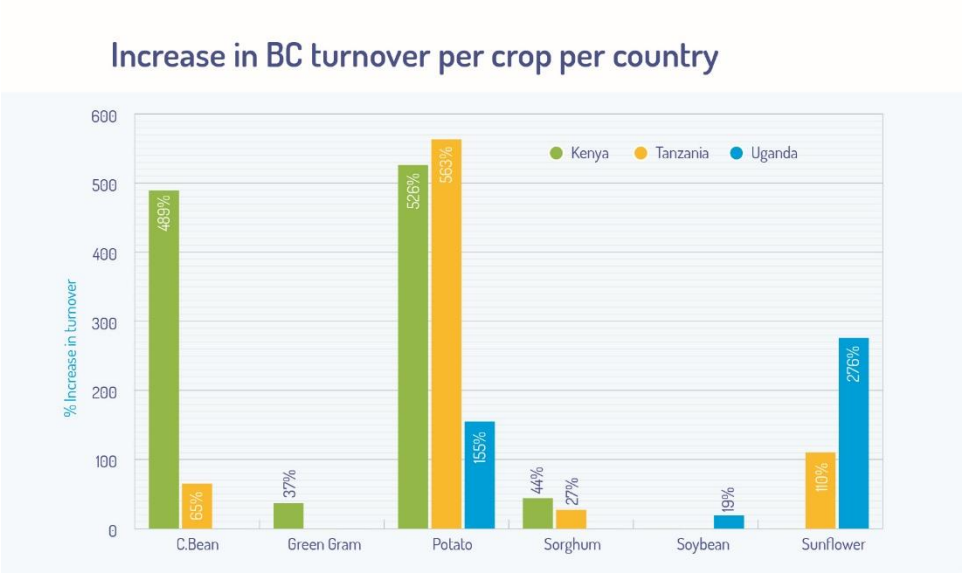

Figure 11: Percentage increase in BC turnover per crop and country

As demonstrated on above, the highest increase is shown in the potato sector in Kenya. The Ugandan BCs in the soya bean VC reported a negative change in their turnover, while the sunflower and potatoes reported an increase. Some BCs had an increase in turnover but had a net loss as their expenses were higher such as Kaplomboi Cooperative in Kenya. 42 out of 44 BC reported that the CRAFT focus crop has been profitable for them, and all 44 BC interviewed seek to continue with investing in the targeted crop.

HOW CRAFT HAS TRANSFORMED THE SDM OF THE TARGET BCS.

CRAFT has had a positive impact on the SDMs of the targeted SMEs and cooperatives. The provision of CSA training through TOTs, soil testing, and mechanisation services has enabled the establishment and growth of a structured market through entering contracts with customers. This has facilitated the procurement of seeds on time and created efficient access to certified seeds. The use of laptops, printers, and accounting package software has simplified work, reduced costs, and minimized errors in documentation. CRAFT has also facilitated the adoption of the ToT model in enabling the smooth running of the services, which has improved efficiency and productivity. Additionally, CRAFT has facilitated the establishment of Public, Private, Partnership (PPP) and the adoption of the farmer field school approach, which has been very essential in extending training. Through working and linking with other service providers and aggregators, the service delivery model has been more inclusive and responsive, and more farmers have been reached. Furthermore, SMEs and cooperatives have been able to open outlets for customers to get their products, establish a financial management system, and be active on social media platforms such as Facebook, Twitter, and WhatsApp. Overall, SMEs and cooperatives report that their service delivery models have become more efficient, inclusive, and responsive since the engagement with the CRAFT project.

Image 4: An aggregation center set up to ease collection of grain from sorghum farmers.

ELEMENTS THAT MAKE THE CRAFT SUPPORTED SMES AND COOPERATIVES CLIMATE SMART

CRAFT supported SMEs and cooperatives consider themselves climate smart due to their focus on CSA practices and technologies, which include the use of mechanisation services, production of improved and resilient seeds, and integrated pest management techniques, land use management practices, soil conservation, introducing agro forestry tree species. Through CRAFT, the SMEs/cooperatives have also created a platform to share weather information to farmers. Through these efforts, the SMEs/cooperatives aim to ensure quality crops are produced upon harvest, which motivate farmers to adopt CSA practices and create a constant market for quality, climate-smart food.

SUPPORT TO THE BC IN SUSTAINABILITY

CRAFT developed and rolled out a CIIF exit strategy, to better prepare CRAFT supported agribusinesses to become stronger value chain actors, beyond CIIF. Close-out meetings were organised to reflect and share learnings and agree on future collaboration

among partners. In Tanzania, stakeholders; like local government, ToTs, extension workers also participate in the meeting, to agree on sustainability and future engagements among different partners involved.

In Uganda, all BCs were supported with training to equip BC's senior management team members with basic knowledge and skills to run and sustain their businesses through business skills and business management training.

AMBITIONS OF THE BCS AFTER CRAFT

In the recent BC reviews, the project sought to understand if the BCs have the ambition to continue with the value chain crops and the model implemented under the partnership. All BCs responded positively and argued that that the farmer field school approach has demonstrated its benefits in relationship with the farmers and other relevant stakeholders. It appears from the respondents that most BC's under CRAFT plan to continue with the staff they recruited through the project. Some will retain all staff while others will only retain certain individuals who are able to contribute directly to their business aspirations. The reasons for retaining the staff include business growth, strengthened relationships with farmers, expanded areas of operation, increased customers for their products, and the competence of the staff in understanding CSA components and developing marketing skills. Some organisations, however, plan to only retain permanent staff or those who directly contribute to the business, while others may absorb staff such as service providers, employees, or links between the business champions and farmers.

FINANCIAL MANAGEMENT AND GOVERNANCE OF COOPERATIVES

Internal capitalization strategies are a critical pillar in ensuring sustaining and scaling of the CSA services for the cooperatives as it unlocks access to finance (external), build member commitment and enables investments beyond the project. This is crucial for continuity of business for the cooperative, especially for the services offered since a majority are highly under-capitalized.

Agriterra supported the cooperatives building their capacity in internal capitalization strategies and prepare internal capital plans. Some of the achievements included:

- Kisoro Union and Sebei Sacco were able to co-invest in storage facilities for their products, because of a successful internal capitalization trajectory with their members. The total investment involved was almost €100,000.

- "Through a combination of internal capitalization trajectory and sustainable services, our cooperative has successfully revived five dormant member cooperatives- Endanoga, Bubu, Mkombozi, Kichameda and Oriday. They are now actively paying for their annual membership fees. Also, since RIVACU works in four different districts, adherence to the cropping calendar has become a key service to members. This is something that we have been able to establish in linking to demand of bean seeds and those of other crops for the upcoming seasons. The cooperative is distributing 10Mt of CS bean seeds to its member cooperatives, including the five recently revived cooperatives as a strategy for upscaling the initiatives for adaptation of climate smart agriculture,"- RIVACU's Project Accountant.

- *"We have changed their share price from TZs 5,000 (€1.92) to TZs 10,000 (€3.85) per share and managed to mobilise the existing members to complete the purchase of the mandatory 10 shares/member. In doing so, we have been able to raise TZS 12 million in member shares from 467 members. We are also planning to issue new shares to our members in addition to the mandatory ones. We undertook this initiative after the Internal Capitalisation training provided by Agriterra in February this year, where knowledge on the different models of raising internal capital was given -* ***Isowelu's Project Manager.***

Under CRAFT, Agriterra has linked the six cooperatives in Uganda to the Uganda Development Bank Limited (UDBL) for continued financing of climate-smart practices and technologies that have the potential for sustainability and scaling. Examples of such technologies are access to quality and affordable seeds and other inputs such as fertilizers. UDBL, being a government institution, has different products aimed at supporting agricultural enterprises. One of the products is called special programs for cooperatives. The cooperatives received technical support to fulfil some of the requirements such as business plans to apply for financing with UDBL.

These are the loans that are mobilised though CRAFT linkages for cooperatives:

- In Uganda, Alito Cooperative received a loan of UGX, 30,000,000 (approximately €7,500) Loan facility from their lender DFCU Bank and now qualifies for another revolving loan.

- In Uganda, P'KWI received UGX 40,000,000 (approximately €10,000) from Post Bank for working capital.

- In Tanzania, Isowelu received a loan of 761,400,000 TZS (approximately €300,000) for potato seeds and fertilizers from NMB bank.

2.2 Support to the financial ecosystem

To stimulate FIs engagement in green financing, CRAFT, through Rabo Partnerships (RP) conducted mapping of the FI landscape in each country see Annex VII, aimed at engaging FIs in financing “Climate smart business models”. The country land-scape analyses identified opportunities for collaboration with interested FI’s focusing on how to create transition pathways towards climate resilient agriculture. RP led one-on-one engagements with selected local financial institutions (FIs) about how to integrate climate change in their financing strategies and decision making. In Tanzania this led to engagement with three financial institutions (Cooperative and Rural Development Bank (CRDB), Azania Bank and National Bank of Commerce (NBC)), in Uganda with the Development Finance Company of Uganda Limited (DFCU) and Equity bank. In Kenya this was not taken forward due to limited appetite from the FI to engage in such a process.

WENR, RP and AICCRA collaborated with the aim of developing tailored climate information for financial institutions. The information has been used in dialogues with these institutions and their clients to create awareness on climate change, how it might impact their businesses as well as to trigger climate proof investments in the agriculture sector.

CRAFT used climate data like, e.g., suitability maps, adaptation modelling, climate impact assessments and climate risks to encourage Financial Institutions (FIs) to decide on viable climate smart investments in the different value chains. Targeted climate modelling will be generated, and results formulated that are understandable and attractive to bankers, to support the dialogues with the FIs. The suitability maps have been adapted by integrating financial data to demonstrate financial institutions the climate risks of their portfolio. The importance of de-risking their agricultural portfolios has been stressed, showcasing potential bankable climate smart investments.

A Memorandum of Understanding (MoU) was signed with ACELI to streamline interventions and complement each other’s support to financial institutions.

DFCU Bank's Bottom-Up Approach to Climate-Resilient Agribusiness Financing in Uganda's Sunflower Sector

Financial institutions like banks play an important role in the economic development of a country, but providing finance to agri-value chain partners, especially SMEs and primary producers, is often considered risky due to factors like lack of collateral and climate risks. In Uganda, Rabo Partnerships conducted a financial landscape analysis and identified DFCU Bank as a leading player in the transition to a climate-resilient food and agribusiness sector.

Through joint climate data analysis, DFCU Bank aims to create valuable, data-driven climate insights for the credit portfolio of dfcu Bank in the sunflower sector. The bank has developed tailored business propositions to meet the needs of clients and address key frictions. The success of the approach depends on the involvement of a multidisciplinary team and key partners. One of the key success factors of the approach is that it's a bottom-up approach where clients' needs and constraints are identified through sector analysis, and a business proposition is developed to meet their needs. The bank's previous products, such as Save for Loan, have not generated the anticipated return on investment, but the bank is committed to creating broad support for the next steps.

The joint data analysis showed that climate change creates more opportunities for the bank as larger areas will become suitable to grow sunflower. Reducing post-harvest losses already significantly impacts greenhouse gas emission reduction and creates a more stable and sustainable sector. The bank is planning to conduct a workshop to develop a tailored business proposition that addresses all key frictions and client needs. For clients in the sunflower value chain, it is important that the solutions are affordable and beneficial, while for the business proposition, the bank should provide a sufficient risk-adjusted return on investment. The involvement of the Executive Management is crucial for the success of the approach.

In Uganda, a workshop with FI institutions, the business champions and relevant stakeholders was held to discuss how FI can enable agribusiness to implement adaptation strategies. Participants reached consensus that climate finance is needed as an instrument to help food systems to overcome some of the numerous barriers to investments in sustainable agricultural practices. It can also catalyse the transition to a more resilient agricultural sector that reduces greenhouse gas emissions and increases carbon sequestration while fostering food security and promoting local economic development.

3.0 Work Stream 3 – Enabling Environment for Development and Scaling

By working with national and regional government agencies, extension services, researchers, meteorological services, and financial service providers the most significant institutional and socio-economic barriers for large scale CSA adoption will be addressed, in cooperation with other climate funding programs.

SO 3 - Improved enabling environment favourable for large scale roll out of climate smart agriculture
IR 3.1 – Increased collaboration and exchange among public private actors on large scale roll out of climate smart agriculture

3.1 Multi-stakeholder dialogues for CSA collaboration and implementation

CRAFT continued with the country specific pathways to increase collaboration and exchange among relevant stakeholders.

In Kenya, to enhance the promotion and adoption of Climate Smart Agriculture (CSA), stakeholders, including SNV and AICCRA continued to work together to establish a coordination and collaboration platform at national and sub-national level, known as the Kenya Multi-Stakeholder Platform (MSP) for CSA. The CRAFT consortium provided intensive support and engagement that culminated in the launch event. As a member of the Kenya CSA-MSP, CRAFT is integrating project learnings and training into five thematic working groups across a wide range of counties. In addition to this, CRAFT has supported the formation of ten sub-national MSPs within CRAFT's BC catchment areas to support the creation of an enabling environment for large scale roll-out of CSA.

CRAFTs involvement in Kenya's CSA-MSP process has resulted into several outputs, including the launching of the CSA-MSP five-year Strategic Plan 2022-2026 (CSA-MSP Strategy) and CSA M&E Framework developed with input from the CRAFT consortium, as well as training manuals for the four targeted VCs. The MSP also cascaded the Kenya Climate Smart Agriculture Strategy

(KCSAS) and Kenya Climate Smart Agriculture Implementation Framework (KCSAIF) for Nakuru County. The consortium has used this platform to share learnings from the project: CRAFT learnings inform Kenya's CSA Multi-Stakeholder Platform.

Through the partnership with the National Multi-Stakeholder Platform (MSP) for CSA, CRAFT facilitated a workshop aimed at formulating a bean strategy for Bomet County, which will support the development of a highly productive and profitable climate-smart bean value chain for resilient, food, and nutrition-secure livelihoods. The workshop, which was held in June 2022, was informed by experiences from Kaplomboi Cooperative, a CRAFT BC. The strategy is under review, this will be followed by a validation workshop in 2023.

In October 2022, CRAFT, the National CSA-MSP, and AICCRA organised the Gender-responsive climate-smart agriculture science-policy dialogue for Eastern, Central, and Southern Africa in Mombasa. This policy conference focused on "innovations and inclusive strategies to improve agricultural productivity, food security and agribusiness incomes" regarding CSA in Eastern, Central and Southern Africa. This is aimed to be achieved through policy interventions in technology transfer, access to resources, access to services and access to markets. Therefore, gaps and barriers in policy implementations and reforms in these sectors were identified across the countries and addressed during the dialogue, with appropriate solutions discussed among the stakeholders. The participants worked out proposals and a detailed list of gaps and barriers to be presented to key policy influencers and policymakers in their respective countries, with strong action points to overcome gender and social exclusion. A great emphasis was put on gender-responsive and socially inclusive answers with a specific focus on CSA further to address the needs of the most vulnerable societies. Furthermore, proposed intervention areas for each stakeholder category along the CSA value chain were identified collaboratively.

In addition, CRAFT and the CSA-MSP organised the Agribusiness-Policy Dialogue Forum, in October 2022 in Nairobi. The meeting was attended by key stakeholders in the policy environment representing National and County Governments, CSOs, the private sector (including business champions for the CRAFT project, Service providers), Cooperatives, research and academia, and farmer representatives. The forum discussed key policy priorities and possible solutions to the barriers identified. It also facilitated dialogue between business champions and policy implementers/policymakers, to remove the obstacles to CSA investments in the targeted value chains. The proposed strategies and action points to be presented to relevant decision-makers for advocacy purposes.

Image 5: PM Kenya Harold Mate interacting with Anne Nyaga, The Chief Administrative Secretary, Kenya's Ministry of Agriculture, Livestock, Fisheries & Cooperatives during the launch of CSA multi-stakeholder platform.

In Tanzania, the stakeholder collaboration was sector specific focusing on the potato sector. In February, a Climate talk dialogue 'Building Resilient Food Systems in Tanzania 'was hosted by The Embassy of the Kingdom of Netherlands (EKN) together with SNV in Dar es Salaam. The dialogue involved various stakeholders from the Government of Tanzania, embassies, academia, research institutions, private sector and university students. The Dialogue was part of a series of events held to accompany the EKN photo exhibition titled 'Capturing Climate Change', which was displayed at Alliance Française.

To understand the available policies linked to agriculture in relation to climate change, the 'CSA policy landscape analysis' was finalised during the first quarter. The analysis aimed to support CRAFT's CSA policy influencing and advocacy agenda in Tanzania. It established strategic linkages with relevant stakeholders and project interventions for future sustainability. The analysis identified policy gaps facing climate smart agriculture and proposed initiatives to influence the policy process progressively to address these gaps.

Following a successful CSA policy analysis, CRAFT organised a CSA Policy dialogue and CRA light workshop for potato stakeholders in Mbeya in June, followed by a CSA policy workshop in Dodoma in November. During the two-day policy dialogues, participants discussed key policy priorities and action points towards addressing the identified barriers in the potato value chain, with a particular focus on the impact of climate change on the sector and the necessary adoption measures. The meetings provided a platform for sub-national CRAFT potato actors to share their experiences with the broader stakeholders and policy makers at national level. The main recommendations were that seed potato stakeholders should develop a strategy for a more dependable and sustainable supply

of improved, high-quality/certified, high-yielding, and climate-resilient seed potato at scale. Additionally, there was a call for the development and strengthening of the Tanzania potato council.

"The impacts of climate change are real; they affect all sectors including agriculture and hence the potato sector. However, to attain optimum production requires high investments in financing farmers to adopt into Climate Smart Agriculture (CSA) practices and technologies to enhance yields per hectare. No time to waste for all actors to work together to improve the potato sector in Tanzania and hence ensure food security for all Tanzania". The Ambassador from the Kingdom of Netherlands

In December, EKN Tanzania organised the Potato Conference- 'Tanzania & Netherlands Co-creating Smart Solutions and Inclusive Potato Sector for a Better Tomorrow' in Mbeya. The conference was attended by key stakeholders representing both private and public actors working within the potato value chain. During the conference, CRAFT presented science-based knowledge about climate change and its impact on the potato sector, as well as its efforts to improve the climate resilience of the potato sector. In addition, business champions ISOWELU and EAFF were given the opportunity to present their work in improving the potato sector. The CRAFT team, alongside Isowelu and EAFF, participated in the 'African Regional Resilience Hub' under the theme "Promoting climate resilient food systems for increased agricultural productivity and food security". During this webinar, Suitability maps, providing climate risks and suitability of adaptative measures for the next 10-30 years were shared, which informed the audience on the value chain specific adaptation measures that will ensure East African countries are food secure.

In Uganda, the CRAFT consortium spearheaded the formation of the Climate Smart Agriculture Multistakeholder Platform (CSA-MSP) , together with MAAIF Uganda and other key stakeholders.

The multistakeholder platform is intended to create space for diverse CSA players to foster collaboration, guide the CSA development agenda, and influence sector transformation necessary to improve the enabling environment that facilitates CSA rollout in the country. Additionally, the CSA-MSP will strengthen the systemic capacity to monitor climate change in Uganda, project the likely impacts of climate change on local agri-food systems, identify improved technologies that can strengthen the resilience of those systems in the face of climate change, support knowledge sharing on improved technologies among agri-food system actors and create awareness/highlight significance of CSA using evidence and science from CRAFT.

The review of the policy landscape in Uganda revealed that at least six government policy documents recommended and expressed the need for a CSA-MSP. The review also found that the existing CSA Task Force is occasionally used for ad hoc tasks and doesn't have a strategic objective or operational structure.

These discussions triggered the development of a framework to guide the formation of CSA-MSP applicable in Uganda – highlighting desired/anticipated achievements, identify key stakeholders to join the steering committee, possible thematic working groups and the possible role for each group.

Under the CSA-MSP, thematic working groups were formed. These include- coordination and resource mobilisation, networking and partnerships/gathering/collaboration/stakeholder mobilisation, knowledge and information management, and policy, advocacy and resource mobilisation. These groups will ensure the performance of the CSA-MSP across these various themes.

The project developed four CSA manuals and training guides aimed at providing farmers with appropriate tools to adapt to climate-smart farming practices and increase their productivity, income, and resilience to climate-related shocks and stresses. To ensure the manuals' effectiveness, CRAFT collaborated with various stakeholders, including the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), NARO, Makerere University, FAO, Uganda National Meteorological Authority (UNMA), civil society organizations, and the private sector, to conduct a series of validation workshops. The feedback from these workshops helped to shape the manuals' current version, and three validations were conducted, with the latest one in September 2022 involving the MAAIF team. The guidance received during these workshops will be integrated into the final copies of the manuals.

3.2 Accessible climate information services for CSA and index-based insurance

In 2022, there has been a notable increase in **the utilization of weather information among farmers, with 47% of them reporting its use (indicator 36).** Kenya boasts the highest usage at 55%, followed closely by Uganda at 52%, while Tanzania has the lowest usage at 26%. Despite this, all three countries have experienced a significant increase in usage since the baseline and 2021. Farmers mainly use weather information to determine the onset of rainfall. However, in 2022, more farmers reported using the information to determine the ideal time for planting and weeding, as well as to manage pests and diseases.

