CGIAR SUSTAINABLE FARMING

AKILIMO PROGRESS REPORT

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Sustainable Farming Science Program

Contents

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Introduction

AKILIMO is a comprehensive decision support framework designed to improve agronomic practices in cassava-based systems, alongside with the delivery mechanisms and partnerships to provide advisory services to smallholder cassava growers in Ghana, Nigeria and Tanzania. AKILIMO provides growers customized recommendations, that consider their unique soil composition, weather patterns, and socio-economic conditions. The suite of digital and analogue decision support tools (DSTs) generates personalized recommendations on fertilizer use, tillage, weed control, planting practices, intercropping and planting/harvest dates to improve productivity and profitability. It leverages digital soil maps, satellite-derived weather data, and geospatial resources to predict the impact of agronomic interventions on crop yield and revenue. This prediction framework combines machine learning, crop modelling, and economic optimization algorithms. It was calibrated using over 50,000 yield measurements from multilocational field trials and evaluated in over 2,000 farmer-managed validation exercises.

Scaling of AKILIMO started in 2019 through a set of partners networks, using different scaling approaches. Various scaling activities have been conducted since then, contributing to diverse outcomes and impact results.

This report details the scaling of AKILIMO through the different partnerships and within geographies. The results presented include up to date summary of scaling activities, partners engaged, participants reached, the different channels used in reaching participants, assessment of the use of tools (tools within which recommendations are packaged). The report also shows the knowledge gained, application of the recommendations, drivers of uptake, and some initial benefits among the participants.

1. Scaling AKILIMO

This section of the report presents a detailed account of the scaling activities of AKILIMO including the scaling strategies adopted, major implementation activities, and how the different pathways through which Use Cases[1] are scaled. It highlights the roles of diverse partners engaged in scaling AKILIMO. The different participants reached (farmers, extension agents, processors, input providers, and policymakers), and thematic content delivered under each Use Case disseminated. Data presented in this section are all obtained through the Monitoring, Evaluation, Learning and Impact Assessment (MELIA) system, shared through partner networks, either by direct upload and or shared with agreed template for upload.

In addition, the section details how gender and youth inclusion are embedded in dissemination efforts, the digital and traditional extension channels applied (e.g., apps, USSD, radio, videos, and printable guides), and the feedback mechanisms that ensure continuous learning

[1] AKILIMO Use Case refers to one of the four main AKILIMO recommendation components- Best Planning Practices, Fertilizer Recommendation, Scheduled planting and high Starch content and Cassava Intercrop (with Maize in Nigeria and Sweet potato in Tanzania)

Scaling Strategies and Activities

Expanding the **reach, uptake, and impact** of AKILIMO across countries requires a combination of strategies and activities that are both systematic and adaptive. The scaling process begins with **readiness assessments** to ensure that AKILIMO's use cases are validated and adaptable to local contexts. Once readiness is established, different **pathways and models** are deployed, leveraging existing partner structures such as market-based approaches, public and private extension systems, digital platforms, and farmer cooperatives.

Partnerships have been central to this process, engaging governments, private sector actors, farmer groups, and NGOs in driving uptake. To maintain momentum, the scaling process is reinforced through **monitoring and adaptation**, with evidence from MELIA used to refine approaches and promote continuous improvement. Throughout, an emphasis on **inclusivity** ensures that women, youth, and marginalized groups can access and benefit from AKILIMO innovations.

To translate these strategies into practice, a diverse set of **scaling activities** has been implemented. **Capacity building** remains foundational, equipping extension agents (EAs), lead farmers, and agro-dealers with the skills needed to effectively use AKILIMO tools. Farmer Field Days and demonstration plots have provided practical platforms to showcase the yield and profitability benefits of applying AKILIMO recommendations, while a Training-of-Trainers (ToT) approach has ensured knowledge cascades efficiently through local systems.

Alongside these in-person efforts, AKILIMO has made significant investments in **digital advisory and ICT platforms**. Recommendations are delivered through mobile applications (AKILIMO App), Short Messaging Service (SMS), Interactive Voice Response (IVR), and WhatsApp chatbots (being developed), ensuring accessibility even in remote areas. Integration with existing digital extension platforms of both public (e.g., National Agricultural Extension and Research Liaising Services (NAERLS)) and private (e.g., ZOWASEL, ESOKO, FBIS-Tech) has expanded reach further, while video sessions have reinforced learning for broader farmer audiences, especially female participants.