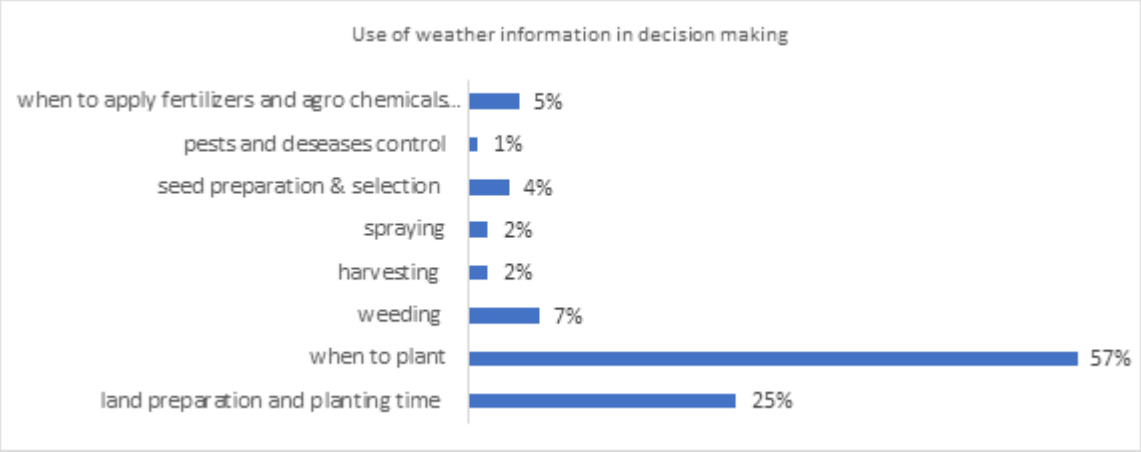

Figure 12: FGD use of weather information services

According to farmers' FGDs, many farmers also utilize weather information to plan for land preparation. However, some groups raised concerns about language barriers and the technical nature of the information provided, which can make it difficult for some farmers to comprehend its meaning. As a result, some farmers who receive climate and weather-related information rarely use it. "Farmers receive the information a few times, but they don't understand its meaning, which results in them rarely utilising it," a farmer revealed.

The farmers also identified several factors that limit their access to weather information. These include a lack of information mediums, such as phones, TVs, and radios, as well as unreliable service providers and poor network connectivity. Additionally, some farmers face literacy challenges. Farmers also reported inconsistencies in the information provided to them, which led to a lack of trust. As one farmer stated, "We often receive conflicting information from the meteorological department, which is why we tend to rely more on indigenous weather knowledge."

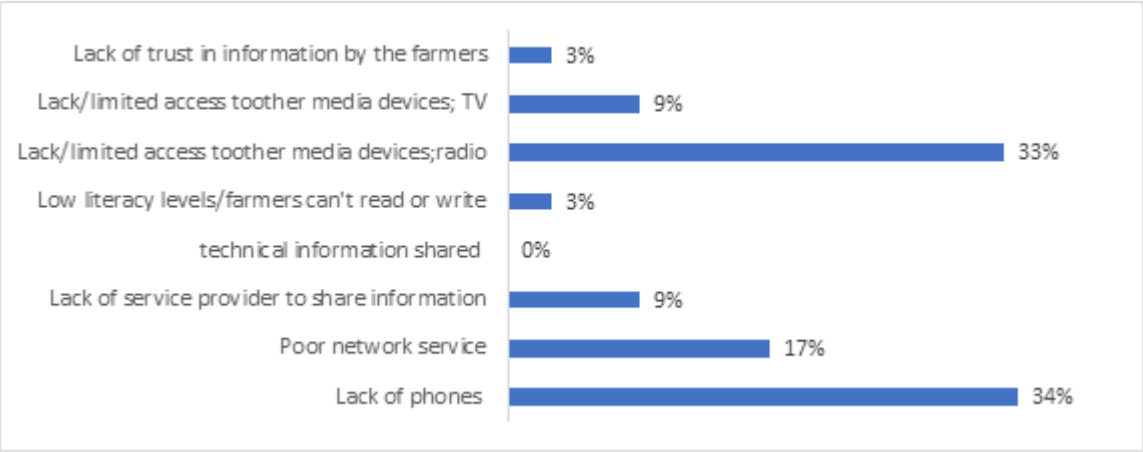

Figure 13: Barriers to accessing weather information for SHF.

IMPROVING SUNFLOWER YIELDS WITH WEATHER INFORMATION AND SUSTAINABLE FARMING PRACTICES

Nondo Peter Kisinza, a farmer from Songambele village in Tanganyika District, has been using weather information to improve his sunflower crop yields and mitigate the adverse effects of climate change. Previously, Mr. Kisinza would plant sunflower in December during the high rainfall season, but the crop did not grow well, resulting in poor yields. However, after using weather information and considering the crop calendar, he has been able to improve his yields. Mr. Kisinza now starts his field operations after checking the forecasted weather information. Last year, he planted his sunflower crop in February when the amount of rainfall was moderate and suitable for the growth of sunflower crops, as per the seasonal forecast information.

Additionally, Mr. Kisinza has started using improved seeds that have a shorter gestation period and are less affected by pests and diseases compared to local seeds. These seeds also have a higher yield potential. Furthermore, he has also started considering crop rotation and plans to include legumes for natural land fertilization this season. These practices demonstrate Mr. Kisinza's commitment to adopting sustainable farming techniques that will not only increase his crop yields but also preserve the land for future generations.

In Kenya, the CRAFT consortium linked to Kenya Agricultural and Livestock Research Organization (KALRO) a research government institution managing the Kenya Agricultural Observatory Platform (KAOP - kaop.co.ke), the platform supports dissemination of weather agro-advisory to SHFs. The services provided under the platform are relevant to CRAFT's ambition to empower farmers with adequate information to be able to take adequate decisions in planning their seasonal farming activities. Currently, the CRAFT Project and KALRO are finalizing an MoU on the digitalization of CRAFT training materials via KALRO apps and the dissemination of agro-weather advisory information to targeted SHFs. The plan is to have a collaborative arrangement where CRAFT Kenya provides farmer details to KALRO who in turn provides the farmers with the much-needed downscaled, targeted weather information and agro-weather advisories through KAOP SMS Gateway. SHFs and other actors will also be able to access the digitized content via KALRO web, mobile apps and USSD. The actual field activities on this collaboration are planned to kick off in early 2023. The subnational scope of the collaboration will cover four value chains across 15 counties where CRAFT Kenya Business Champions have a presence with a pool of about 71,000 SHFs. Currently, BCs are retrieving weather information from the KAO platform, integrating it with agronomic information based on a seasonal calendar then disseminating it to SHFs via bulk sms purchased from communication service providers. SHFs also receive weather information from radio stations, extension officers and weather online-based apps.

In Tanzania, the project has continued to support the deliberate efforts of the BCs, along with regional TMA offices, in preparing weather-related messages and disseminating them to farmers through various channels. These include SMS messages, local radio stations, and extension officers. The forecasted weather information is also translated into a language that is easy for farmers to understand, as the project recognises the importance of linking weather information to crop management. For instance, if dry weather is forecasted for the next week, farmers are advised to harvest and dry their crops. One farmer from Mtwara, Tanzania shared, "I normally receive SMS weather information through my mobile phone. This has not only been helpful for the sunflower value chain implemented by the CRAFT project, but I have also been using this information to decide on other crops I used to plant."

In Uganda, CRAFT continued to facilitate the interaction between weather information providers and the BCs. The SDM of various BCs includes access to weather information, for example for Okeba, there is a close relationship with the local representative of UNMA. Through weekly radio shows, weather information along with agronomic advice is provided to the farmers.

At national level, UNMA has been closely involved in the different dialogues and stakeholder learning events.

CROP/ WEATHER INSURANCE

The use of insurance has increased **(indicator 3**7), with 8% of SHFs (52% women) reporting its use in farm management (compared to 2.3% in the baseline). Among the countries, the highest usage was reported in Kenya at 11%, followed by Uganda at 10%, and Tanzania at 4%. However, it's worth noting that the trend has decreased from 2021, with most BCs reporting lower numbers in 2022.

In Kenya, CRAFT has partnered with the Kenya Crop Insurance Project (KCIP) under the broader Kenya Agricultural Insurance Program (KAIP). The goal of KAIP is to pilot weather index-based insurance products across the country in collaboration with a consortium of insurance companies. While crop insurance products dominate the market, there is a lack of well-developed weather index-based insurance products. CRAFT is actively disseminating information about its operational regions to identify potential smallholder farmers who can benefit from the program. At present, approximately 43% of smallholder farmers are receiving weather information through other programs. In the eastern regions, for example, smallholder farmers have received two pay-outs due to failed rains. CRAFT will build on the lessons learned from the program and explore ways to mainstream the program's benefits. Actual field activities for this collaboration will commence in 2023.

In Tanzania the uptake of insurance is low (4%). A total of 101 farmers from Kibaigwa (36 Female, 65 Male) received weather index Insurance. Sensitisation meetings on the insurance aspects were done by majority of the supported BCs, and several farmers showed interest in the scheme. However the insurance providers needed a crticall mass of farmers buying the insurance before it makes economic sense to serve farmers in a specific region. The vastness and lack of detailed weather information makes it costly

to visit farmers to determine the growth stage and performance of the insured crops. This hampered the uptake of crop weather insurance in the country.

"Our group had no problem accessing financial loans and crop insurance in the previous season through NMB bank and RELIANCE insurance. However, in the last season, we were affected by floods, and have yet to be paid by the insurance company, which is a great disappointment to us women farmers. Agricultural loans from banks are delayed, and they are often given according to the banks' crop calendar, which may not coincide with the current rains. Following up on bank loans is more expensive than the loan itself, especially since we take small loans at our level. The loan requirements are also complicated, and the collateral required, such as photos with our husbands, is a problem for unmarried women and creates doubts among married women about our husbands' support for our financial empowerment," a farmer from Amani Farmer group from Kibaigwa shares.

AICCRA developed a CRAFT learning document around the state of index-based insurance and other crop insurances. The paper will come out in 2023.

In Uganda, there has been a slight increase in the use of insurance as a risk management measure, with 10% of farmers (compared to 6.5% in 2021) reporting its use. The project has partnered with the Agro Consortium, which comprises 13 insurance companies offering agricultural insurance covering crop and livestock risks.

DISSEMINATION AND TRAINING ON WEATHER INFORMATION SERVICES AND CSA TECHNOLOGIES AND PRACTICES TO PUBLIC EXTENSION PROVIDERS

The project has made a concerted effort to strengthen linkages with government extension officers in the three countries. This year, the project successfully trained 522 officers and ToTs (indicator 39). These officers actively participated in the training and refresher courses, which increased their awareness and capacity as trainers. As a result, the connection between local government, ToTs, and BCs has been strengthened, creating a sustainable support system for BCs. The project's efforts have also facilitated the participation of BC-related stakeholders, including ToTs, in other government projects. For instance, in Kenya, Nakuru, the government initiated the cascade of climate action to the ward level, the smallest administrative unit. ToTs were appointed as climate action ambassadors at the ward level to monitor progress, a clear indication of their increased capacity and recognition by the government.

Use scaling readiness research to initiate policy dialogues towards enabling large scale rollout of CSA

The project conducted an assessment of the readiness of the enabling environment, policy, and institutional systemic conditions for the large-scale rollout of validated and scalable CSA technologies and practices. The scaling expert at AICCRA led this effort, with a focus on assessing the readiness for the large-scale rollout of validated and scalable CSA technologies and practices for CRAFT's selected value chains and BC's. To ensure scientific evidence was gathered for the scaling process and to achieve impact at scale, a participatory and bottom-up approach was used. One output was a journal article on scaling climate resilient seed systems: Titled "Scaling climate resilient seed systems through SMEs in Eastern and Southern Africa: challenges and opportunities". In addition, a policy brief was developed with Rabo Partnerships and SNV titled - "Leveraging Climate Finance for Agribusiness SMEs to Scale Up Climate Resilient Agriculture in East Africa: Lesson from the CRAFT Project" -

4.0 Work Stream 4 – Learning and Knowledge Sharing

The project will further the existing knowledge base on CSA in food systems through monitoring and applied research related to market-driven adoption and scaling of technologies and practices for climate resilient value chains.

4.1 Knowledge/ Learning agenda

The 2022 knowledge agenda focused on five overarching learning topics:

1. Research and documentation on, and for scaling barriers and opportunities
2. Service provision models for resilience and documentation of the business cases within CIIF
3. Impact assessment of CSA practices and technologies
4. CIS integration and/in extension services
5. Climate and business integration

Additionally, the teams gathered evidence about the approach of CRAFT- working through SMEs to attain climate adaptation at SHF, and its scalability.

4.2 Scaling Research

In 2022, AICCRA captured lessons around the processes of vertical and horizontal scaling. The different outputs were reported in workstream three.

Service provision models for resilience and documentation of the business cases within CIIF which was conducted by Agriterra as a learning exercise.
Agriterra led the documentation of the cooperative cases and worked with three learning consultants (one per country) to support the documentation of lessons and success stories. The critical points focused on CIIF and cooperatives- facilitation of climate adaptation through CIIF, opportunities and challenges within the process of onboarding and implementation, and sustainability of continuity. The report will be published in 2023.

4.3 Impact assessment of CSA practices and technologies

PHD STUDENTS RESEARCH

CRAFT project in its learning agenda engaged 2 PHD students to assess factors affecting scaling of the CSA innovations. One study aimed to draw lessons from 25 cases of scaling CSA and related projects implemented by public institutions, local and international research organisations, Non-organizations (NGOs), and community-based organisations in Ethiopia, Kenya, Uganda, and Tanzania.

The research identifies that the scaling process follows a linear path that involves testing and expanding technology. In most cases, the focus is on technologies and models for climate change adaptation in crop-based value chains, with few incorporating mitigation measures. Some of the factors identified hindering the scaling of CSA interventions include:

1. Limited understanding and consideration of the dynamics of smallholder farming systems in scaling strategies
2. Rare application of climate data, projections, and impact models in decision-making for scaling
3. Minimal consideration of biophysical and spatial-temporal impacts and trade-off analysis in scaling efforts
4. Challenges in effecting systemic change to enable sustainable scaling.

The research offers a comprehensive context of scaling from a SHFs perspective and was published online: Scaling Climate Smart Agriculture in East Africa: Experiences and Lessons.

The second research was conducted in Uganda, targeting business champions in the soybean VC. The aim was to determine the extent of SHFs' participation in the value chains, the implications of different types of farmer-farm linkages, the effectiveness of farm-level training (FLT), and Contract for the adoption of CSA innovations.

Though the research paper is yet to be published, the preliminary analysis show that adoption of CSA innovations occurs in phases, where a few farmers are early adopters and others adopt at later periods i.e., they follow the innovation adoption lifecycle. The main driving factor for early adopters was increased availability of VC services, complemented by information about existence of these services through the BCs. The research further identified that adoption was hampered by lack of education, small farm size, insecure land tenure, and limited access to credit. A mobile phone played a key role in service use and soybean uptake as those farmers who lacked mobile phones were not able to access these services.

Further examination into the BCs engaging in the soybean VC demonstrated that utilization of farmer-firm linkages and FLT results in an increase in the adoption of climate-resilient seed, rhizobia inoculants, and increase in the share of soybean seed expenditure. The research paper is being worked on and will be published in 2023.

4.4 CIS integration and/in extension services.

As reported in the first workstream update, the CSA manuals for four value chains in Kenya were launched, while the manuals for Tanzania and Uganda are in the final stage of development. Additionally, the CRA-4 pagers have been updated.

4.5 Climate and Business integration

Climate and business integration was documented in a policy brief: "Increasing climate resilience and incomes in the food value chain: Six opportunity areas for private sector support in East Africa."

AICCRA, together with ASARECA, CRAFT and Kenya CSA MSP, held a continental CSA science-policy dialogue from 26th to 28th October 2022. The conference theme was "Innovations and inclusive strategies to improve agricultural productivity, food security and agribusiness incomes through policy interventions in technology transfer, access to resources, services and markets". The main objective of the conference was to provide a forum for sharing evidence and innovations among relevant stakeholders towards influencing gender-responsive policy implementation and reforms with specific focus on CSA. The conference report encompassed the key takeaways and recommendations from the thematic areas that were discussed.

4.6 COVID-19 Response and Resilience Initiative for Food Value Chains (CORE) - Africa

The CORE-Africa project (2020-2022) aimed to strengthen responses to the COVID-19 situation through nine MFA-funded projects across Africa. CRAFT was involved with different trajectories that supported learning and adaptation to strengthen the project's approach. Overall, documentation of the project can be found online: CORE project lessons from COVID.

The project conducted a case study in Uganda aimed at assessing integration of hygiene in the agriculture sector. A comprehensive study on the status of hygiene in the agriculture sector for CRAFT was developed and disseminated on the SNV website: Hygiene research UGANDA,

Furthermore, the project conducted an analysis of Service Delivery Models (SDMs) for Farmer (Climate) Services within CRAFT to understand 'what is working and why?' and 'what is not working and why?' in respect of inclusive SDMs and support provided to farmers. The learnings were used within the project and learning sessions within SNV. These findings have been documented in different briefs: A comparative analysis of climate smart service delivery models and blog on strengthening resilience of farmer service delivery models.

CRAFT participated in learning trajectories around resilience and Digital Services for Agriculture which were documented in the learning brief: Addressing structural barriers to scale digitalisation for resilient food systems.

4.7 Learning events

In Kenya a CSA National Learning Event was held. The purpose of the event was to share lessons learned and proof of concepts (evidence) related to CSA practices and technologies (Climate adaptation and mitigation practices and technologies, adoption and upscaling of CSA, policy and governance, and capacity development) that were influenced by CRAFT. The event created an opportunity for the identification of areas of cross-pollination with related SNV projects and other partners.

Farmer field days-There were several BCs such as IMCOS, Quinam, SOPA, Smart Logistics, Topical Ventures and Fresh Crop that held farmer field day events in the various localities of the farmers they engage. The attendees of the events included value chain actors such as agrochemical companies, seed companies, mechanization service providers, spraying service providers, agricultural machinery dealers, EAGC and CGA officials, sub-county administration officers, sub-county agricultural officers, and the chief in many instances. This exposed the farmers to new CSA products and services and created an opportunity for farmers to learn about new varieties in the respective value chain crops as some of the events were held at demonstration sites.

Over 1000 potato farmers attended the farmer learning event organised by FreshCrop, where they were introduced to the latest technologies such as hybrid tube potato seeds and apical cutting, and linked with financial institutions in the potato sector, while agrochemical companies showcased their products to the farmers, providing them with an opportunity to interact with experts and ask questions about their products and services, ultimately gaining practical knowledge to implement in their farming ventures.

National youth convention organised by CRAFT and partners- CRAFT, in partnership with Agriterra and the Kenya National Federation of Farmers (KENAFF), hosted a national youth convention, which brought together 168 young people from various regions of the country who are associated with KENAFF, SNV, and Agriterra-supported cooperatives. The primary goal was to create a forum for sharing experiences and opportunities in climate-smart agriculture and to equip young people with contemporary agribusiness skills, so that they can take advantage of the vast potential in the agriculture sector. The convention also aimed to encourage effective youth engagement in agricultural enterprises, cooperatives and farmer organizations, governance, policymaking, and climate action towards a sustainable agri-food system in Kenya. It provided access to financial options, with government financial institutions that offer loans at low-interest rates in attendance.

Youth council exchange visits- Kaplomboi, Nandi and Marakwet youth visiting Fresh crop and Sereni Fries Limited -The exchange visit aimed to enhance the capacity of youth councils within cooperatives by building on the outcomes of previous youth kick-off workshops. During the exchange visit, the youth had the opportunity to learn about mechanization and other CSA practices in the potato value chain from Fresh Crop, as well as linking them up to markets. In addition, some youth from Kaplomboi, who were interested in potato farming, received seeds from Fresh Crop that were previously unavailable to them. The youth also visited Sereni's cold storage facility in Naivasha to learn more about post-harvest handling. The cooperative boards were also represented at the exchange visit.

CRA Light workshop- CRAFT organised a climate risk assessment workshop that brought together BCs operating in the potato and sorghum value chains. The workshop, which had 60 participants, aimed to enhance the understanding of climate change and its potential impact on these value chains. During the workshop, the BCs identified trends that may impact their businesses in the future and learned how to incorporate that information into their strategic planning. They also discussed suitable adaptation strategies that can increase the resilience and adaptive capacity of actors within the value chains.

Roadmap to COP27 climate change forum- CRAFT, in partnership with DFCD and ENDEV project in SNV, participated in a pre-COP27 conference focused on climate change issues in Africa. The conference, which attracted several civil society organisations, served as a networking platform for global climate change topics. At the event, CRAFT exhibited its knowledge products and participated in panel discussions on climate finance and climate-smart agriculture in Africa.

In Tanzania, two policy events were organised with over 100 potato actors and stakeholders to discuss challenges in the sector, disseminate findings from a policy inventory done by CRAFT, as well as discuss the latest information from the developed suitability

map and climate projections. One of the main bottlenecks identified in the potato sector is the availability of healthy clean seed potato varieties. In collaboration with the Dutch embassy in Tanzania, interventions were organised to strengthen the potato seed sector.

Rabobank conducted a **financial landscape analysis** which helped in identifying several local financial institutions interested in working with CRAFT. CRAFT organised various learning events with each interested bank, namely Cooperative Rural Development Bank (CRDB), Azania Bank, and National Bank of Commerce (NBC), to facilitate a better understanding of the agricultural sector in which CRAFT operates. The events included sharing climate projections and suitability maps, and initiating conversations on how financial institutions can use this information to make strategic decisions. The main objective of these events was to build stronger partnerships between CRAFT and the banks, and to explore potential avenues for collaboration in promoting CSA and rural development in Tanzania.

Various **farmer learning days** were organised by business champions. The main purpose of the events was to showcase the learnings from the FFS, invite service providers to showcase their products and services on offer, and to strengthen the relationship between farmers and business champions. One of the events was held in Namtumbo to showcase various conservation agriculture practices and technologies with over 200 people in attendance. The visiting farmers had the opportunity to learn about spacing at the FFS plot, land preparation, and various CS technologies, including performance of different sunflower varieties.

A **learning event** focused on sorghum was organised in collaboration with a seed company and Kibaigwa farmers. The event was attended by over 150 farmers from 30 villages. The main objective was to showcase the performance of improved sorghum varieties, which were demonstrated at the company's model farm. The farmers had the opportunity to learn about different crop management and post-harvest practices, as well as the benefits of using improved climate-smart sorghum varieties such as Mercia, Narco, and Tegemeo.

A **close-out** meeting was held with three grantees, aimed at reviewing the results, identifying implementation challenges, and discussing the continuity of the activities with stakeholders. *'Sunflower used to be a low value crop. Farmers intercropped it with maize, sorghum, and beans. They would use local varieties, which yielded poorly. CRAFT introduced improved varieties of sunflower and those that started using them are getting exceptionally good yields. For example, black record weighs 62kgs/bag, Aguirra 68kgs/bag, and Hysun 71kgs/bag. Now, sunflower is a big business among farmers,'* says a Lead farmer from, Sumbawanga district.

To strengthen the technical capacities, CRAFT organised 13 technical refresher trainings to 361 ToTs and extension workers as well as quarterly reflection meetings with grantees and extension workers and gov officials to discuss implementation of the grants and identify any challenges hindering implementation and develop mitigation plans.

In Uganda, CRAFT organised several learning events throughout the year. In May, a **CSA learning event** was held at Makerere University Agriculture Research Training Institute (MUARIK) in Kabanyolo in partnership with Soybean Africa Limited (SAL), with the objective of facilitating learning about the soybean value chain, seed business, and proper management of the crop from planting to harvesting. Among the participants were eight service providers in the value chain, who demonstrated and pitched their business offerings. The climate-smart practices and technologies demonstrated included soil testing, land opening services, weather information, seed testing (germination test), crop insurance, irrigation, post-harvest handling (PHH) equipment such as moisture meters, collapsible seed dryers, tanks, and ICT/digitalizing agriculture.

CRAFT also hosted **a learning event about farming systems** for the BCs to share knowledge and information on the farming system approach for sound management of farm resources to enhance sustainability in farm production and improve livelihoods of farmers. To identify possible strategies or actions for integrating farming systems approach among business cases.

In March 2022, CRAFT participated in a three-day ***Harvest Money expo***, a national agriculture exhibition organised by Vision Group, the Embassy of the Kingdom of Netherlands (EKN) in Uganda, and the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Five BC's showcased their different climate smart agriculture practices and technologies and finished products. In addition, a CRAFT Agronomist facilitated a Master Class on scaling adaptation of CSA to improve resilience of smallholder farmers to climate change.

4.8 Documentation, Communication and sharing of project results and lessons

At the beginning of 2022, CRAFT enhanced its media presence, through conducting a two-month media campaign across mainstream and social media platforms, participate in learning and networking events, and build the capacity of its staff in communication skills, such as photography. These efforts were aimed at increasing the visibility of the project and highlighting the impact of climate change on farmers, as well as increasing public engagement on CRAFT platforms.

CRAFT increased its visibility nationally and internationally. First, the project participated in and organised international events sharing learning and profiling its work. These include AGRF and COP 27, and the gender policy event in Mombasa. CRAFT also participated and organised several pre-COP27 events such as the African Resilience Hub online and dialogues in Kenya.

CRAFT hosted a Women's Day Public webinar, to increase public awareness on the contribution that women and girls are making towards climate action in agriculture. The webinar was live streamed on Twitter and LinkedIn and featured renowned climate leaders and women rights activists and agriculturalists from the East African region that shared insights on how climate change mitigation and adaptation initiatives can be harnessed to benefit women.

The project used these events to advocate and influence climate leaders at national and international levels around key aspects of increasing private sector investment in building climate-resilient food value chains.

CRAFT ran a 16-day climate action campaign in commemoration of World Environment Day 2022. The campaign aimed at increasing awareness about the urgent need for human beings to live sustainably and in harmony with nature by making transformative changes at a personal level. The campaign attracted not only CRAFT project teams, but also other SNV Uganda staff who made personal commitments towards reducing carbon print to make the environment healthier, greener, and cleaner.

Communications staff-built capacity in documentation and provided branding materials to project teams. The team also carried out a multi-country trip gathering content which resulted in several significant change stories and videos that highlighted the projects support to farmers, business cases and other partners. These have been used on social media and at events. The project also utilized printed and broadcast media to elevate conversations about climate change in the three countries.

The project grew substantially with its following on different (social) media platforms and launched its YouTube page and Newsletter. YouTube- The CRAFT Project – YouTube; Additionally, Twitter following almost doubled from 676 followers in 2021 to 1,317 by the end of 2022. The several social media campaigns CRAFT ran in this year, such as the Women's' Day campaign, Climate Action and World Environment Day Campaign, greatly contributed to this growth. The project released four newsletter editions, sharing news, and learning with stakeholders in government, climate space, and implementing partners. Twitter- https://twitter.com/crafteastafrica; LinkedIn- https://www.linkedin.com/company/craft-east-africa/

Additionally, CRAFT started on designing of the project website which was concluded towards the end of 2022 and was launched in February 2023, that feature project success stories, training aids and manuals, documentaries among others. CRAFT project website: https://www.crafteastafrica.org/resources/publications .

5.0 Work Stream 5 – Gender and Youth Inclusion

CSA planning inclusive of gender equality and opportunities for youth can provide economic opportunities for enterprise development and the creation of an on- and off-farm labour force if systematically integrated throughout all workstreams.

CRAFT's GESI objective is to support agribusiness models where men, women and youth operate in the CSA space as entrepreneurs along the target VCs equally, with the following specific objectives:

1. Women and youth actively participate in CSA service provision as clients, employees and entrepreneurs along target VCs.
2. Enhance the agency of women and youth CSA entrepreneurs.
3. Foster an enabling environment for the development and scaling of gender-sensitive CSA products and services along CRAFT target VCs.
4. Provide evidence on the BC for gender-sensitive CSA service delivery

Capacities of women and youth-led enterprises implementing inclusive climate business cases: The results and activities supporting the 20 women and youth led enterprises are reported under workstream two.

The GESI (Gender Equality and Social Inclusion) strategy has largely been implemented by BCs, with 30 out of 44 BCs interviewed reporting the adoption of a GESI policy or guide. The importance of inclusion is increasingly recognised by BCs, with all 44 reporting that they have taken actions to improve gender equality. Of these, 33 have taken deliberate action around equal employment opportunities and creating a supportive work environment. For example, Okeba, a CRAFT partner in Uganda in the soybean VC established a childcare facility for its employees. This has been a great support to the female employees at the sorting facility. Additionally, 26 BCs have implemented affirmative action measures to ensure greater participation by women and youth in decision-making processes. In terms of farmer training and mobilization, all 44 BCs are committed to promoting equality and ensuring equal access to inputs. Everada Katondwa, a lead farmer in Tanzania is one of the women to benefit from such actions. Through CRAFT BC Ikuwo General Enterprises, Everada has been empowered to lead farmer training at farmer field schools. *"We used to see men take leadership roles in our communities. With CRAFT, women in Milanzi village have awakened and believe they can also*

lead, teach, and supervise groups of women and men," Everada shares. Now, she purposefully includes more women in activities and supports them in adopting climate-smart agricultural practices and technologies.

Image 6: A staff from Popular Knowledge Women Initiative Cooperative (P'KWI) showcasing the virgin sunflower oil, processed by the cooperative.

5.1 Agriterra supported cooperatives in strengthening GESI trajectories.

Female Leadership trainings were conducted in all three countries. They aimed at understanding the position of women in cooperatives and promoting increased membership of women in entrepreneurship and leadership in cooperatives. The training also aimed to build the capacity of current and potential women leaders by providing leadership and management knowledge and skills. Topics covered included gender balance in leadership and membership, characteristics of good leaders, and different leadership styles. Each cooperative proposed the establishment of a women's council to provide representation for women and conduct a specific economic activity. All participating cooperatives developed action plans focused on including more women in leadership positions, strengthening them, and setting up women's councils.

5.2 Youth and Women councils established within the Cooperatives.

In 2022, six new youth councils were established with bottom-up representation at the board level. Now, ten out of the 15 cooperatives have youth councils in place. These councils not only provide youth representation in the cooperative's governance structure, but also engage in economic activities such as land rental for production, seed multiplication, extension services, operation of agrovets, transportation services, and distribution.

CRAFT organised an exchange visit and learning program for youth in agribusiness, with the main objective of providing a platform for experience sharing and peer-to-peer learning, allowing them to share innovative business approaches, strategies, and real-life experiences relating to agroecological and climate-smart practices. This program also sought to engage youth groups within the cooperatives and expose them to the work of other youth, thereby creating opportunities for business development partnerships for markets and financial linkages.

The youth inclusion case of Starlight Cooperative

Paul Kariuki, a 35-year-old member and treasurer of Starlight Cooperative's youth council, started with a one-acre potato farm trial in 2020. With the help of certified seed potatoes of the Shangi variety and CSA practices, he was able to expand his farm to 3.5 acres during the 2022 OND season, despite the lack of rainfall. Despite the challenging weather conditions, he harvested an average of 160 bags of potatoes. His success has allowed him to build a permanent home and acquire an additional 0.5-acre piece of land, demonstrating significant improvements in his livelihood.

Zaitun Amuge shares that, "*through the formation of youth councils and exchange visits to different regions of the country, we were able to create smaller groups of youth who are now actively involved in agriculture. Many of them are multiplying seed for us as a business and have embraced agriculture in a way they never did before. We also recognized the importance of having a youth representative on our board to give a voice to the younger generation. Before, our board consisted only of elderly members, but now we have a more diverse representation that includes the youth perspective*."

5.3 Gender-responsive research on CSA practices and technology in the four VCs in Kenya.

CRAFT conducted a field study in Kenya to identify gender-responsive CSA practices and technologies, as well as the main barriers to their adoption. The study also involved conducting risk and diversification analyses, cost-benefit analyses, and return-on-labour analyses. The aim was to provide recommendations for appropriate solutions that consider specific gender and age groups, ensuring that CSA practices and technologies are economically viable and responsive to the needs and interests of farmers of different genders

and ages. This approach ensures equal opportunities for men, women, and youth in relation to climate change adaptation. The findings of the study will be published in 2023.

5.4 Internship Programme

> *"I learnt about communication, I used to fear talking before a crowd but now I can speak before an audience" Godfrey Ojok (intern at CRAFT Uganda)*
> *"Because of mentorship, I have developed a mindset change towards goal achievement and I now believe in myself, I listen to advice more, and I always dream big "- Intern.*

The CRAFT internship program recruited participants from Kenya, Tanzania, and Uganda. In Uganda, 21 interns were recruited and placed in 17 districts with 15 business champions and three SNV offices. During the six-month internship period, the interns gained valuable technical and soft skills in the workplace. They were trained in CSA practices such as using improved seed varieties, interpreting weather information, and practicing water and soil conservation. In Tanzania, eight interns supported the MEL team and were assigned to support the various BC's. The gained valuable competences and two out of the eight interns were able to secure jobs as advisers on different projects under SNV. The internship was a positive experience for both the interns and the host organisations, providing recent graduates with valuable career experience and transferable skills. IN Kenya four young professionals were given an opportunity to assist the MEL team in data collection.

6.0 Key Learnings

6.1 Key Learnings

Adaptation to climate change is location specific across different spatial scales. Need-driven climate change adaptation technologies have shown more acceptance by farmers. CSA uptake thrives with context-specific and locally adapted actions and interventions. Therefore, there is a need for stronger engagement with other actors, such as researchers, to integrate local and scientific knowledge. Having adequate data to assess the 'best fit options' across different spatial scales and topography, while considering socioeconomic issues, is crucial. It is important to note that the two rainfall seasons differ across spatial scales, and the generic two long and short rain seasons months are not the same for all regions. For example, in the Rift Valley and western areas of Kenya, the months for seasons are different. Understanding the months for seasons across different spatial scales will enable proper planning and implementation of intervention areas. Additionally, some seasons are more prone to climate risks than others, such when farmers are planting. Future CRAFT interventions should focus on water harvesting technologies such as irrigation to support farmers during drought, especially in the ASAL areas where water stress is a major limitation to adoption. This is particularly important as farmers have expressed a strong desire for this support, as their incomes cannot cover support investment in CSA products and services.

Availability and affordability of CSA practices and technologies. The costs of CS inputs like seed is still high for smallholder farmers and is the main reason they continue to use non-improved seeds from local markets that deliver poor yields. The cost of CSA inputs is exacerbated by the distances between these sources and farmer location. The farmer needs to pay extra to access these inputs and services hence increasing the production cost. Additionally, the rural location of most farmers makes it difficult to access some of these inputs whose vendors are concentrated in urban or peri-urban centres. The project's support has bridged the gap by facilitating linkages between farmers and input service providers through business-to-business meetings and exhibitions. The match marking has contributed to the notable uptake of improved seed, although more efforts are still needed to increase uptake.

The envisaged development of CSA financial products has taken longer than originally anticipated. Financial institutions prioritise profitability and hence favour less risky commercial financial products. For example, the cost of lending to agri-enterprises, especially the farmers, is five percent more expensive than lending to a similar business in another sector. This is mainly due to lack of proper records that prove credit worthiness. The project mitigated this by conducting due diligence and supporting agribusinesses to develop the required records. This has heavily lifted the burden of investing in the agribusinesses. This is only true for the CRAFT supported agribusiness, but work will be scaled to other businesses in future. At farmer level, group borrowing from lower-level financial institutions such as SACCOs, which are closer to the farmers and with less stringent lending terms, has been promoted.

Business champions have prioritised climate smart agribusiness services that are more profitable to their businesses, and within their capacity. This implies that fewer climate agriculture services were scaled as businesses. The capacity of agribusinesses has therefore affected levels of adoption. For example, some business champions were overwhelmed by the increased demands among their farmers and could not afford to stock the required quantities of seed and other inputs on time, resulting in delayed deliveries and planting.

The Training of Trainers (TOT) model is preferred by farmers because it is more personal and allows for one-on-one interactions. Additionally, the accessibility of the TOTs within their local communities has contributed to their effectiveness in reaching many farmers. The TOTs have also been successful in delivering practical training to farmers through methods such as demonstration farms and FFDs.

The Farmer Field School (FFS) approach is considered an effective way to provide practical learning opportunities to farmers. Participants appreciate the chance to ask questions and observe changes on demonstration farms, which they can then apply to their own farms. However, some farmers have noted that the FFS approach can be a lengthy process, which makes it difficult for them to consistently participate in all sessions. As an alternative, they suggest that local extension officers visit their farms and provide the needed extension services. Many farmers find a mixed public-private extension model to be the most effective approach.

The use of an independent team of experts to review BCs applications was found useful, as it promoted transparency and ensured the quality selection of the BCs for engagement. In some cases, IAC members provided essential information about applicants that supported CRAFT due diligence efforts.
Areas for future improvement included: strengthening due diligence and increased project monitoring with a focus on micro impact at the household level. Additionally, the period between application and onboarding needed to be quicker and more efficient without negating quality and the project should strive to onboard all BCs in the early phase of the project: this gives the BCs adequate time to execute the business case. Overall, IAC commended CRAFT for emphasising quality versus quantity in the onboarding process.

Decisions by farmers on what crop to farm are driven by market dynamics. Farmers are generally open to investing in options that address their immediate needs- improved productivity and income. They will grow crops which have an available market and are prioritising early maturing crops that can give higher returns in a short period of time. Therefore, it is crucial that farmers have information they need to take informed decisions about their investments.

An inclusive and participatory mechanism for technology validation, selection and dissemination helps to improve knowledge, skills and attitudes of farmers in adoption of CSA technologies. Some farmers have not planted varieties promoted by the BC due to low market demand or lack of awareness of markets as opposed to other varieties. Some farmers may be hesitant to adopt improved varieties because they believe that these varieties are more susceptible to diseases when used as seed in subsequent seasons, compared to indigenous varieties which they perceive to be more pest and disease tolerant. The validity of this belief has been debated in conferences and food security policy forums and it is important to validate this claim and provide farmers with appropriate advice, particularly in relation to red sorghum and common beans.

As climate change has caused more extreme and unpredictable weather, agriculture planning has become more difficult. Context-specific climate information services are important for understanding local climate change impacts and facilitating the planning of local adaptation actions. This was achieved through climate risk assessments and engagement with weather information service providers through the BCs. However, for decision making at farm level, farmers require regular, short-term forecasts that are less technical, incorporate indigenous knowledge and are provided in their local languages, along with agro-advisory services, rather than long-term future projections for decision-making at the farm level. Diversification within and beyond agriculture is crucial for risk reduction and successful adaptation to climate change. Water conservation and training in improved water management are fundamental to sustainable livelihood diversification and adaptation to climate change in semi-arid or arid regions. There is also a need to assess sustainable land use in the face of drought to see if farmers turn to natural resources to sustain their livelihoods.

Cooperatives are one quick way for scaling CSA practices: There is strong evidence from the CRAFT project to demonstrate the relevance of cooperatives in scaling climate-smart agricultural practices and increasing smallholder farmers' incomes through collective bulking and marketing. Adopting climate-smart practices does take time because it involves a shift in mindsets. Tapping into existing structures like cooperatives will accelerate the rate at which these CSA practices will be adopted. Cooperatives offer great platforms for increasing climate resilience to many SHFs through the delivery of climate-smart interventions. Usually, well-governed cooperatives enhance the confidence and trust of their members and thus increase response to the collective initiatives organized by the cooperatives and/ or implementers. In particular, knowledge, such as climate-smart agricultural practices, can be very well spread to many SHFs, when there is a presence of a well-governed cooperative.

To the extent possible, harmonisation of project and government strategies and activities is important for the CSA service sustainability. Government has different planning, budgeting, and implementation cycles, making exploitation of synergies difficult. However, CRAFT experience has shown that where harmonisation is possible, it leads to a greater sense of government ownership of the intervention. There is need to come up with strategies to ensure sustainable collaboration between ToTs and public extension officers which continues beyond CRAFT.

Implementation of CSA requires a coordinated approach. CSA requires a coordinated implementation and reporting system from sub-national to national level. For instance, in Kenya, harmonisation of CSA implementation was difficult before establishing the CSA-MSP platforms at national and sub national level which facilitated stakeholder communication, learning and coordination.

There is a need to pay more attention to the overall farming system. There was no clear strategy to look beyond the value chain approach and pay more attention to the farming systems. Although CRAFT did not monitor farmers' production of other VCs throughout the year, CRAFT highly encouraged practices such as crop rotation, intercropping, crop residue management, mulching, cover cropping which implied an inclusive farming system. In addition, farmers indicated that they applied the CSA learnings also in their other crops.

6.2 Key identified challenges

In terms of private sector own contribution to the project activities, CRAFT had planned and required CIIF applicants to demonstrate viability and ability to co-invest at least 50% to the project interventions. CRAFT later realised that majority of women/youth led, and cooperatives lacked ability to co-invest, compared to SMEs, CRAFT revised the criteria down for women, youth, and cooperatives to become more inclusive. For example, CRAFT continued to work with the revised criteria for women/youth led BCs and cooperatives to co-invest 30% of the total grant value. A specific call for service providers was rolled out in Kenya and Uganda, with adjusted criteria in 2022.

Access to finance to SHF is still a challenge due to low incomes and limited collateral. SMEs, and cooperatives in the three countries face significant challenges when it comes to accessing finance. High interest rates charged by FIs are identified as one of the major barriers, coupled with the high cost and lengthy procedures for accessing financing. Some BCs noted that FIs did not understand the nature of their businesses and were not willing to provide loans due to the perceived risks. Women and youth-owned BCs also face challenges in accessing financing due to inadequate collateral such as land or buildings. This limits the amount of financing they can access. Delayed disbursements of loans is a significant challenge as they affect the performance of agricultural loans, which follow the cropping calendar. There are existing tailor-made financial products but FIs need support to mainstream tailor-made products for farmers to access them. There is a need to develop standardised criteria to assess how bankable a farmer is to access credit. More engagement with MFIs and SACCOS to be considered as opposed to banks since they are more locally available and give favourable credit terms.

Co-financing, despite this overall success, CRAFT noted challenges that, to some extent, affected cost share realisation for some BCs. Inability to realise the anticipated co-funding especially from commercial banks (due to inadequate collateral). This affected BCs working capital and ability to buy back produce from the SHFs. As a result, SHFs opted to side selling, which affected performance of some BCs.

High interest rates charged by financial institutions made it unprofitable to acquire credit facilities, especially for the low margin VCs that CRAFT is dealing in. For example, BCs focusing on sorghum, sunflower, soybean, and potatoes were able to co-invest unlike their counterparts focusing on green grams, beans, and sesame.

Limited public sector involvement in specific VCs such as availability of breeder or foundation seed for sesame, green grams and beans, compared to the other project VCs. Inadequate availability of CSA seeds affected the overall VC supply chain, and thus limited business growth for the BC and other VC actors to invest sustainably.

CRAFT implemented grant amendments to respond to the needs of the private sector. These included: a) reduction of cost share mainly attributed to effects of COVID-19, that affected business transactions and thus ability to raise cost share, b) reduction of targets (financial and program targets) to match the agricultural seasonal calendars and grantees' abilities to implement their

contractual obligations, and c) expansion of awards' scope of work (SOWs) due to program scaling. Financing cooperatives through matching grants put significant pressure on the cooperatives to raise external financing from banks which to an extent was unrealistic and relatively expensive financing since banks on average charge up to 24% interest per annum. The CIIF criteria for cooperatives were later on relaxed to ease the co-financing pressure.

Access to land by youth and women remains a challenge. Access to land by youth is limited by the fact that it is often tied to marital status, with many parents holding onto land up to old age, thereby restricting the youth's access to it. In addition, access to land for women is also a challenge as a sunflower farmer in Tanzania explains, '*In our society, the land is owned by men, which means that we have limited access to our own land for farming*.'

Need for a more explicit gender mainstreaming strategy when developing business cases. There is a need to develop a gender mainstreaming strategy for all value chains, while also prioritizing capacity building efforts geared towards men, women, and youth, as well as BC staff, with a focus on gender equality in the context of CSA practices and technologies.

The high cost of CSA practices inhibits adoption of CSA practices and technologies by youth and women. The high cost of CSA practices and technologies, especially for women and youth, is a significant barrier to adoption. A stronger access to finance component focusing on SHFs would improve adoption rates and climate proofing the VCs.

The decision-making process for cooperatives is different from that of typical SMEs. In Tanzania for example there are 5 layers in the cooperative decision-making process. The bureaucracy around the policy and procedures of the Cooperative Act hinders the transformation of the cooperatives hence it takes time before change is happening.

The cost of internet data in some countries like Uganda is high, which made digital data collection expensive for the business champions and their agents. In some places, telecommunication infrastructure is not well developed making online data correction challenging. Additionally, types of phone or internet gadgets that are appropriate for data correction work are expensive because of the high taxes levied. This makes it difficult for the agribusinesses and the farmers to invest in them. The project took the initiative to support digital data collection, especially during the baseline and annual reviews. The project provided phones which were collected and kept by the project team. However, this approach is not sustainable beyond the project unless targeted support is provided.

Bureaucracy in public institutions delays progress of any initiatives, for example decision making in public institutions might be vested in an office that is hesitant to participate in the dialogue sessions.

Public institutions need support to implement action plans developed with partners. For instance, in Uganda, the ministry required funding to establish a secretariat and organise quarterly meetings of organisations working in the CSA space. The secretariat's purpose is to improve coordination among like-minded organisations. Similarly, in Tanzania, while several policy issues address CSA, coordination between partners and ministries is inadequate, causing the CRAFT team to seek clarity from each line ministry to produce a unified conclusion.

Political risks, especially after change of governments or government staff, makes it difficult to follow up on already established engagements with the previous regime. This delays the process since it warrants another round of introduction and updates.

In summary, the implementation of CSA interventions is critical for building resilience and adapting to the effects of climate change. However, successful adoption of CSA technologies and practices by SHFs is dependent on several factors, including location-specific adaptation strategies, affordability and availability of inputs, engagement with other actors, and prioritization of profitable CSA practices and technologies. Effective training and extension services, as well as an inclusive and participatory approach, can facilitate the adoption of CSA interventions. While the project has made a significant progress towards achieving its goal of increasing the income of SHFs through inclusive climate-smart business cases, challenges such as the longer time it took to onboard business champions and the impact of the Covid-19 pandemic have affected its ultimate reach. Continued engagement with key stakeholders and prioritizing investments in CSA research, innovation, and capacity building at all levels are crucial to addressing these challenges.

Annex

I Country story: Kenya.

II Country story: Tanzania.

III Country story: Uganda

IV Table indicators.

V MTR process and table of follow up points.

VI Agriterra work with cooperatives.

VII Summary Financial Landscape Analysis Kenya, Tanzania and Uganda.

VIII Summary of the climate projection work under CRAFT project (AICCRA)

IX Publications 2022.

ANNEX I: COUNTRY STORY: KENYA

BUSINESS CASES

The focus for this year was to consolidate the interventions that the BCs had previously implemented, while also striving to identify synergies at various levels throughout the value chain and ensuring the sustainability of the BCs. The project focused on BCs that were strategically positioned, in geographical areas that experience high weather variability resulting in food insecurity, and areas with high food production potential.

The team provided ongoing technical support to 15 business champions in the potato, common beans, sorghum, and green grams value chains, which has allowed these businesses to successfully carry out their planned activities. Two of the 15 were onboarded at the start of the year and one service provider in July. This put the total CIIF committed grant funds at €1,767,202, with € 1,465,594 (83% of the total grants committed so far) spent within the year. The co-contribution by BCs so far stands at 82% of the € 4,600,820.

The BCs registered 44,234 farmers with most BCs surpassing their target number for the year. Of these, the BCs provided training to 36,116, while also establishing 309 demonstration farms as learning sites for CSA practices and technologies. The total number of farmers engaged by the BCs now stands at 60,533, which is a significant achievement. In the annual surveys conducted to gather monitoring data and other relevant information from 12 BCs, results indicated that 33,293 Smallholder Farmers (SHFs) reported an increase in income. Additionally, 29,201 SHFs from the sampled BCs reported an increase in yields due to the implementation of CSA practices and technologies.

VALUE CHAINS

Priority was given to two VCs commonly grown in semi-arid regions and two that are grown in middle to high altitude zones, while also considering the commercial viability and food security aspects of the enterprises.

The chosen VCs - beans, potato, green grams, and sorghum - are essential crops in Kenya, with sorghum presenting opportunities for dryland farming, ready market, and drought tolerance. The farmers employ a mixed farming system, cultivating cash or food crops based on the season. The sorghum, common beans, and green grams VCs faced various challenges. Low productivity due to unreliable rainfall patterns and insufficient rainfall was cited as a significant issue, and the project addressed this by advocating for CSA practices that conserve soil moisture, improve soil water holding capacity, and enhance soil nutrition. Other strategies include the use of improved certified seeds that are drought-tolerant, as well as the adoption of good agronomic practices such as timely planting, appropriate seed rate, and right spacing, and timely pest and weed control. At post-harvest level, use of labour-efficient threshing technologies such as mechanised threshers as opposed to manual threshing helped women save on labour since this labour-intensive activity is mainly carried out by women. Furthermore, the use of mechanical threshing significantly reduced post-harvest losses, by up to 10%.

The potato VC focused on easy accessibility and timely availability of certified seeds that have climate-resilient traits such as resistance to disease and tolerance to drought. Access and availability to certified potato seed during the planting season has been a challenge for many farmers. This has been attributed to the strict phytosanitary requirements associated in multiplying seed potatoes, inadequate foundation materials to multiply enough seeds to meet farmers demand, and logistical challenges due to bulky nature of the potato seeds making it hard to decentralise the multiplication systems thereby affecting its affordability. In addition, proper storage technologies were also limited, making it difficult for seed multipliers to store seeds. To overcome these challenges, the project supported the BCs in adopting rapid alternative multiplication technologies like apical cutting propagation, which has been instrumental in availing planting material and shortening the seed multiplication process i.e. from five to three seasons. Additionally, the BCs have established out grower models to decentralize seed multiplication systems thereby making seeds affordable to farmers, breeding

Starlight Cooperative and Fresh Crop partnership: Increasing Access to Quality Potato Seed in Kenya

Starlight Cooperative, a farmer-led and owned cooperative dealing in potato, faced a significant challenge with seed availability for its potato farmers. Farmers relied on market-bought seeds during the planting season, which resulted in crops affected by pests and diseases and a negative impact on their harvest quality and quantity.

Through CRAFT, Starlight was linked to Fresh Crop, a potato seed company. Fresh Crop, through CIIF enhanced the quality and quantity of ware potato produced by employing climate-smart practices. Starlight entered a five-year contract with Fresh Crop Limited to supply certified seeds at a subsidized price to its members. Out of 2500 farmers of Starlight, 52% up from 21% in 2020 have adopted improved varieties due to increased access and some farmers are seed multipliers, selling potato seeds to other farmers in within and outside the cooperative. Farmers have seen a significant increase in production and a reduction in pests and diseases. The partnership has significantly increased the availability and quality of certified potato seed for farmers in the region, resulting in increased yields and improved economic outcomes for Starlight Cooperative members. For instance, in the last season, the society had five acres for seed, which on average yielded 400 to 500 bags per acre.

locally suitable varieties like Chulu that are suitable in low altitude areas and establishing diffused light storage facilities that help farmers store seeds for a longer time thus increasing seed availability. These efforts have resulted in over 1000 MT of DLS facilities, a 20% reduction in seed costs, and continuous multiplication of seeds in all seed classes. In 2022, the BCs successfully produced 15 MT of Mini tubers, 158 MT of pre-basic, 377 MT of basic, and 1272 MT of C1.

CLIMATE AND WEATHER

In 2022, Kenya's Arid and Semi-Arid Lands (ASALs) counties continued to face drought, with five consecutive below-average rainy seasons since the end of 2020. By the end of the year, 22 out of 23 ASALs counties were affected, with poor performance of the October-December 2022 short rains, according to the National Drought Management Authority (NDMA).

The weather patterns across different regions in the country varied significantly. The eastern region, where green grams and sorghum are the main crops, experienced severe drought for four consecutive seasons, including the extreme 2022 OND season, resulting in almost 100% crop loss for some farmers. This had adverse effects on the capacity development of farmers, as demonstration plots failed to perform. Additionally, it negatively impacted the buy-back arrangements between farmers and the BCs, which had been part of the business model, leading to decreased motivation among farmers to participate in project activities. Despite the adverse effects of the drought, the selected value chains, such as sorghum, presented different signals in the market. The low production of sorghum due to the drought increased the demand for the crop as animal feed, leading to a price hike from KES38 to KES62. This benefited SHFs, enabling them to reinvest the income into more production. However, it disadvantaged the BCs as they had to source more working capital to buy the produce.

The weather variability also affected the adoption of CSA technologies, as investing in improved inputs with no tangible results on the farm reduced farmers' motivation to change. Despite almost no harvest in the areas of extreme drought, farmers still expressed a desire to continue with the selected crops. They also requested support with water management interventions like small dams to facilitate irrigation.

Narok and Bomet regions were impacted by a distinct weather pattern, characterized by sporadic rainfall throughout the year, making it difficult for farmers to differentiate the seasons and plan their planting schedules. As a result, farmers had difficulty determining when to plant common beans and other rotational crops. This lack of clarity resulted in a mix of crop stages across the region, leading to inconsistent harvests and reduced quality of the harvested beans due to prolonged dry spells mid-season.

In potato-growing regions, the MAM season was characterized by favourable rainfall, resulting in high productivity and bumper harvests for some farmers. However, the increased production led to a market glut, causing a decrease in prices. The price of a 50kg-bag of potato that would sell for KES2000 (£13.30) was selling for as low as KES500 (£3.32). Though prices did not go this low as in 2021, as some areas did not have the production. The market glut is intensified by the limited shelf-life of potato, as storage is not possible for a long time. In general, even though harvest was good, market prices were relatively bad, and the costs of production had gone up significantly. During the OND season, the rainfall was insufficient, and farmers planted less acreage due to the market glut from the previous season. As a result, productivity reduced by more than 50% compared to the previous season.

It is important to note that most of the farmers in the arid areas rely heavily on the OND season and invest more as compared to the MAM season, which typically has shorter rains. During the MAM season, there is a long cold spell, and in 2022, there were different variations in temperature across different regions. On the other hand, in the Rift Valley and Western region, the MAM season is considered the long rains, and farmers tend to make more investments during this period.

Despite facing challenges such as drought, which resulted in some planned activities being delayed or postponed, CRAFT Kenya 2022 was still an active year for most BCs. They conducted trainings, demonstrations, and increased their focus on cascading their work to smallholder farmers. The SDM learning exercise was used to facilitate improvements in service delivery to farmers. As a result of these efforts, farmers in 2022 displayed a change in attitude towards adoption, moving from appreciation to embracing and understanding the need to adapt to new technologies.

The organization of farmers has significant impact on their ability to market their produce. For instance, in areas where aggregation is organised in clusters, sorghum farmers working with Quinam Ltd, one of the CRAFT BCs, were able to enjoy premium prices. However, in areas where green grams are grown, marketing efforts depend on individual farmers. Nevertheless, CRAFT is working with BCs to develop TOTs into micro-enterprises and play a more significant role in aggregation. This model has already been successfully implemented by some BCs such as Sereni Fries, Quinam Ltd, FreshCrop Ltd, and Shalem Investment.

BC LEARNINGS AND PERFORMANCE

In 2022, BCs have demonstrated their innovative strategies to enhance service delivery to smallholder farmers. For example, Smart Logistics (SLS) developed a model with bundled services to support producers in extension, buy back, and linkage and access to finance in the bean value chain. SLS set up Mobile Aggregation Centres (MACs) in different locations, including Machakos and Nakuru, to handle post-harvest processes such as bagging, moisture measurement, drying, and threshing. The MACs provide a fast

and accurate system for farmers to deliver their produce for aggregation and buyback by SLS, with access to financial services. The system has also reduced costs for the aggregators, as they do not need to rent out permanent storage facilities, and they can move from one location to the other, collecting farmers' produce. Farmers can store their produce safely, and the trainers of farmers (TOTs) have also benefitted from the MACs, as explained by SLS CEO Rose Mutuku in this video: https://youtu.be/Ah-Ub1_cp0E.

Freshcrop, another BC interviewed by the MTR, has transitioned from improving the seed system to providing overall market access through hub sites within catchment areas. Freshcrop uses the hub sites to decentralize the seed system and extend climate-smart bundled services to farmers within the hub site catchment area. The services include CSA trainings, certified seeds, input credit, mechanization, weather information, and linkages (market and service providers). Freshcrop has four hub sites with a catchment of over 1500 SHFs. The BC uses trainers of trainers (TOTs) to reach out to SHFs. Freshcrop has a plan to retain the TOTs by making them their ambassadors, and they will earn a commission from services extended to SHFs, such as linkages and aggregation of seeds and ware potatoes. Freshcrop has also increased partnerships with service providers, such as Cropnuts, who provide soil health services. Through the partnership, SHFs can get soil testing services at a lower cost of KES. 1,350, compared to the market rate of KES. 2,500 per test. Freshcrop has also engaged in Gender Equality and Social Inclusion (GESI) activities, such as mapping exercise for youth and women councils, enhancing youth participation, training them on different skills, setting up 4 youth councils in respective cooperatives they work with, and more.

The BCs have incorporated gender aspects in training materials and identified opportunities for youth and women in the value chains. They have organised female leadership training to equip women with leadership and management skills. They have engaged with Agricultural Finance Cooperation, which has tailor-made products for youth and women to access loans without collateral and at low interest rates. They also organised a national youth convention in collaboration with Agriterra and Kenya National Federation of Farmers, bringing together youths from all the supported cooperatives to facilitate experience and opportunity sharing within the climate-smart agriculture sphere and modern agribusiness skills to enable youths to harness the massive opportunities in agribusiness.

In Kenya, the team observed that not all BCs used the opportunity of CRAFT for institutional and business growth and sustainability. Collaboration with CRAFT was treated as donor funding and not as an investment opportunity, which obstructed the understanding and implementation of the business case. Some BCs had a non-cost extension to consolidate their activities and business case, as some had a slow start, were affected by drought, or only started activities in 2022. Four out of the 16 BCs were supported with digital tools through collaboration with EPROD as a proof of concept on how digitalization of

However, the team observed that not all BCs in Kenya used the opportunity of Collaborative Research and Adaptation for Food Security in Africa (CRAFT) for institutional and business growth and sustainability. Collaboration with CRAFT was treated as a donor funding opportunity rather than an investment opportunity, which obstructed the understanding and implementation of the business case. Some BCs had a non-cost extension to consolidate their activities and business case due to factors such as slow start, drought, or starting activities in 2022. Four out of the 16 BCs were supported with digital tools through collaboration with EPROD, as a proof of concept on how digitalization of the processes supports SDM to farmers. Through the commercialization of climate-smart agriculture practices and technologies, BCs have been able to incorporate gender aspects in training materials and identify opportunities for youth and women in the value chains.

ADAPTATION OF PRACTICES AND TECHNOLOGIES

Farmers are adapting to climate change by adjusting their farming systems. In the lower eastern region where CRAFT supports green gram farmers, farmers are mixing perennial crops that leverage the little rain that is received from one season to the other. For example, farmers in Kitui are growing cassava and pigeon peas, to balance between the rainfall received in between season one and season two. In the Rift Valley region, where there are two seasons, farmers are incorporating two shorter cycle crops during the long rains (August to January) to have three crop cycles in a year, instead of planting long cycle hybrid maize varieties.

Partnerships between BCs and soil nutrition service providers are helping farmers apply recommended practices, which have proven to be profitable. However, accessing these services remains a barrier for some farmers. Mechanization has been observed to save 50% in production costs, and the demand for climate-smart service provision has increased. BCs are creating awareness on an array of climate-smart products and services, including minimum tillage rippers and chisel tines in areas affected by drought, water management practices, and soil health, such as soil testing. The biggest challenge now is availing these services to SHFs, possibly through capacity building service providers on possible climate-smart opportunities and strengthening linkages with SHFs.

Lack of skills to apply the correct fertilizers or herbicides bringing out negative results has affected farmers' perception towards change, and there is inadequate availability of the correct fertilizers and herbicides. CRAFT has created demand, but the seed barrier is still a challenge that needs to be addressed in a possible next phase. Farmers are using weather information a lot, and weather forecasts with agro-advisory support are helping farmers make adequate decisions. However, language is a barrier, and access to (smart) phones is limited. To make the messages technically understandable, there is a need to integrate indigenous knowledge and make the information more accessible to farmers.

ANNEX II: COUNTRY STORY: TANZANIA

In 2022, CRAFT worked with 14 active agribusiness SMEs and four cooperatives with over 30% being managed by women or youth. There were no new BCs onboarded during the year, but 8 BCs (5 SMEs and 3 Coops) were extended, either on non-cost or cost extensions. Half of the grantees focus on sunflower as their main crop, and the other half on a mix of common beans, potato, and sorghum. Within the portfolio, there are two service providers: a digital services provider and a lime producer.

CRAFT was able to register 41,063 SHFs, with 17,058 of them being women and 24,005 being men. Out of the registered farmers, 26,274 were trained in various areas, including governance and leadership, crop and field management practices, harvest and post-harvest management practices, pre-season planning and planting, marketing, and economic benefits. Annual surveys were conducted for 13 business champions, and out of the sampled BCs, 11,035 SHFs reported an increase in income, while 11,042 SHFs reported increased yields due to the application of CSA practices and technologies.

To strengthen the capacity of grantees, technical refresher training and reflection events were held between grantees, local government officials and extension officers. These training efforts led to improved project implementation and reporting.

CLIMATE AND WEATHER

The country experienced a shortage of rainfall during the first season, resulting in long periods of drought. This scarcity was due to a delayed rainy season, which typically begins in November or December but only arrived between mid-January and early February and ended in June. As a result, planting schedules were disrupted for farmers, particularly in the central zone and southern highlands. This meant that farmers had fewer growing seasons, with only two seasons for common beans and one for sunflower. Consequently, sorghum became a better option for farmers as it was more resistant to drought and pests and diseases compared to sunflower.

Farmers in the central region planted less maize and cashew, opting for sunflower during the second season since it was more profitable, high-yielding, and market-informed. When the rains came in February, they were low, particularly in the central zone and southern highlands, which affected farmers in Rivacu. Therefore, farmers were unable to plant common beans, causing a hike in cooperative prices, as there were no common beans to be bought back from the farmers due to the prolonged drought.

ADOPTION OF CSA PRACTICES AND TECHNOLOGIES

There was a noticeable improvement in the adoption of CSA practices and technologies across various value chains, such as potato, common beans, sunflower, and sorghum.

The annual review revealed a 2.4% increase in the number of SHFs accessing weather information services. This was due to the concerted efforts of BCs and regional TMA offices in disseminating information through various channels such as SMS messages, local radio stations, and extension officers.

Improved varieties are yielding more, drought-tolerant, and more resistant to pests and diseases compared to the local varieties used before CRAFT's intervention. Therefore, to ensure that smallholder farmers had continued access to improved seeds, more QDS farms were created as a sustainability plan for some BCs, such as Kibaigwa and Isowelu. This increased the demand for certified seed at Isowelu from 18 tons in 2021 to 36 tons in 2022. BCs also started practising contract farming between QDS out-growers and companies, which secured a demand for QDS out-growers and enabled them to continue producing QDS. In 2022, Nondo established a QDS program to address the seed demand gap for farmers by setting

Boosting sunflower production with the adoption of climate-smart agricultural practices.

Temnar, a CRAFT partner in the sunflower value chain, operates ten demonstration plots, which are managed by well-trained ToTs and seed multipliers. Through these plots, Temnar promotes CSA practices and introduces new technologies to smallholder farmers, resulting in increased adoption of these methods.

One of the most widely adopted practices was the use of improved seeds. The black record seed varieties distributed by Temnar proved to be the most effective crops despite challenging weather conditions. Farmers also adopted spacing and lining, which helped with weeding and allowed for a reasonable plant population. Since farmers were aware of the competition for resources with the main crop, they diligently weeded the sunflower plants twice.

Additionally, Temnar provided farmers with information about the germination rate of the seed varieties, which resulted in them sowing only one seed per hole and utilizing their available seeds more efficiently. In order to maintain soil moisture levels, farmers employed furrowing, zero tillage, and ridging methods of land preparation, especially during dry spells.

These practices, coupled with average to above-average rainfall in the districts, resulted in healthy sunflower crops that grew to the recommended height and head size. However, some practices were not adopted due to cost and accessibility-related challenges. For instance, farmers did not use fertilizers or agrochemicals due to high prices and limited availability. To overcome these barriers and increase the adoption of climate-smart practices,

up 15 acres of QDS. They managed to harvest 5,250kgs and packaged the seed to be sold to farmers at TZS 8,000 per kg which is lower compared to HYSUN and AGUARA which is sold at TZS 45,000 per Kg. The government has also supported sunflower growers by subsidizing seed to ensure their availability on the market. However, the quantity produced is still less than the demand.

The government launched a fertiliser subsidy scheme to reduce the prices of DAP and Urea fertilizers at the farm gate level, with the price for fertiliser going down to 70,000 TZS (€26.82) from the market price of 136,135 TZS (€51) for DAP and 124,714 TZS for Urea. This was an effort to combat the high inflation that resulted from high fuel and food prices. This intervention was a relief to smallholder farmers who were affected by the high cost of fertilizer.

As a sustainability plan for BCs, more extension workers both private and public were continuously trained to create more awareness, resulting in increased production in 2022 compared to 2021. SHFs had exchange trips to seed exhibitors, where they were equipped with knowledge and skills on seed performance in different ecological zones.

There was an increase in youth and women's participation in training programs at FFS, demonstration plots and CSA practices and technologies. The project also invested in campaigns. For example, Ikuwo sensitized women to participate in training and used a gender-sensitive recruitment strategy. Additionally, in BCs like Isowelu, youth participation was encouraged through the promotion of Youth Council programs.

The project has also extended knowledge of CSA practices and technologies to farmers who were not part of the project through farmer-to-farmer training. This has enabled them to apply and replicate acquired skills and knowledge on their farms and other crops.

The integration of service providers, particularly with DCCL, for the use of lime in areas of high acidity for potato production has yielded positive results and left farmers impressed. This has supported in meeting the increasing demand for soil health technologies. However, there are two key issues: the high cost of the service and the low supply, despite the increased demand of the service among farmers in various value chains. The high transport cost has resulted in farmers who live further away paying almost double the normal price. Furthermore, the current DCCL supply capacity is still limited, leading to a shortage of lime availability. To address these challenges, DCCL is partnering with One Acre Fund to work on their distribution network. This partnership aims to increase the supply of lime and improve its availability to farmers, particularly those in remote areas. By doing so, farmers can access the service at a more affordable cost, hence increasing their access to soil health-improving technologies, such as lime.

Access to finance among farmers is also a critical issue that the project needs to address if it receives another phase. More than 40% of farmers who failed to adopt CSA inventions cited lack of capital as the main hindrance.

THE MARKETS FOR THE VALUE CHAINS

Under Isowelu, a CRAFT BC in the potato value chain, smallholder farmers have seen a significant increase in their income. With the use of improved varieties and signing contracts with buyers, SHFs were able to sell their produce by weight, rather than in bags, which led to higher prices and increased income.

Kibaigwa which deals in sorghum value chain, signed a contract with a brewery company in Tanzania that uses sorghum in their production. This contract offered a higher price for high-quality sorghum, which motivated SHFs to produce more and sell at the new, increased prices. The prices for sorghum rose from 350 TZS (€0.13) per kg to 550 TZS (€0.21) per kg in 2022, leading to a significant increase in income for smallholder farmers.

The project has also significantly impacted the sunflower sector in the Dodoma area, with more farmers opting to grow sunflower. Furthermore, more investment has been made in the value chain, such as processing machines, with several small to medium processing plants installed in Mpanda and Tanganyika districts.

BC LESSONS AND PERFORMANCE

Tanzania has now trained a total of 69,919 SHFs in various CSA techniques and most of the BCs have been able to meet their targets, especially milestones outlined in their contracts.

The project has also significantly impacted the sunflower sector in the Dodoma area, with more farmers opting to grow sunflower. More farmers in KSR areas have increased their land for sunflower production due to the increased demand and price of sunflower. The price hike is due to low production of sunflower, but the overall national demand for sunflower oil is about 60%. Furthermore, more investment has been made in the value chain, such as processing machines, with several small to medium processing plants installed in Mpanda and Tanganyika districts. Raymond Kamtoni, Managing Director of Nondo, a sunflower oil investor, said, "We have not made huge profits from the sunflower business due to the amount of investment done by Nondo. But due to CRAFT's support, there are changes in the farmers' mindset and production of sunflower in the region, which has led to the availability of sunflower oil throughout the year. Today, sunflower oil is still available in the market, while it is not in season, whereas in previous years before the project, sunflower oil was available in the region only during the season. Even now, there is a lot of sunflower oil,

and many women have engaged in that business on a small scale. Therefore, the project has contributed to the increase in production of sunflower in the region".

There has been an increased demand for improved seed varieties for sunflower, potato, common bean, and sorghum from SHFs. The QDS approach was used for sunflower and common bean value chains to reduce the problem of seed availability. However, seed availability remains a challenge for the potato value chain as there are limited companies that produce potato seed.

Even with the QDS approach, there is still a high cost of seeds, which was a major challenge faced by SHFs in Tanzania this season. For example, HYSUN 33/GUARA, a high-yielding sunflower variety, was sold for TZS 45,000 per kilogram compared to the unimproved variety, which was sold for TZS 20,000. Therefore, planting one acre of land, which requires at least 2 kilograms of seed, costs about TZS 90,000 per acre. The recent increase in input costs has forced some farmers to use local sunflower variety seeds or low-cost improved seeds such as Black Record, which has a lower yield compared to HYSUN 33/GUARA.

Some BCs faced challenges which affected their operations. Temnar was affected by a fire outbreak in the year, which resulted in the loss of their storage facility. This made it difficult for BCs to buy back from SHFs since they had nowhere to store the buyback. Additionally, the location of some farmers posed a challenge for BCs like Rivacu and Kimolo (KSR) since they were unable to reach all the farmers by the end of the season. The low aggregation of produce at the end of the year was also highly impacted by drought, which increased sourcing costs for companies to place aggregation centres in villages. Supply chain management imposed specific challenges, such as side selling by farmers even with contracts in place. There is also a tendency for an influx of other off takers during harvesting, which sources produce from farmers in areas where BCs are operating, leading to high competition. Companies prefer to work with smaller producer groups instead of large cooperatives, and although BCs would like to buy directly from farmers, high transaction costs make this difficult. Therefore, they revert to their old sourcing model, making use of village agents and brokers.

Climate change and its effects, including increases in temperature, rainfall, droughts, floods, and expansion of tropical diseases and pests, are being felt in crop production, including potatoes. Therefore, the project is encouraging farmers to adhere to all recommended CSA, GAP, and technologies on their farms to enhance their productivity and improve their livelihoods.

Business champions saw an advantage in working with AMCOS in project operations, particularly during the replication of the project. This enhanced project performance because farmers were active and ready to participate in the training sessions in already established farmer groups.

The improved linkage between stakeholders in the sunflower and potato value chain was a key enabling policy environment within the agriculture sector. Key stakeholders from the government, private, academic institutions, donors, and civil society organizations validated major policy issues that hinder supply and service providers in the context of the potato value chain. They also identified key major policies relevant to CSA implementation in Tanzania. One of the agreements was to develop a National Potato Plan that would cover the whole potato value and supply chain and include a Seed Systems Plan, which would contain certified seed and quality-declared planting material (QDPM) – good quality seed and regulations needed. Daico Mbozi, a representative for the government said, "I appreciate CRAFT for supporting us, the government, in putting the Agricultural Sector Development Programme Phase Two (ASDP2) agenda into action through this project. I congratulate KMC for using the project funds efficiently, and as seen, the impacts are clear to farmers of the Songwe region and its districts. The Local Government Authority is ready to work with KMC to implement the sustainability plan and ensure that all beneficiaries are reached as planned. I would like to call for continued communication among BCs, government officials, and the CRAFT team."

ANNEX III: COUNTRY STORY: UGANDA

In 2022, CRAFT worked with the 20 BCs in Uganda (14 SMEs, including three agri-business service providers, six Cooperatives,). Two BCs started in January 2022, and two service providers were added in August. Six of the BCs (30%) are women or youth led. The onboarded BCs supported 118,431 SHFs with different CSA services. The BCs, through their extension fabric, trained 118,431 (of which 53% were females) smallholders during the year. From the 2022 annual reviews, 68,690 farmers increased their incomes, while 57,674 adopted two or more CSA practices in the past 12 months. The total value of the CIIF portfolio is €7,690,574, 34% CRAFT contribution and 66% co-contribution. By end of 2022, the CRAFT Uganda grant contribution was at €2,476,550) and the grantee's contribution at € 4,481,754.

VALUE CHAINS

Uganda prioritized four entry value chains, including soybean, sesame, potato, and sunflower. All the crops have their respective environmental and economic attributes that have contributed to adoption. For example, soybean is highly valued for its versatility and market demand. Apart from its use in human and animal food, and cooking oil production, soybean also provides additional benefits to soil fertility through nitrogen fixing. Its suitability for small-acreage farming makes it accessible to women and youth. Soybean is a crop that can be grown in any region of Uganda, making it easier for BCs to promote it. Additionally, more soybean companies and cooperatives were eager and capable of co-investing in CSA practices and technologies. Sunflower varieties have been found to be drought tolerant and suitable for the semi-arid conditions of Northern, North-eastern and Eastern Uganda. The crop is grown for both oil and animal feed. The crop has provided additional income to the households which is used to access food as well as other household amenities. Crops like potato are suitable for mountainous terrains and high altitudes because of the low temperatures and this dictated the location of the BC. Sesame on the other hand is majorly grown in Northern Uganda where the temperate climate offers a favourable environment, it is a staple crop in the regions and contributes to household food security and incomes. Accessibility to improved sesame soybean seed remains a challenge and it has affected adoption of some CSA technologies and practices.

CRAFT UGANDA IN 2022

Since the beginning of the year, the country has been grappling with a steep rise in inflation rates, primarily driven by escalating fuel and food prices. In addition to this, the cost of fertilisers has more than doubled in the first half of 2022, although it showed signs of stabilisation in the latter half of the year. Uganda also faced a series of multi-hazardous events, such as natural disasters, including droughts, floods, landslides/mudslides, and heavy storms/hailstorms. Additionally, in September, the Ministry of Health declared an outbreak of the Ebola Virus Disease in Uganda, although this had a minimal impact on the performance of the CRAFT value chains.

Drought affected the performance of all crops during the first season, with the northern region experiencing the worst impact - the first season production was estimated 30% - 50% below average[7] according to the FAO GIEWS update. The March-June rains were erratic and by mid-June, severe drought conditions affected more than 85% of the crop land in central, eastern, and northern districts. The drought also had a significant impact on farmers adoption of CSA practices. The poor harvests of the first season led to a low supply of crops, resulting in an increase in prices, particularly for soybeans and sunflowers. Few farmers who had the crop by then benefited from the price hike. The second rainy season, which typically extends from September to November, had a timely onset and received adequate precipitation.

ADOPTION OF CSA PRACTICES AND TECHNOLOGIES

CRAFT observed that the adoption of CSA practices and technologies is multifaceted and influenced by factors such as availability, accessibility, and costs. 2022 saw an increase in the use of improved drought tolerant seed varieties, combined with the application of good agronomic practices. The effect of adoption of CSA practices and technologies was more pronounced among soybean and potato farmers, resulting in increased yields. The uptake of drought resistant seed for sunflower, soybean and potato has been substantial, while for sesame farmers, working with improved seed varieties did not make the substantial difference as expected. The CRAFT team implemented various strategies to ensure the last mile delivery of improved varieties. For instance, the project established a partnership with Soybean Africa Limited to increase the volume of foundation seed and distribute quality-declared seed throughout the country. Additionally, in all value chains the project focused on increasing the availability of quality seed by building the capacities of the BCs and their farmers to grow QDS. However, demand for the seed is still higher than the supply. In addition, female participation increased with the seed production.

"In 2021, I borrowed UGX 800,000 to start potato growing on half an acre and got UGX 1,600,000 worth of harvest, this motivated me to increase land under potato cultivation to two acres, in May 2022 despite some weather challenges, I was able to harvest UGX 3,000,000 worth of potato" Enid Sayuni a farmer under Kisoro District Potato Growers Cooperative Union recalls.

Some of the CSA practices and technologies promoted by CRAFT are crop specific. For example, for soybean, the use of rhizobia boosts nitrogen uptake for better plant growth at germination. The project also promotes good agricultural practices (GAP) such as

[7] GIWES Uganda

line planting and timely weeding, as well as land and water management practices. Soil testing is used to ensure the correct application of inputs and enhance soil fertility. The project also promotes soil management practices and technologies such as planting nitrogen-fixing soybean as part of crop rotation regimes. Biodegradable waste recycling for all crop residues is also promoted to improve soil fertility. To reduce soil micro-environment disturbance, CRAFT is championing the reduction of bush burning practices through promoting labour-saving, affordable mechanization for all value chains. The project also promotes conservation farming practices to reduce soil disturbances, for example, using minimum tillage practices such as 'basin agriculture' and GAPs that reduce soil erosion and flooding. The project promotes the use of early-maturing, high-yielding, pest, and disease-resistant, drought-tolerant seed varieties for all crops. Solar-driven irrigation, vacuum storage techniques to minimize fumigant usage, and solar-drying technology are promoted for soybean to sustain productivity under unfavourable weather conditions. For potato, erosion control practices, cover cropping, and crop rotation are promoted.

To facilitate accessibility, several BCs mediated with financial institutions to facilitate finance to farmers because they could receive inputs in time without paying money and the cost is deducted from farmer during marketing. The service delivery model exercise with CORE allowed the team and partners to reflect on the required farming services allowing farmers to become more resilient. Some of the services offered are directly embedded in the business case operations whereas others are brokered and provided by stand-alone service providers.

The CRAFT project's post-harvest handling and facilities are a vital component of the service delivery models. With six BC's, the project co-invested in modern storage facilities with relevant equipment, production plants for cleaning and grading, and a diffuse light store (potato), which will provide services to farmers. BCs and farmers were also trained to use moisture meters for measuring moisture content at the drying stage before storage, and tarpaulins were promoted for improved quality of produce. The project also partnered with e-Prod to support BCs with the digitalization of their processes to enhance their business performance and unlock services to farmers.

The CRAFT project aims to create platforms for farmers to interact with other stakeholders that would be key in supporting their agricultural interventions. In Uganda, the team organised several events for farmers and partners to introduce service providers offering services: soil testing, land opening, weather information, seed testing (germination test), crop insurance, irrigation, PHH - moisture meters, collapsible seed dryers, tanks) and ICT/ digitalizing agriculture.

CRAFT aims to enhance farmers' resilience to climate shocks by increasing the resilience of value chains (VCs). However, implementing a single-commodity VC approach has yielded mixed results. To improve farm resilience, CRAFT adopts a complementary approach that considers all crops and the farmer's context, rather than focusing on one VC. This approach addresses land limitations, reduces risks associated with monocropping, promotes enterprise diversification, and adds value to alternative income sources while efficiently utilizing farm resources. The Ugandan team has raised awareness among partners, leading to a farming system learning event where each BC planned how to integrate a more farming systems sensitive approach in their business.

2022 LESSONS AND BC PROGRESS

The performances of the Business Champions improved considerably however, their operations were still substantially impacted by the COVID-19 pandemic, resulting in financiers being more risk averse Nonetheless, all BCs in Uganda experienced a positive trend, with some, such as Okeba Uganda Limited and TRAFORD, registering significant growth in the number of supported Smallholder Farmers (SHFs). Other BCs, such as AgriNet and P'KWI, transitioned into soybean and sunflower oil processing, respectively, and expanded their farmer base. Additionally, the Kisoro District Potato Growers Cooperative Union established a state-of-the-art ware potato storage facility, increasing farmer capacity to hold produce for better prices.

Integration of farming systems concept in CRAFT project was kick started during the reporting period. Farming system concept looks at reinforcing smallholder and other stakeholder resilience to climate related shocks and stresses. The concept, therefore, addresses three issues, firstly limitation

Transforming Farming Systems: The Impact of CSA on Smallholder Farmers in Pakwach District

Florence Lokojo is a mother of five who grows various crops in Nyamutagana village, Dei, Pakwach District. Due to the impact of climate change, Florence suffered a decline in crop production. When CRAFT partnered with Panyimur Dei Cooperative in 2021, Florence attended all the trainings, including CSA practices, financial literacy, governance, and savings.

Florence decided to try MAKSOY3N, an improved soybean variety, on a quarter acre of land. She followed recommended CSA practices and harvested 120kgs, which motivated her to extend the cultivation to an acre. She sold the first season's harvest for UGX1.2m (€293) and invested in her house and other crops.

Florence used the soybean and bean husks to mulch other crops and dug trenches to collect water for her banana plantation. She bought a solar irrigation pump with the second season's earnings and started growing and selling vegetables during the dry season.

Florence has also started growing green gram using the same CSA practices she learned. Florence's success has made her a model farmer, and the district Operation Creation Wealth team recognized her and offered her exotic piglets to rear, which have since multiplied to ten. Collin Kumakech, CRAFT's coordinator at Panyimur Dei Cooperative, referred other farmers to her for training.

of land, secondly reduction in the risk associated with monocropping activities and thirdly promoting enterprise diversification, value addition and development of alternative income streams with efficient utilization of farm resources. Farming system integration means less land is required for a mix of enterprises. Enterprise diversification results in sustainability and additional incomes, better management, or efficient allocation of important farm resources like land, labour and capital etc, provides an opportunity for effective recycling of the product and by-products, helps to generate flow of cash to the farmers all year round by way of disposal of produce, manure etc., beside other agricultural products.

Farmer cooperatives, as a means of implementing development programs in communities, offer an opportunity for greater inclusivity. However, they require special attention due to their service provision model of operation and the low business turnover that can threaten sustained investment in CSA technologies and practices.The financial and institutional capacity of most of the women and youth led businesses have weaknesses that limits their possibility to accessing credit and other sources of finance. This therefore means inclusion of women and youth led agribusinesses require deliberate innovative development pathways.

Majority of service providers for climate smart technologies and services are key to boosting climate smart agricultural production in the rural communities, however their business model remains threatened without donor support because of the high initial investment required. There is a need to develop cost effective and sustainable models that will improve access to affordable CSA solutions by the smallholders.

ANNEX IV: PERFORMANCE INDICATOR TARGET TABLES

SO 1 - Increased income for SHFs and SMEs						
IR 1.1 – Increased adoption of CS practices and technologies among SHFs, SMEs and Cooperatives						
Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
Ind. 1 - Reached number of SHFs with increased income	KE	19,475	19,819	33,293	100,000;	53% of 116,555 SHFs trained in 2022 had an increase in income. The increase is attributed to better market prices and an increase in yield for potato, common beans, sorghum and soybean.
	TZ	12,000	11,035	29,366	100,000;	
	UG	28,443	31,463	68,690	100,000	
	Total	59,918	**62,317**	**131,349**	**300,000**	
Ind. 2 - Percentage increase in yield for selected crops due to application of CSA practices and technologies	KE	20%	Green grams Sorghum Common beans Potato	66% -34% 48% -21%	20%	2022 annual results indicate an increase in yield for some VCs like green grams, common beans, Potato and Soybean and a decline in Sunflower, Sorghum and Sesame VCs. The decline in yield is attributed to weather shocks.
	TZ	15%	Potato - Common Beans Sorghum - Sunflower	15% -43% -16% -12%	20%	
	UG	14%	Potato- Soybean - Sunflower - Sesame-	-38% 16% -5% 0%	20%	
	Total	16.3%	N/A	N/A	20%	
Ind. 3 - Reached number of SHFs whose farming enterprise become more resilient to possible stresses and/or shocks	KE	19,475	21,837	36,701	100,000;	60% of 116,555 SHFs trained in 2022 reported that their enterprises became more resilient due to and the option of CSA technologies.
	TZ	3,642	11,308	30,093	100,000;	
	UG	42,800	36,904	80,569	100,000	
	Total	65,917	**70,049**	**147,363**	**300,000**	
Ind. 4 - Number of SHFs that have applied 2 or more climate resilient farming practices in the past 12 months	KE	33,751	31,025	52,119	100,000;	79% of 116,555 SHF trained in 2022 applied 2 or more CSA practices during the reporting period.
	TZ	13,164	22,096	58,802	100,000;	
	UG	12,800	38,678	84,441	100,000	
	Total	**59,715**	**91,800**	**195,362**	**300,000**	
Ind. 5 - Reached number of Ha of farmland with agroecosystems that became	KE	25,249	15,133	15,769	200,000;	A total of 44,835 Hectares were reached by SHFs that became more resilient in 2022.
	TZ	10,000	8,335	28,438	200,000;	
	UG	5000	21,367	46,650	200,000	
	Total	**40,249**	**44,835**	**90,857**	**600,000**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
more resilient to possible stresses and/or shock						
Ind. 6 - Number of SME businesses and cooperatives applying at least 2 CS practices and technologies within their business and/or VC	KE	14SMEs, 5Coops	8SMEs, 1 SP 5Coops	8SMEs,6Coops, 1SP	15 SMEs, 10 Coops	
	TZ	14SMEs, 4Coops	10 SMEs, 3 SPs 4Coops	14SMEs, 3 Sps 4Coops	17 SMEs, 10 Coops	
	UG	12SMEs, 8 Coops	12 SMEs, 2SPs 6Coops	12SMEs, 6Coops, 2SPs	18 SMEs, 10 Coops;	
	Total	**40SMEs, 17 Coops**	30 SMEs, 6 SPs 15Coops	34 SMEs, 16Coops,6SPs	**50SMEs, 30 Coops**	
Ind. 7 – Number of SP representatives trained on profitable CS supply chain development and opportunities	KE	48	102	602	50	267 (Service providers, these include: Agro input providers, ToTs who provide services, Soil testing and weather information Service providers) representatives were engaged in trainings, learning events and CSA knowledge dissemination events to explore effective service delivery.
	TZ	50	52	158	50	
	UG	100	113	614	50	
	Total	**198**	267	**1374**	**150**	
Ind. 8 – Number of SHFs, cooperatives and SMEs that are satisfied with the quality and affordability of CS services provided	KE	19,513	25,584	42,978	100,000;	65% of 116,555 SHF trained in 2022 were satisfied with the quality of CS services however, affordability for most of the farmers is still a challenge
	TZ	13,344	11,298	30,065	100,000;	
	UG	44,295	38,515	84,086	100,000;	
	Total	**77,152**	**75,397**	**157,130**	**300,000;**	
Ind. 9 –Number of SHFs using CS inputs and services	KE	32,000	33,512	56,296	100,000	2022 results indicate that 90% of 116,555 SHFs trained in 2022 are using CS inputs and services.
	TZ	12,899	20,494	54,537	100,000;	
	UG	41,458	50,992	111,325	100,000;	
	Total	**86,357**	**104,998**	**222,158**	**300,000;**	
Ind. 10 – Number of CS BCs implemented	KE	14SMEs, 5Coops	8SMEs, 1 SP, 5Coops	8SMEs,6Coops, 1SP	15 SMEs, 10 Coops	
	TZ	14SMEs, 4Coops	10 SMEs, 3 SPs 4Coops	14SMEs, 3 Sps 4Coops	17 SMEs, 10 Coops	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
under the project	UG	12 SMEs, 8 Coops	12 SMEs, 2SPs 6Coops	12SMEs, 6Coops, 2SPs	18 SMEs, 10 Coops;	
	Total	**40SMEs, 17Coops**	30 SMEs, 6 SPs 15Coops	34 SMEs, 16Coops,6SPs	8SMEs,6Coops, 1SP	
Ind. 11 – Total number of SHFs reached by training on CS practices and technologies for their farming system(s)	KE	36,116	36,034	60,533	116,000	87% of 116,555 SHFs were trained on CS practices and technologies for different VCs.
	TZ	17,146	26,274	69,919	117,000	
	UG	54,391	54,247	118,431	117,000	
	Total	**107,653**	**116,555**	**248,883**	**350,000**	
Ind. 12 – Total number of Ha of farmland reached by the project	KE	29,253	24,972	41,949	200,000	2022 results indicate that 81,210 hectares (200,674 acres) of farmland were under production for all the SHFs that were trained. On average, an individual farmland under production per country: Kenya:0.693Ha (1.71acres) Tanzania: 0,945 Ha (2.33acres) Uganda: 0,579 Ha (1.43acres)
	TZ	16,117	24,829	66,073	200,000	
	UG	31,002	31,409	68,572	200,000	
	Total	**76,372**	**81,210**	**176,594**	**600,000**	
Ind. 13 – Number of SME representatives that trained on CS practices and technologies relevant to their company and/or VC.	KE	80	112	466	83	BC extension staff and TOTs whose capacity was enhanced to mobilise and facilitate Farmer trainings
	TZ	30	171	1032	83	
	UG	100	197	1113	84	
	Total	**210**	480	**2611**	**250**	
Ind. 14 – Number of representatives of farmer cooperatives trained on CS practices and technologies relevant to their cooperative and/or VC.	KE	50	124	192	50	Cooperative staff and TOTs whose capacity was enhanced to mobilise and facilitate farmer engagement and services .
	TZ	100	70	186	50	
	UG	100	92	235	50	
	Total	**250**	**286**	**613**	**150**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
SO 2 - Increased business performance for agribusiness SMEs and Cooperatives due to CS investments						
IR 1.2 – Increased investment and business growth in CS VCs						
Ind. 15 – Number of agribusiness SMEs and cooperatives that have increase their turnover due to climate related investments	KE	14SMEs, 5Coops	8 SMEs,5Coops	8SMEs, 5Coops	15 SMEs, 10 Coops	Agribusiness companies with an increase in turnover attribute the business performance to support provided to SHFs to increase productivity, which ultimately increased their turnover.
	TZ	8SMEs, 2Coops	8SMEs,3Coops	8SMEs, 3Coops	17 SMEs, 10 Coops	
	UG	6SMEs, 3Coops	7SMEs,4Coops	9SMEs, 3Coops	18 SMEs, 10 Coops;	
	Total	**21SMEs, 7Coops**	23SMEs, 12Coops	25SMEs, 11Coops	**50SMEs, 30 Coops**	
Ind. 16 – Number of agribusiness SMEs and cooperatives that have worked to improve key manageable climate risks	KE	14SMEs, 5Coops	9SMEs,4Coops,1SP	9SMEs,5Coops, 1SP	15 SMEs, 10 Coops	Agribusiness companies that are adopting CSA technologies and practices to respond to manageable climate risks.
	TZ	14SMEs, 4Coops	10SMEs, 3SPs 4Coops	14SMEs, 3SPs 4Coops	17 SMEs, 10 Coops	
	UG	12 SMEs, 8 Coops	12SMEs, 6Coops 2SPs	12SMEs, 6Coops, 2SPs	18 SMEs, 10 Coops;	
	Total	**40 SMEs, 17Coops**	31SMEs, 14Coops,6SP	35SMEs, 15Coops, 6SPs	**50 SMEs, 30 Coops**	
Ind. 17 – Number of agribusiness SMEs, cooperatives and farmer organizations that accessed finance for the implementation of CC adaptation practices and/or technologies at the level of their company and/or VC	KE	14 SMEs, 5Coops	2SMEs,1Coop	2SMEs, 1 Coop	15 SMEs, 10 Coops	Agribusiness companies that have accessed additional external financing to implement CS services.
	TZ	14 SMEs,4Coops	9SMEs,4Coops	9SMEs, 4Coops	17 SMEs, 10 Coops	
	UG	12 SMEs, 8 Coops	4SMEs,4Coops	7SMEs, 5Coops	18 SMEs, 10 Coops;	
	Total	**40 SMEs, 17Coops**	15SMEs,5Coops	18 SMEs, 10 Coops	**50SMEs, 30 Coops**	
Ind. 18 – Amount of private sector funds invested as part of matching grant/investment facility	KE	2,261,436	2,384,275	3,785,049	3,333,333	Extracted from the 2022 financial reports
	TZ	3,496,546	1,485,057	2,413,303	3,333,333	
	UG	4,544,031	2,952,102	4,481,754	3,333,333	
	Total	**€10,302,013**	**€6,821,434**	**€10,680,106**	**€10,000,000**	
Ind. 19 – Number of representatives	KE	10	0	0	25	55 FI individual representatives
	TZ	10	15	15	25	
	UG	20	40	49	25	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
of FIs trained on CS agribusiness, de-risking and financing for climate adaptation in agribusiness VCs.	Total	**40**	55	64	**75**	were trained from 10 FIs
Ind. 20 – Number of dialogues held with FIs on CS agribusiness, de-risking, and financing for climate adaptation in agribusiness VCs.	KE	5	3	5	2	Dialogues with FIs to focus on financial products that address financial needs of SHFs and the Agribusiness company's needs.
	TZ	2	6	6	2	
	UG	14	6	6	2	
	Total	**21**	15	**17**	**6**	
Ind. 21 – Number of FIs reached with training or dialogues	KE	5	3	5	5	
	TZ	3	3	6	5	
	UG	8	7	7	5	
	Total	**16**	13	18	**15**	
Ind. 22 – Number of SMEs and cooperatives that have developed a bankable business plan and apply for finance for their CS BC	KE	14SMEs, 5Coops	9SMEs,5Coops, 1SP	9SMEs, 5Coops, 1SP	15 SMEs, 10 Coops	Total of 56 (35 SMEs,15 Coops and 6 SPs) developed bankable business plans , applied and accessed financing
	TZ	14SMEs, 4Coops	14SMEs, 3 SPs, 4Coops	14SMEs, 3 SPs 4Coops	14 SMEs, 3SPs, 10 Coops	
	UG	12 SMEs, 8 Coops	12SMEs,6Coops,2SPs	12SMEs, 6Coops,2SPs	18 SMEs, 10 Coops;	
	Total	**40SMEs, 17Coops**	**35SMEs, 15Coops,6SPs**	**35SMEs, 15Coops, 6SPs**	**47SMEs, 30 Coops,3SPs**	
Ind. 23 – Number of finance institutions offering financial services for climate adaptation in agribusiness value chains	KE	5	0	0	2	Equity, DFCU and UDB
	TZ	0	0	0	2	
	UG	10	3	3	2	
	Total	**15**	3	3	**6**	
Ind. 24 – Number of private sector partners (SMEs, finance providers, others) that	KE	0	0	13	15	None during the reporting period since the onboarding process ended
	TZ	0	0	0	17	
	UG	6	0	0	18	
	Total	**6**	0	13	**50**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
have signed a letter of intent on co-funding of BC activities to be developed under the project.						
Ind. 25 – Percentage of SMEs and cooperatives managed by women and youth	KE	25%	46%	50%	25%	Total of 20 Agribusiness companies are women and youth led (35.7%) over all above the expected target
	TZ	25%	44%	48%	25%	
	UG	25%	30%	30%	25%	
	Total	**25%**	41%	43%	**25%**	
Ind. 26 – Number of women and youth-led businesses that received matching grant/investment facility allocations	KE	1	7	7	4	No new youth and/or women led BC was onboarded, however the 20 in the portfolio continue to receive funding through CIIF
	TZ	0	7	10	4	
	UG	1	6	6	5	
	Total	**2**	20	20	**13**	
Ind. 27 – Number of women and youth farmers engaged in farmer groups and cooperatives	KE	16,525	27,873	46,960	35,000	64% of SHFs are women and youth engaged in farmer groups these also include cooperative members.
	TZ	14,000	15,775	41,951	35,000	
	UG	28,000	36,855	77,966	35,000	
	Total	**58,525**	80,503	166,877	**105,000**	
Ind. 28 – Number of women and youth employed in SMEs, farmers groups and cooperatives	KE	150	53 women & 79 youth	127 women & 211 youth	300	Most of the Agribusiness companies did not recruit more women and youth during the reporting period 2022. They worked with existing employees. It is also important to note that some employees are seasonal employees they are engaged during harvesting, aggregation and sorting period especially for cooperatives.
	TZ	50	57 women & 106 youth	195 women &384 youth	300	
	UG	100	61 women & 118 youth	266 women& 498 youth	300	
	Total	**300**	**171 women, 303 youth**	**588 women, 1,093 youth**	**900**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
SO 3 – Improved enabling environment favourable for large scale roll out of CSA						
IR 3.1 – Increased collaboration and exchange among public private actors on large scale roll out of CSA						
Ind. 29 – Number of CSA related legal, policy and institutional frameworks developed and operationalised with support from CRAFT	KE	1	3	4	1	Development and launch of CSA-MSP Strategic plan and Beans Strategy was realised in 2022
	TZ	0	0	0	1	
	UG	1	0	0	1	
	Total	**2**	3	4	**3**	
Ind. 30 – Number of best practices in CS BCs captured and disseminated	KE	4	13	13	6	Documented best practices in CS technologies, practices and science: like soil testing, seed multiplication, mechanization, and weather information services
	TZ	4	5	5	7	
	UG	2	0	2	7	
	Total	**10**	18	20	**20**	
Ind. 31 – Number of tested and tried inclusive CS farming system or service delivery models developed and disseminated	KE	2	3	3	1	Service delivery models developed and disseminated Quinam, Shalem, Musoma Food, EAFF, Kibaigwa, Starlight, Okeba, Sebei and Acila.
	TZ	1	1	3	1	
	Ug	3	3	3	2	
	Total	**6**	7	9	4	
Ind. 32 – Number of CSA learning events organised	KE	3	5	11	2	National CSA learning events, High-level science conference and participation at COP27. Potato policy dialogue Farming systems integration learning event and technology demonstration learning events.
	TZ	4	4	6	2	
	UG	10	2	7	2	
	Total	**17**	11	24	**6**	
Ind. 33 – Number of learning and exchange visits organised for smallholder	KE	3	15	20	4	Exchange visits for SHFs, cooperatives and Agribusiness companies to enable peer-to-peer interaction
	TZ	2	3	7	4	
	UG	10	0	15	4	
	Total	**15**	18	42	**12**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
farmers, cooperatives and private sector partners						and mutual learning.
Ind. 34 – Number of national policy dialogues held on CSA and policy-related enabling factors	KE	1	4	17	2	Agribusiness policy dialogue 2022, High-level science conference on gender-responsive CSA, Bomet Beans strategy and CSA MSP strategy launch. Potato Policy dialogue and Climate talk with the Embassy. MSP-engagement meeting to set up a space for stakeholders to dialogue on CSA Policy issues.
	TZ	2	3	4	2	
	UG	3	1	2	2	
	Total	**6**	8	23	**6**	
Ind. 35 – Number of value chain actors reached through policy influencing activities and/or national policy dialogues	KE	56	300	500	15	This counts participants who were engaged in dialogues and policy engagement platforms (Indicator 32).
	TZ	51	218	300	15	
	UG	72	57	65	15	
	Total	**179**	575	865	**45**	
Ind. 36 – Number of farmers that have access to climate/weather information services	KE	37,959	19,819	33,293	100,000	47% of 116,555 SHFs accessed weather information services in 2022. 2022 results indicate 5% (2507) increase in access from 48,495 in 2021. The increase is attributed to a combination of channels for dissemination of WI (radio, text messaging and through extension)
	TZ	10,000	6,831	18,179	100,000	
	UG	45,000	28,208	61,584	100,000	
	Total	**92,959**	**54,858**	**113,056**	**300,000**	
Ind. 37 – Number of farmers that have access to	KE	800	3,964	6,659	333	Index insurance has taken off very slowly, across the region. During the
	TZ	10,000	1,130	3,007	333	
	UG	10,000	5,425	11,843	333	
	Total	**20,800**	**10,518**	**21,508**	**1000**	

Performance indicators		Target 2022	Achieved 2022	Achieved to date (where applicable cumulative)	Overall target	Comment.
index-based insurance products						reporting period 2022, an increase in uptake of index insurance was observed by 19% (1685) from 8833 in 2021 to 10518 in 2022
Ind. 38 – Number of farmers that received extension services on CS practices and technologies	KE	36,116	27,386	46,005	116.000	In 2022 more SHFs received extension services compared to 2021 due to the high demand and interest of farmers in CSA knowledge and services.
	TZ	17,146	17,682	47,055	117,000	
	UG	54,391	42,855	93,560	117,000	
	Total	**107,653**	**87,923**	**186,621**	**350,000**	
Ind. 39 – Number of extension service workers trained on CS practices and technologies	KE	284	236	1059	333	Under the various technical trainings, 522 extension workers were trained in the targeted CRAFT crops
	TZ	100	254	1021	333	
	UG	200	32	165	333	
	Total	**584**	522	**2245**	**1000**	

ANNEX V: UPDATED MANAGEMENT RESPONSE MATRIX

Evaluation Criteria/Question	Findings	Management Response	Plan of action (Aug 2022)	Status by end 2022
Relevance				
EQ1: To what extent has CRAFT addressed Climate Change (CC) adaptation constraints, addressed CC risks, and capacities within the respective value chains at different levels?	1. Climate change risks associated with the respective value chains were correctly identified, although degree of responsiveness to them varied	This is partly valid. CRAFT undertook a comprehensive stakeholder and market analysis at the beginning of the project, in addition to the climate risk assessments per value chain.	The climate change risks are included in risk register (per BC or VC) and updated on a quarterly basis. The project will continue collaboration with national agencies around timely provision of seasonal forecast and link with extension advise.	Risk register is in place at project level and updated at quarterly basis, includes seasonal forecast risk information.
	2. Using BCs to deliver agricultural extension to SHF has worked well in some cases but appropriateness is questionable for agri-business which do not have extension delivery in their business model.	This is partially valid. It is too early to draw such conclusions, many BCs still in progress and development. CRAFT has been able to work with agribusinesses to successfully integrate extension in their business models including co-financing of extension key positions where this service is deliberately integrated in the overall business case. Though the few BCs with challenges were incidental and their capacity need to be strengthened. We agree that for cooperatives they have the capacity to deliver extension services – only are limited by capacity and resources.	Leverage on state extension services and/or engage with other initiatives around quality extension services, while working on the capacities of the BCs. Improve ways of simplifying and disseminating content in the manuals/aids so it is relevant to grassroot extension works and SHFs.	The project has increased engagement with public extension services to support the extension systems of the business champions. The farmer survey outcomes indicate a higher appreciation of services by TOT, in quality and being more reliable. A high number of the BCs have integrated the ToTs (or part of them) in their operations to continue to support extension services in a combination with aggregation services. The project has invested in simplified content to facilitate knowledge transfer during extension services, especially in Uganda.
	3. Crop/value chain selection was largely appropriate despite being partially driven by the donor, although appropriateness was more questionable for certain VCs due to constraints concerning access to markets, access to finance and, to a lesser extent, post-harvest handling.	This is partially valid. The crop/VC selection was driven by donor (not partially driven). The selection is relevant (staple crops) given their importance in national food security. CRAFT has invested substantial resources in supporting post-harvest handling to improve hygiene and mitigate use of storage chemicals/fumigants. The project has integrated PHH services within the business cases since the start.	The Service Delivery Model learning exercise will provide a base in further supporting the teams and BCs in analysing the appropriateness of the interventions. The project plans to conduct a cost benefit analysis for three value chains – potato, beans and green grams which will facilitate the identification of bottlenecks and opportunities.	The project will not continue with sesame in Uganda, as the investments in climate adaptation are not making business sense to the farmers and the BCs. The other selected crop/value chains were validated for appropriateness in the contexts of the country. For example, sorghum that is grown mainly for breweries is a good cash crop to be mixed with food crops within the farming system. The SDM learning exercise, including the market scan has assisted the project team and BCs in the sustainability strategies.

		This should have been evident if the sample space was wider.		Gross Margin Analysis were done at different levels (at demonstration sites, during farmer field days).
EQ2: How well does the design of the project articulate and address the overall development goal and relevant needs and priorities?	4. There is a lack of shared understanding on vision and change pathways – the theory of change is not central or active, there are different views on understandings on vision and pathway to goal	This is valid. The MTR confirms the complexity of the project. The diversity within the consortium, and partially through the many indicators but also due to a focus on outputs per Workstream; lead to challenges with the overall integration between the different interventions.	Already started during implementation in 2022, and going forward, the story of CRAFT will be made central to the project implementation, based on a clear ToC. While through more periodic reflections on progress the theory will be tested, in addition to structural testing of the assumptions	The project reviewed the MEL procedures and practices to check on the quality of the processes and ability to respond the underlying stories of the indicators. As part of this process teams reviewed and discussed the TOC and the underlying assumptions.
	5. The validity of project assumptions underpinning the project has proved to be somewhat mixed.	This is valid. Though it is too early to draw a definite conclusion. The project assumed that SMEs/cooperatives would automatically or would be able to invest in CSA solutions. This has proven to more complex.	Review assumptions	The overall and sub-assumptions for the different levels in the ToC were identified and checked by the full team during implementation.
	6. Some of CRAFT's initial impact and outcome indicator targets have proved unrealistic – partly due to COVID-19 but also under-estimation of scale of the challenge and time needed.	This is partially valid. The project was too ambitious with respect to the time within which the intervention was to be implemented. Despite Covid the project managed to realise a substantial number of BCs. Too optimistic about required time and efforts onboarding BCs (very similar to comparable programs e.g. 2SCALE, DFCD). The numbers were too ambitious in respect to smallholder farmers in East Africa especially the acreage, the number of farmers to be reached per BC, the number of cooperatives, and SME to work with. This in addition to the bottom-up approach to policy influence.	We will conduct target reality check to establish what is feasible to reach by end of project and document the reason for any changes as shall be preferred. The issue of unrealistic/ unachievable targets was already discussed with DGIS; the agreement was to maintain them but document learnings.	Target reality check was done and included in the annual plan 2023. Main conclusions of the targets are: 1. Ratio = #farmers and land size is not realistic 2. # farmers within the current project lifeline not possible to reach, with the enrolled # of BCs 3. # farmer target is possible to reach with sustainable results in a longer time frame. The feasibility of the targets has been an on-going discussion with MFA (also before MTR). The land-size was an error (to be acre not ha).
	7. CRAFT's design is gender and youth responsive	This is valid.	We will continue to strengthen our focus on GESI. CRAFT is currently working to build a body of evidence around gender responsive CSA practices and technologies.	The project has continued interventions towards youth and women. For example, the establishment of youth councils within the cooperatives and women leadership. In Kenya a study on gender-responsive CSA practices and technologies assisted in better understanding the application and adaptation incentives by men and women per value chain. Study to be finalised in 2023.

EQ3: How well has the programme adapted to change in the external environment?	8. COVID was a major unanticipated disruption to which CRAFT has at times found it difficult to adapt to, in order to keep the project on track.	This is partially valid. The greatest impact of COVID19 on CRAFT was lost time and inability to implement activities due to movement restriction but also loss of business for SMEs and Cooperatives, and lack of appetite to finance by the financial sector. The CORE-Africa project assisted with several responses and learning trajectories around increasing resilience (at different levels).		The impact of COVID is mostly felt in the capacity of the BCs to engage and implement their business cases. Their business environment was not enabling with higher prices, markets being affected as well access to finance.
	9. The CRAFT proposal correctly identified most key risks though there was no regularly updated risk matrix	This is valid.	The project has updated the risk register at country and project level (PMU) – The risk register will be updated regularly (on quarterly basis) to ensure it aligns with the changing contexts at various levels.	The project has updated the risk register at country and project level (PMU) – The risk register will be updated regularly (on quarterly basis) to ensure it aligns with the changing contexts at various levels.
Coherence				
EQ4.1: To what extent is CRAFT externally coherent with other CSA agricultural value chain initiatives in the three countries and agricultural value chain initiatives in the three countries?	10. The CSA methods promoted by the project are well aligned to existing evidence and best practice.	This is valid.	Pager about unique approach of CRAFT (what makes it different from a VC project)	Updated info notes/ fact sheets
	11. Linkages and cross-programme learning with other related initiatives has occurred to a limited extent.	This is valid. COVID-19 was one of the limiting factors in building linkages.	The project has established more links to other projects/initiatives, also a good moment since we are at the end of the project: a good moment to for knowledge/learning harvesting.	Ongoing; the project has made more connections in the three countries. For example, in Kenya, the CSA MSP facilitates broader connections. Additionally, the project engaged with KALRO around different interventions (knowledge and insurance). In Uganda, the project worked closer with local and national government and through CSA MSP increased linkages with other stakeholders. In Tanzania, engagement at local level with the relevant stakeholders as well through the different dialogues.
	12. Useful linkages with key government departments, agencies and mechanisms have been made though this should receive more attention in the future.	This is valid. There is need to engage more than one institution since CSA is a cross-cutting initiative.	The project will be more strategic in linking with government agencies, particularly high-level government/agency officials. The project will continue to organise multi-stakeholder engagements and build more synergies with relevant institutions.	Ongoing: see point 11
	13. Supervision from DGIS/IGG has been remote	This is valid.	This is valid.	Increased communication and constructive discussion with MOFA/IGG and the EKNs.

	and limited, while alignment with Dutch Embassies' strategy is variable.			
	14. CRAFT is leading and innovative in using a private sector-based approach to climate adaptation and in combining climate science, agronomics and value chain development, though might have done more to develop and implement CSA innovation.	This is partially valid. Explicit choices have been made in focus and delivery models. However, the communication and packaging could have been better.	CRAFT will ensure that its innovations are made clearer for both business champions and the smallholder farmers. CSA innovations will be packaged in simplified training guides and as well the climate risk assessment sheets.	The project has focussed on CSA practices and technologies suitable for the crops and farmers. Good Agronomic Practices (GAP), together with access to quality and drought resistant seed and post-harvest practices was a substantial change already. The timeframe considered to facilitate change; considering that farmers need to trial and observe before adopting a broader array of new farming approaches over and above the improved seeds and low investment crop management approaches. It is anticipated that adoption rates increase during the lifetime of the project and beyond because farmers were able to observe practices and technologies over a longer period.
Effectiveness				
EQ5: To what extent are planned outcomes and strategic objectives likely to be achieved?	15. CRAFT is demonstrating some success in promoting adoption of CSA practices and technologies amongst farmers and agribusinesses	This is valid.	Undertake an extended quantitative and qualitative analysis of data available considering the dynamics in agroecological zones and value chains. Need to consider the qualitative aspects strongly (Tell our story strongly)	Additional data collection and analysis done. First results shared in the 2022 annual report.
	16. There are a variety of factors negatively affecting adoption of CSA practices, technologies, and services	This is valid. Documentation of these will help in understanding the issues better	Further analysis of the M&E data to establish the level of CSA adoption (SME vs cooperatives), different VC's, seasons and across countries, while considering bout affordability of some of the CSA innovations (solar solutions, irrigation etc.) affecting their uptake.	See point 15
	17. Progress on stimulating investment and growth in climate smart value chains has been made but not at the pace or degree initially projected.	This is partially valid. Too early to draw conclusions, it is a learning point that more to be expected to happen in the second half of the project. The financial sector was also influenced by COVID-19.	Focus more on scaling and matchmaking for further investment. CRAFT will continue supporting capacity training of finance institutions on opportunities and potentials for investment in CSA; will consider engaging MFIs such as SACCOs especially for cooperatives and small SMEs; and will strengthen the internal	Additional data collection around the impact of the business case on the growth of the company or cooperative will provide a better understanding. The growth in turn-over of the BC is not always linked with the business activity linked with CRAFT. The project supported the BCs with developing sustainability strategies of the business case, especially the longer-term linkages with the farmers and building an inclusive supply chain. To be continued in 2023.

			capitalization and governance for cooperatives.	Where necessary linkages with FI's for additional financing was made. The internal capitalisation for cooperatives assisted them to sustain and scale their services to farmers.
	18. Bigger than anticipated capacity issues with BCs and higher than anticipated risk aversion from FIs – both partially linked to COVID-19 – are the key factors in lower than anticipated investment.	This is valid.	CRAFT will strengthen follow-up actions with financial institutions based on Financial Landscape Analysis and individual engagements with FI in the three countries.	The project is expected to reach the targeted co-investment amount of 10Euro. The cooperatives worked on their internal capitalisation, and financial systems, making them more investment ready. Linkages with FI's (different types) are made for possible additional finance.
	19. Some foundations for creating an enabling environment for CSA have been laid but much remains to be done if the overall goal is to be attained.	This is valid.	The project will be able to reach out and share with relevant stakeholders the evidence and learnings from CRAFT. This, in conjunction with higher level engagements at Governmental level, will enable the project to influence the enabling environment. Per country expectations will be defined. More time is needed to be able to do this.	The project will be able to reach out and share with relevant stakeholders the evidence and learnings from CRAFT. This, in conjunction with higher level engagements at Governmental level, will enable the project to influence the enabling environment. Per country expectations will be defined. More time is needed to be able to do this.
	20. CRAFT is generating high quality research but there is something of a disconnect between research outputs and implementation	This is partially valid. The comment was based on interview with PHDs on PHD research. It does not relate to all research done in the project. The usage of the research and inputs from research partners has increased as evidence is becoming available, and this will be reinforced going forward.	There is an ongoing commitment to ensure research and other knowledge products are disseminated both for both internal and external learning.	The project has made deliberate effort around learning and connecting the research with implementation. The learning questions were re-defined (with several rounds of reflection). Additionally, the workplan 2023 includes a list of knowledge products and learning processes.
EQ6: What are the key overarching factors influencing effectiveness?	21. CRAFT has an effective strategy in place to support women and youth empowerment.	This is valid.	There is an ongoing commitment to ensure GESI principles are mainstreamed and applied in the design, implementation and M&E processes.	Ongoing
	22. Difficulty attracting private sector actors of the size and capacity needed to deliver to the scale and timeframe.	This is valid.	More time needed, request for top up to donor. A long-term strategy will need to be implemented for envisioned goal to be fully achieved.	A substantial number of BCs were able to attract finance to scale their operations, and 24 BCs will be able to scale up with an extension in 2023. The reflection within this finding of the MTR refers to the CIIF instrument, and if CRAFT

				was able to attract the type of companies with the capacity to reach scale. This is part of the 2023 learning agenda.
	23. Limited interest or appetite to fund staple crop production geared around CSA amongst financial institutions.	This is valid. The target VCs are low margin crops with unstructured markets.	Partnering with initiatives in the same space to increase the viability of investment, and better understanding how to facilitate funding.	CRAFT is working with ACELI, among others, to facilitate increased investments for BC's and for collective actions around increased investment in CSA. Rabo Partnerships work with banks in TZ and UG are also part of this. In KE access to finance for the BC is more available.
	24. VC specific bottlenecks and constraints slowed progress but have been adapted to.	This is valid.	The SDM analysis has provided the project insights on improved analysis and reflection on progress and bottlenecks.	No specific action required. Internal reflections around the different VCs and feasibility for CIIF and CSA investments led to strategic choices of interventions for 2023.
	25. Issues with internal coordination and clarity around partners' roles impacted effectiveness, especially in initial stages.	This is valid.		Ongoing point of attention
	26. The COVID-19 pandemic severely undermined effectiveness.	This is valid.		No action
Impact				
EQ7: Based on the available indications, how likely is that the project will achieve its intended impacts?	27. Evidence is inconclusive at this stage in relation to impact on SHF level resilience.	This is valid.	The resilience indicator will be reviewed as we recognise the importance. This will include adopting more universal methods of measuring resilience. Intentionally track data on farmers' yields/productivity/income, and their absorptive and adaptive capacity as well as a critical aspect of CRAFT's impact.	The resilience measurement is a critical aspect of 2023 measurement. Additional tools were designed and applied.
	28. Certain CSA approaches exhibit potential for replicability by SHFs and scalability by SMEs and cooperatives.	This is valid. Farmers are adopting lower cost practices/technologies.	Each country to document the uptake by SMEs outside CRAFT's BCs. Organisation of learning events, at regional level for example for the potato value chain which has a presence in the three countries.	Ongoing
	29. The prospects of scalability of climate smart business cases for further	This is valid.	Implementing partners to invest resources in CSA policy gaps	Longer term support to position BCs as an attractive investment is required. Also, more time to mature the business case.

	private sector investment is mixed – longer term support would be required for it to occur in some cases.		analyses that the project can leverage on to influence enabling environment.	
	30. Greater influence on the wider operating and policy environments requires more time, stronger evidence and more coherent messaging.	This is valid.	Organisation of national CSA dialogues involving multiple stakeholders where key learnings captured inform development of advocacy products that can be effectively disseminated in policy influencing fora at local, national and international level.	Ongoing dialogues in the different countries at different levels.
Sustainability				
EQ8: To what extent are the benefits generated by CRAFT to date likely to continue?	31. Farmers are likely to continue to use the most accessible, low-cost CSA approaches if they remain available, but sustained adoption of less accessible, higher cost products and services will likely require further intervention.	This is valid. More attention to service provision is needed – which offer various CSA practices/technologies. But adoption of lower costs/easier accessible practices/technologies is clear.	With the different adoption levels, more time is needed for some farmers to comprehend the message and develop capacity to invest in CSA practices and technology. The focus will be to strengthen CSA extension services for sustainability purposes. Other focus areas will include scaling and promoting shared learning around the potato value chain; conduct gross margin analysis on CSA technologies and practices; and improve availability of CSA service providers.	Within the BCs more attention was given to the quality of the service delivery models and seeking sustainability of their services to the farmers. A number of BC continue in 2023 to further consolidate their business case.
	32. While some BCs have been successful in attracting investment, others are likely to find it difficult to deliver their scaling plans and may revert to pre-CRAFT practices.	This is valid.	Focus will be to conduct intensive engagement with Financial Institutions to facilitate alternative sources of funding for CSA for SHF and BCs. There is need to engage decision makers of financial institutions for a structural change; as well as engaging the cooperatives, VSLAs and other organised microfinance institutions - which are easily accessible with less stringent conditions (diversification).	Engagement with FI and ACELI ongoing, as well working on the sustainability of the business case.
	33. Improving farmers' access to services and inputs through CIIF support and thinking around Service Delivery Models could improve prospect for sustainability, but it is too early to tell.	This is valid.	Follow up and increase the use of the model	Ongoing

	34. It is still too early to tell what the project's impact on policy influence will be.	This is valid.	More time is required to demonstrate impact on policy. However, as part of MEL processes, the project will be more intentional in tracking changes in the enabling environment directly influenced by the project.	In 2022 the restructuring of learning agenda and ambition of documenting will support the policy influence activities.
EQ9: Has an appropriate exit strategy been developed and applied?	35. CRAFT's exit strategy looks appropriate, but lack of time and BCs' ability to attract more investment pose risks.	This is valid. Exit plans are under development, with a focus on sustainability after CRAFT.	CRAFT to develop tailored exit strategies for the different BCs that speak to their needs. The project will also conduct portfolio reviews to help in determining which BCs to continue funding/support to ensure they are investment ready.	The exit strategies for the BCs are followed up during 2023. The project exit strategy to be further developed in 2023.

ANNEX VI: MAIN OUTCOMES WITH COOPERATIVES 2022

MAIN INPUTS AGRITERRA 2022

Agriterra conducted 23 trainings with a total of 687 participants on a variety of topics such as youth and female leadership, internal capitalisation, financial management, marketing, and governance. Of the total participants, around 40% were women and 40% were youth. To address the cross-cutting topics of youth and gender, four trainings on female leadership and five on youth were conducted, including a youth kick-off workshop. These activities aimed to increase the involvement of women and youth in cooperatives by setting up women and youth councils. Agriterra also conducted four workshops and four advisory assignments on sustainable services, resulting in the development of sustainable business plans for the cooperatives. In addition, five exchange visits were facilitated in 2022 - three on youth in Uganda, one in Kenya, and one in Tanzania - to promote best practices and share learnings. The table below provides an overview of the main activities undertaken by Agriterra in 2022

Agripooler	Experts	Training	Exchange	Assessment	Trained
					
10	16	23	5	1	687

"Agriterra has built the capacity of management through trainings. We have been able to raise money, run the cooperative better and we are stronger as an institution than before. We now provide credit, banking, extension, and marketing services to our members and in the next eight years, aspire to be the leading producer of cooking oil with a working capital of UGX 15 billion," **CEO Sebei Farmers SACCO.**

Based on the inputs and various trainings the follow outcomes can be reported about Agriterra's work in 2022 under CRAFT. The table below summarizes the most important and critical ones.

Trajectory	Outcomes 2022	Remarks
Farmer-led business (workstream 2) 	15 climate smart business plans implemented	For all 15 CIIF supported cooperatives business plans were implemented. In Kenya 3 potato coops also developed a seed production strategy and 1 cooperative acquired a seed merchant certificate which will contribute to the sustainability of the cooperative (Starlight).
	4 New market linkages created (2 UG, 2 TZ)	
	10 Linkages created with FIs for access to finance (UG & KE) 3 cooperatives were able to mobilize loans in Tanzania and Uganda. The loans have been used for: 1: input loan facility for seeds and fertilizers (inputs) & 2. working capital.	
Sustainable services (workstream 1) 	7 agreements with agricultural input suppliers signed – resulting in improved access to quality inputs	In 2022 there was a lot of focus on implementing sustainable services at cooperative level. Some results, like increased sales of inputs and increased productivity, are visible already in 2022, but more are expected in 2023.
	6 extension services plans developed and implemented to improve service delivery to members (UG, TZ)	
	4 sustainable services business plans were developed and implemented to guide scale up of current CSA services provision (KE)	
	29 coop extension officers trained on topics related to sustainable services	

	Financial mgmt. 	7 new internal capitalization strategies developed and implemented	The internal capitalisation strategies are starting to show results. In Tanzania in total approximately 5,000 euro was collected from members. In Uganda 2 cooperatives were able to invest in storage facilities with a total value of almost 100,000 euro because of the internal capitalisation trajectories.
		6 cooperatives improved their financial system resulting from Agriterra finance training	
		4 cooperatives raised internal capital through retained earnings and sales of shares to match CIIF funds (UG, TZ)	
		2 cooperatives started savings and loan associations for inputs (UG)	The 100,000 EUR is generated from internal capital from both FOs (50%) and the other 50% comes from 3rd party loan from Stanbic Bank for Sebei SACCO.
	Governance 	4 policy documents developed on HR, finance, and procurement for 4 coops in Kenya	Most female leadership trainings took place in Q3 and Q4. One of the most common action points is the setup of a women's council.
		1 cooperative supported to revise their manuals on including youth/ women (UG)	
		1 women council registered, and 7 cooperatives are in different stages of registering the women council.	
	Youth 	6 youth councils were established. 2 youth exchange visits facilitated	Due to the Youth kick of trainings, there is more attention and focus on the topic youth which has led to an increase in youth membership and the establishment of 6 youth councils.
	Climate 	8 climate clever checks implemented (UG, TZ) The climate clever check is part of the sustainable services trajectory of Agriterra. Basically, it is an assessment of potential climate risks linked to water, soils, crops, energy and waste. A refresher assessment from the earlier climate risk workshops and at the same time to create awareness at the cooperative level. The climate check also comes with a score and list of recommendations. Since this is directly linked to the farm level outcomes it can help the cooperative in making priorities when developing an extension department/unit and where farmers need most support. The link with CRAFT and CSA is to ensure that certain CSA practices developed and implemented at the farm level under CRAFT can be sustained through improved extension services resulting from the sustainable services trajectory. Example RIVACU: Shortly after the climate clever check, reflections on improved seed varieties as a service was put as action plan. This was a tailored approach as it was included in the sustainable services trajectory and hence cementing it as a service and ensuring business model and sustainability by highlighting its return mechanism. The AGM approved retaining two staffs among the four to ensure that services are carried over kick started by CRAFT project.	Climate clever checks were followed up with an action plan and served as input in preparation for the sustainable services trajectories.

ANNEX VII: SUMMARY FINANCIAL LANDSCAPE ANALYSIS

FINANCIAL LANDSCAPE ANALYSIS KENYA

Kenya has three tier-1 banks with a strong rural presence: KCB Bank, Equity Bank and Coop Bank. KCB Bank and Equity Bank have sizeable, dedicated F&A departments, while Coop Bank is the preferred financier of producer cooperatives in Kenya. The tier-1 banks focus on structured value chains such as coffee, tea and dairy.

Furthermore, several tier-2 and 3 banks, micro finance banks, micro finance institutions and financial cooperatives/SACCOs offer agricultural finance to value chain partners.

Many financial institutions are aware that the impact of climate change poses a risk for the food & agribusiness sector and their loan portfolio, however they lack knowledge, risk appetite and skills to translate climate change into the credit policies and product offering of their respective financial institution.

RP recommends the following way forward in increasing CSA awareness and actions by financial institutions in Kenya:

- Conduct strategic sessions on the impact of climate change on the F&A loan portfolio of a bank with the following partners:
    - Tier-1 bank: Equity bank or Coop bank
    - MBI: Faulu or KWMB
    - MFI: Eclof or Vision Fund
- Focus on increasing risk-appetite at strategic level, product offering at business level and creating deal flow at client level.
- Investigating insurance opportunities to de-risk lending to F&A clients.

FINANCIAL LANDSCAPE ANALYSIS TANZANIA

TADB (Tanzania Agricultural Development Bank), CRDB and NMB Bank (National Microfinance Bank) have a sizeable loan portfolio in the food & agribusiness sector. Most of the lending is disbursed to partners in structured value chains such as coffee, tea, cotton and tobacco. Their lending is de-risked by working together with guarantors such as PASS, TADB or through the collaboration with Development Finance Institutions.

Furthermore, there are some smaller banks that have the ambition to expand its F&A footprint such as NBC (National Bank of Commerce) and Azania Bank. There are only a small number of MFI's and community banks active in Tanzania, that support less formal value chains.

CSA is for financial cooperatives and SACCOs not a topic that is standard on the agenda due to other challenges such as long lead times, high collateral demand and the nascent stage of business planning.

An interesting potential partner is Aceli Africa which is a market incentive facility aiming to unlock finance for agricultural SMEs.

Rabo Partnerships recommends the following way forward in increasing CSA awareness and actions by financial institutions in Tanzania:

- Explore ways to cooperate with Aceli as a strategic partner. Aceli has 'feet on the ground', a good network and can offer (blended) solutions that can leverage the funding available at financial institution level.
- Conduct strategic sessions on the impact of climate change on the F&A loan portfolio of a bank with the following partners:
    - Tier-1 bank: CRDB, TADB and/or NMB Bank.
    - Tier-2 bank: Azania Bank.
- Focus on increasing risk-appetite at strategic level including risk-mitigation strategies by using specific instruments and knowledge.
- Use the CRAFT business cases to translate the learnings into the bank credit policies, risk appetite and product offering.
- Explore whether TADB can become an enabler for the financial sector in terms of knowledge provider on CSA.

FINANCIAL LANDSCAPE ANALYSIS UGANDA

The following tier-1 banks in Uganda have a loan portfolio in the food & agribusiness sector: Centenary Bank, dfcu Bank, Equity Bank, KCB Bank and Stanbic Bank.

SACCOs and financial cooperatives can play an important role in offering financial services to SMEs, however most of these partners are not well organised in terms of governance and credit regulations.

Rabo Partnerships recommends the following way forward in increasing CSA awareness and actions by financial institutions in Uganda:

- Conduct strategic sessions on the impact of climate change on the F&A loan portfolio of the following tier-1 banks: dfcu Bank, Equity Bank, KCB Bank and Centenary Bank.
- Focus on increasing risk-appetite at strategic level including risk-mitigation strategies by using specific instruments and knowledge.
- Conduct strategic discussions with enablers such as the Bank of Uganda on the investment policies and risk appetite regulations towards financial institutions.
- Explore ways to cooperate with partners that can unlock access to finance for (smallholder) farmers. The venture between Mastercard and RP called Agriculture Exchange might be an initiative that can boost climate smart agricultural investments. Agriculture Exchange is a digital open ecosystem that offers multiple services to farmers and other value chain partners. It is expected that the first farmers in Uganda can be onboarded during Q3 2022.

ANNEX VIII: CLIMATE PROJECTION WORK UNDER CRAFT PROJECT

As part of the Climate Resilient Agri-business for Tomorrow (CRAFT) project in East Africa, a climate projection was performed for different value chains in Kenya, Uganda and Tanzania using a high-resolution data from the Coordinated Regional Climate Downscaling Experiment (CORDEX). The first climate projection work was based on two validated regional climate model data that are dynamically downscaled from four Global Circulation Models (GCMs), which has a reasonable skill in East Africa. The regional models RCA4 and MPI-CSC-REMO2009 were used to downscale four Global Circulation Models (EC-EARTH, MPI-ESM-LR) from the Coupled Model Inter-comparison Project Phase 5 (CMIP5). The regional model was run at a grid resolution of 0.44° x 0.44° (50km x 50km) over the African domain and all other details about the simulation can be found in Dieterich et al. (2013). The GCMs projections were forced by the Representative Concentration Pathways (RCPs), which are prescribed greenhouse gas concentration pathways (emission) trajectory and subsequent radiative forcing by 2100. The climate projection work in the CRAFT project is based on two RCP scenarios, RCP4.5 and RCP8.5, that are representatives of mid-and high-level of emission scenarios, respectively.

In the updated CRAFT climate projection work, the CORDEX multi-model past, present, and future climate change scenario datasets were collected from Earth System Grid Federation (ESGF) data replication centers. Five Regional Climate Models (RCMs), i.e, SMHI-RCA4, GERICS-REMO2009, ICTP-RegCM4, MPI-CSC-REMO2009, and CLMcom-CCLM4-8-17, driven by a combination of thirteen Global Climate Models (GCMs), i.e., NOAA-GFDL-GFDL-ESM2M, NOAA-GFDL-GFDL-ESM2G, NCC-NorESM1-M, MPI-M-MPI-ESM-MR, MPI-M-MPI-ESM-LR, MOHC-HadGEM2-ES, MIROC-MIROC5, IPSL-IPSL-CM5A-MR, IPSL-IPSL-CM5A-LR, ICHEC-EC-EARTH, CSIRO-QCCCE-CSIRO-Mk3-6-0, CNRM-CERFACS-CNRM-CM5, and CCCma-CanESM2 were used in this project. Table 1 shows the list of GCMs and RCMs models used for this work and the table also indicates GCM-RCMs combinations.

For this work on climate change projections, dynamically downscaled daily rainfall, maximum, minimum and mean temperature from these models were used. The model datasets were validated using observational and re-analysis data for the historical period (1961-2005). Observation datasets from the Climate Hazards Group InfraRed Precipitation Version 2.0 (CHIRPS v2.0) and Climatic Research Unit (CRU) Time-Series (TS) Version 4 (CRU TS4.04) were used to validate the model rainfall and temperature datasets respectively. A number of studies in the region indicated that CHIRPS is high-quality rainfall data to validate model outputs in East Africa. Table 2 shows CHIRPS and CRU datasets descriptions, short names, and resolutions. A daily dataset of CHIRPS with spatial resolution $0.25° \times 0.25°$ and a monthly CRU dataset with spatial resolution $0.50° \times 0.50°$ are used in this study. These observation datasets were mapped to models (GCM-RCMs) grid resolution using a first-order conservative remapping. We computed climatologies of precipitation and near-surface temperature datasets for historical period 1961-2005 and future projections for the two seasons (MAM and OND) in 2030s, 2050s, and 2080s. The historical period GCMs seasonal climatologies are compared with observational CHIRPS and CRU climatologies. The multi model's ensemble mean is calculated and compared with the observation datasets. Thus, performance matrices used for models versus observations comparisons are bias (B), root-mean-square-difference (RMSD), standard deviations (SD), and correlation coefficients (CC).

The selected downscaled climate datasets were analysed to evaluate the historical and future climate change scenarios in rainfall, temperature, and a number of indices to estimate the extreme events such as consecutive wet days (proxy for excessive rainfall), consecutive dry days and standard precipitation index (proxy for drought events) for all the value chains across East African countries (i.e., Kenya, Uganda, and Tanzania). As the assessment and prediction of the onset and cessation dates, and length of the growing spell of a rainy season is very crucial element to the agricultural activities of the countries in East Africa, these variables were estimated for the historical (1961-2005) and the 2030s and 2050s for the two rainy seasons under both RCP4.5 and RCP8.5 scenarios. Two methods were used to analyze the onset and cessation for the two seasons in the three CRAFT countries: traditional threshold approach and harmonic analysis method. In our first version, we used the traditional threshold approach adopted from ICPAC. In the updated version of the climate projection work, the harmonic analysis-based determination of onset and cessation dates were employed.

Table 10: Combination of GCMs and RCMs used for this analysis. The top column names indicate RCMs, and the row names are GCMs driven the RCMs.The combinations of driver GCMs and corresponding RCMs are indicated by symbol (X).

	SMHI-RCA4_v1	GERICS-REMO2009_v1	ICTP-RegCM4-3_v4	MPI-CSC-REMO2009_v1	CLMcom-CCLM4-8-17_v1
NOAA-GFDL-GFDL-ESM2M	X				
NOAA-GFDL-GFDL-ESM2G		X			
NCC-NorESM1-M	X				
MPI-M-MPI-ESM-MR			X		
MPI-M-MPI-ESM-LR	X			X	X
MOHC-HadGEM2-ES	X	X	X		X
MIROC-MIROC5	X	X			
IPSL-IPSL-CM5A-MR	X				
IPSL-IPSL-CM5A-LR		X			
ICHEC-EC-EARTH	X				
CSIRO-QCCCE-CSIRO-Mk3-6-0	X				
CNRM-CERFACS-CNRM-CM5	X				X
CCCma-CanESM2	X				

Table 11: Precipitation (CHIRPS) and temperature (CRU) observation datasets used for GCM-RCMs evaluation.

Models descriptions	Short name	Resolutions
CHIRPS Version 2.0	chirps	$0.25^{\circ} \times 0.25^{\circ}$
CRU TS4.04 Mean Temperature	cru	$0.50^{\circ} \times 0.50^{\circ}$

ANNEX IX: PUBLICATIONS

Country	Published articles/blogs
UGANDA	
	• **January 2022:** SNV Website: Learning events with farmers increasing take up of climate smart agriculture practices and technologies: Learning events with farmers increasing take up of climate smart agriculture practices and technologies | SNV • **April 2022:** SNV Website: Former IT professional switches to sustainable soybean production: Former IT professional switches to sustainable soybean production | SNV • **March 2022:** WUR Website: Uganda soybean sector assessment: Uganda soybean sector assessment - WUR • **March 2022:** CGIAR: Climate Smart Agriculture Multistakeholder Platform Strategic Plan 2022-2026: CSA MSP Strategy.pdf (cgiar.org) • **August 2022:** CRAFT LinkedIn: Improving the coordination of climate finance for resilient food systems in Uganda: Improving the coordination of climate finance for resilient food systems in Uganda | LinkedIn • **August 2022:** CRAFT You Tube: Transforming the agriculture sector in Uganda through building climate resilient food value chains: Transforming the agriculture sector in Uganda through building climate resilient food value chains - YouTube • **November 2022:** CRAFT LinkedIn: CSA Multistakeholder platform formed in Uganda**:** Climate Smart Agriculture Multistakeholder platform formed in Uganda | LinkedIn • **November 2022**: CRAFT profiled in DGIS Agrospecial: Boeren in Oost-Afrika geholpen met Nederlandse expertise | Uganda | Agroberichten Buitenland • **December 2022:** CRAFT LinkedIn: Working with private sector to scale up climate smart agriculture in Uganda. Working with private sector to scale up climate smart agriculture in Uganda | LinkedIn • **December 2022:** CRAFT LinkedIn: Sebei Farmers' SACCO dreams big! Sebei Farmers' SACCO dreams big! | LinkedIn
KENYA	
	• **March 2022:** SNV Website: Multi-Stakeholder Platform – Climate Smart Agriculture 5-year strategic plan launch: ▪ CRAFT integrated into Kenya's Multi Stakeholder Platform on climate smart agriculture | SNV • **March 2022**: FarmKenya – Standard Media: Climate smart agriculture key to food security: Climate smart agriculture key to food security - FarmKenya Initiative (standardmedia.co.ke) • **March 2022:** ILRI Website: New multi-stakeholder platform to promote strategic approaches in climate-smart agriculture in Kenya. New multi-stakeholder platform to promote strategic approaches in climate-smart agriculture in Kenya (ilri.org)

	• **March 2022:** CGAIR Website: CSA MSP Strategic Plan 2022-2026: CSA MSP Strategy.pdf (cgiar.org) • **March 2022**: TV47 – YouTube: Ministry of Agriculture, Climate smart agriculture launch a 2022-2026 strategic plan: https://youtu.be/nTnqGzWZm40 • **March 2022:** YouTube**:** Society of Crop Agribusiness Advisors of Kenya: CSA-MSP Strategic Plan 2022-2026, CSA M&E Framework, CSA Training Manuals: https://youtu.be/fNUHMCNdbTM • **April 2022:** SNV Website: CRAFT learnings inform Kenya's Climate Smart Agriculture Multi Stakeholder Platform: CRAFT learnings inform Kenya's Climate Smart Agriculture Multi Stakeholder Platform | SNV • **April 2022**: SNV Website: Mechanised farming increasing potato production in Nakuru, Kenya: Mechanised farming increasing potato production in Nakuru, Kenya | SNV • **June 2022:** YouTube: AICCRA CGIAR: Unleashing the power of digital tools to accelerate the transform of African food systems: (53) Unleashing the power of digital tools to accelerate the transform of African food systems - YouTube • **June 2022:** Daily Nation: SNV-pages.pdf (nation.co.ke) • **July 2022:** SNV Website: Climate resilient agriculture: The smart way for green gram farmers: Climate resilient agriculture: The smart way for green gram farmers | SNV • **July 2022:** CRAFT LinkedIn: Developing bankable climate-smart agri-cooperatives: Post | Feed | LinkedIn • **August 2022**: The Nation: FreshCrop growth strategy boost production of clean potato seeds: FreshCrop growth strategy boost production of clean potato seeds | Nation • **September 2022:** CRAFT YouTube**:** Promoting climate resilient potato production: Promoting climate resilient potato production - YouTube • **September 2022:** Switch Media: Climate Smart Agriculture and Food Security in Kenya: Climate Smart Agriculture and Food Security in Kenya (switchtv.ke) • **October 2022:** CRAFT LinkedIn: Increasing farmers' income thru adoption of climate-smart practices and technologies: Increasing farmers' income through adoption of climate-smart practices and technologies | LinkedIn • **November 2022:** CRAFT LinkedIn: Increasing farmers' income through adoption of climate-smart practices and technologies**:** Increasing farmers' income through adoption of climate-smart practices and technologies | LinkedIn • **November 2022:** CRAFT YouTube: The critical role of agri-SMEs in delivering nutrition & food security: The critical role of agri-SMEs in delivering nutrition & food security - YouTube • **December 2022**: LinkedIn: CRAFT convenes a continental policy dialogue on gender responsive climate-smart agriculture**:** ❖ CRAFT convenes a continental policy dialogue on gender responsive climate-smart agriculture. | LinkedIn ❖ Gender-responsive climate-smart agriculture science-policy dialogue for Eastern, Central And Southern Africa | AICCRA (cgiar.org) • **December 2022:** LinkedIn: Climate risks and adaptation assessment for resilient Potato value chains: Climate risks and adaptation assessment for resilient Potato value chains | LinkedIn • **December 2022:** CRAFT LinkedIn: Kenya's Co-operative Bank commits to finance climate-smart investments in the potato value chain: Kenya's Co-operative Bank commits to finance climate-smart investments in the potato value chain | LinkedIn • **December 2022:** CRAFT LinkedIn: Laureen from Starlight Farmers' Cooperative shares lessons from COP27: Laureen from Starlight Farmers' Cooperative shares lessons from COP27 | LinkedIn
TANZANIA	
	• **March 2022:** SNV Website: Irrigation key to sustainable agriculture for smallholder potato farmers in Tanzania: Irrigation key to sustainable agriculture for smallholder potato farmers in Tanzania | SNV

	• **March 2022:** EKN website: Building Climate Resilient Food Systems in Tanzania and Photo exhibition "Capturing Climate Change" | Tanzania | Agroberichten Buitenland • **February 2022:** YouTube: Netherlands Embassy in Tanzania: Climate Talk - Building resilient food systems: https://youtu.be/RPoCZVnIJfE • **August 2022:** CRAFT LinkedIn: Harnessing the power of community radio broadcasting to engage communities on climate smart agriculture: Harnessing the power of community radio broadcasting to engage communities on climate smart agriculture | LinkedIn • **October 2022:** CRAFT YouTube: Building climate-resilient value chains in Tanzania: Building climate-resilient value chains in Tanzania - YouTube • **December 2022:** CRAFT LinkedIn**:** Private Sector-led Efforts Towards Sustainable Uptake of Climate Smart Agriculture in Tanzania: Private Sector-led Efforts Towards Sustainable Uptake of Climate Smart Agriculture in Tanzania | LinkedIn • **December 2022:** CRAFT LinkedIn**:** CRAFT together with other stakeholders spearheading the development of Tanzania National Potato Plan: CRAFT together with other stakeholders spearheading the development of Tanzania National Potato Plan | LinkedIn
CROSSCUTTING BLOGS AND BLOGS	
	• **March 2022:** MDPI: Scaling Climate Smart Agriculture in East Africa: Experiences and Lessons**.** Agronomy | Free Full-Text | Scaling Climate Smart Agriculture in East Africa: Experiences and Lessons | HTML (mdpi.com) • **May 2022:** Publication: Full article: Scaling climate resilient seed systems through SMEs in Eastern and Southern Africa: challenges and opportunities (tandfonline.com**)** • **April 2022**: AICCRA Website: The commercial opportunities to scale climate-smart agriculture in East and Central Africa: The commercial opportunities to scale climate-smart agriculture in East and Central Africa | AICCRA (cgiar.org) • **April 2022: SNV Website:** CRAFT co-investment catalyses millions in private sector finance to support resilient agribusiness: CRAFT co-investment catalyses millions in private sector finance | SNV • **August 2022:** CRAFT LinkedIn: Promoting Climate Action consistent with evidence & science in food systems in East Africa: Promoting Climate Action consistent with evidence & science in food systems in East Africa | LinkedIn • **August 2022:** CRAFT LinkedIn: Demonstration gardens enhancing mindset change & uptake of climate smart agriculture in East Africa: Demonstration gardens enhancing mindset change & uptake of climate smart agriculture in East Africa | LinkedIn • **October 2022:** AGRF 2022 | Green Climate Fund and CRAFT: (64) CASA 4x4 at AGRF 2022 | Green Climate Fund and CRAFT - YouTube • **October 2022**: Working on climate-resilient agriculture in East Africa: CRAFT: Working on climate-resilient agriculture in East Africa | Mirage News • **October 2022:** Wageningen University & Research website: CRAFT: Working on climate-resilient agriculture in East Africa - WUR • **November 2022:** CRAFT LinkedIn: Creating a climate smart food agri-strategy for financial institution: Creating a climate smart food agri-strategy for financial institutions | LinkedIn • **November 2022:** CRAFT LinkedIn: CRAFT contributing to COP27 discussions on climate resilient food systems | LinkedIn • **November 2022:** AICCRA Website: Gender-responsive climate-smart agriculture science-policy dialogue for Eastern, Central And Southern Africa | AICCRA (cgiar.org) • **December 2022:** CRAFT LinkedIn: Building climate smart cooperatives in Kenya, Uganda and Tanzania: Building climate smart cooperatives in Kenya, Uganda and Tanzania | LinkedIn • **December 2022: YouTube: EA CONFERENCE FINAL - YouTube** • **December 2022:** Development and analysis of service delivery models: Guidance note on application of SDM analytical framework:

	https://snv.org/assets/explore/download/SDM%20Analysis%20Methodology%20FINAL.pdf https://snv.org/assets/explore/download/SDM%20Analysis%20Methodology%20FINAL.pdf • **2021 Annual Report: CRAFT LinkedIn: Post | LinkedIn**
NEWSLETTER EDITIONS	
	• **April 2022:** CRAFT Quarter 1: CRAFT Project Newsletter - Q1 2022 (mailchi.mp) • **August 2022:** April - July 2022 Newsletter Edition: CRAFT Project Newsletter Updates: April - July 2022 (mailchi.mp) • **November 2022**: COP27 Newsletter Special: Join us on the road to COP27 (mailchi.mp) • **December 2022:** End of Year Newsletter: CRAFT End of Year Newsletter🎁 (mailchi.mp)
CRAFT IN WEBINARS	
	• **March 2022:** CRAFT LinkedIn: Recognising the role of women in climate action: LinkedIn • **June 2022:** Switch TV - YouTube: Promoting #RoadMap to COP27 Engagements: (Kenya) ▪ Day 1: https://youtu.be/spv4E36QNiw ▪ Day 2: https://youtu.be/auQrCaMoXyg • **September 2022:** CRAFT YouTube: Africa COP Resilience Hub: Promoting climate resilient food systems for increased agricultural productivity and food security - YouTube **CRAFT AT COP27** • **November 2022: COP Resilience Hub – Blog:** CRAFT contributing to COP27 discussions on climate resilient food systems | LinkedIn • **November 2022:** YouTube: EIB Pavilion**:** How to mobilize private sector finance towards inclusive climate resilient food systems: How to mobilize private sector finance towards inclusive climate resilient food systems - YouTube • **November 2022:** Food Systems Pavilion: YouTube: Enable a culture of sustainable, healthy and nutritious diets: ENABLE a culture of sustainable, healthy and nutritious diets - YouTube • **November 2022:** Food Systems Pavilion: YouTube: Increase sustainable investment and financing to build food systems: INCREASE sustainable investment and financing to build food systems - YouTube • **November 2022:** Food Systems Pavilion: YouTube: Scale climate resilient agriculture: SCALE climate resilient agriculture - YouTube • **November 2022:** YouTube Resilience Hub Pavilion: Reaching Resilience: African solutions for the African continent: Reaching Resilience: African solutions for the African continent - 15 November 2022 - YouTube
TRAINING MANUALS	
Kenya	• SNV website/Library: Green-gram - Climate smart resource and training guide: GreengramTraining Guide(web).pdf (snv.org) • SNV Library: website: Green-gram - Climate smart training aid: GreengramTraining Aid_0.pdf (snv.org) • SNV Library: Potatoes - Climate resilient potato production Training Aid: PotatoTraining Aid(web).pdf (snv.org) • SNV library: Climate Resilient Potato Production Handbook - A guide for farmers and trainer: PotatoTraining Handbook WEB.pdf (snv.org) • SNV library: Climate Smart Dry Bean Guide - Dry Bean Production Manual.pdf (snv.org) • SNV Website/ Library: Sorghum: Climate Smart Sorghum Production Resource Guide- SNV Craft Climate Smart Sorghum Production Training and Resource Guide.pdf • SNV website: Sorghum: Climate Smart Sorghum Production Training Aid: SNV Craft Sorghum training aid.pdf