Scaling has also been advanced through **partnership-based approaches**. Collaborations with processors such as Psaltry and Flour Mills have encouraged uptake through outgrower schemes, while alliances with NARS, NGOs, and development programs have embedded AKILIMO within existing agricultural initiatives. Partnerships with the private sector including financial institutions have enhanced farmers' access to credit and inputs, enabling more effective uptake of recommendations.

To stimulate demand, **awareness and demand-creation activities** have been deployed, including agricultural fairs, and community sensitization events. The use of lead farmers has helped build trust in AKILIMO, while supporting materials such as manuals, flyers, and guides, developed in local languages have made recommendations more accessible and farmer friendly.

Finally, **monitoring, evidence, and feedback (MELIA)** are fully integrated throughout the scaling process. Data is collected to track reach and usage of recommendations and related benefits. In addition, Usability Metric for User Experience (UMUX-lite) and Net Promoter Score

(NPS) tools, capture insights on usability and satisfaction of participants. This continuous evidence loop ensures that AKILIMO advisories remain relevant to farmers' realities, are adapted where necessary, and deliver sustained impact at scale.

Partners incorporating AKILIMO into their business and Organizational structure

Several partners are engaged in the scaling of AKILIMO across the different countries, each applying diverse approaches to reach smallholder farmers. Currently, over 270 partners are actively integrating AKILIMO into their networks, demonstrating the strength of collaboration across the public, private, and NGO sectors. using different approaches. These partners include public, private and NGOs, partners have integrated AKILIMO into their business and organizational systems, reaching out to smallholder farmers withing their networks. Figure 1 shows the different partner categories within the different countries.

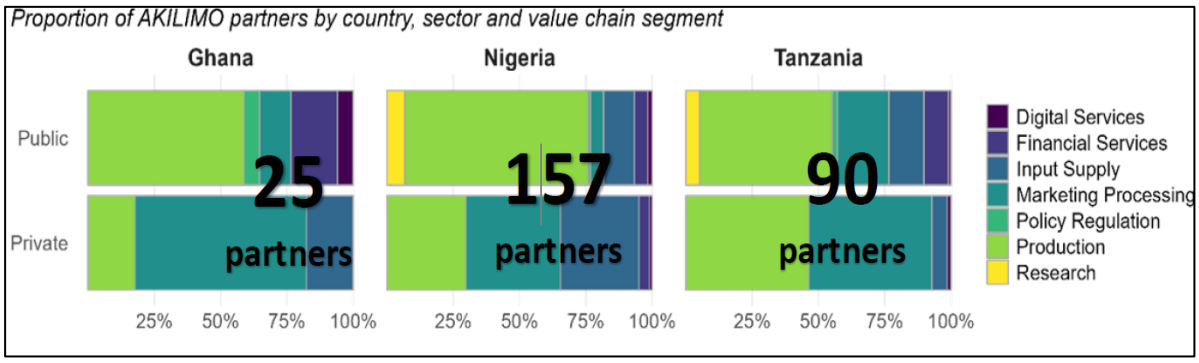


Figure 1. Partner categories within the different countries

2. Results- AKILIMO reach

This section of the report details the different participants reached, thematic content of each Use Case disseminated, and the channels used in scaling the content. Data presented in this section are all obtained through the Monitoring, Evaluation, Learning and Impact Assessment (MELIA) system, shared through partner networks, either by direct upload and or shared with agreed template for upload.

Partner staff trained to lead AKILIMO scaling interventions

Extension Agents have been key in the scaling of AKILIMO in both public and private sector partner networks. A total of 8,571(17% female) have been trained in the various AKILIMO content and formats across Ghana, Nigeria and Tanzania. The agents engage smallholder farmers through various scaling events (demonstrations, video sessions, training, etc) in disseminating the content. In addition, they use the AKILIMO app in generating personalized recommendations for farmers within their networks.

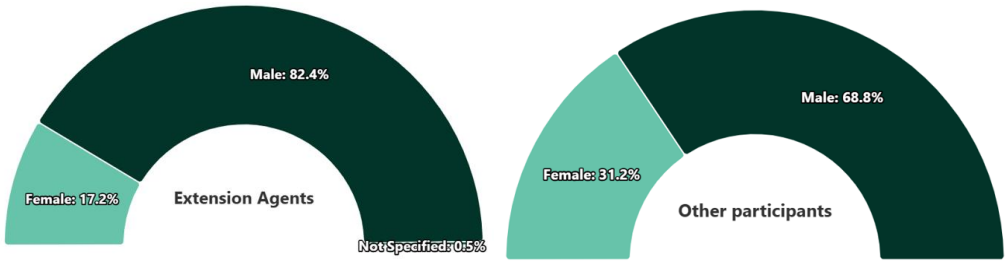
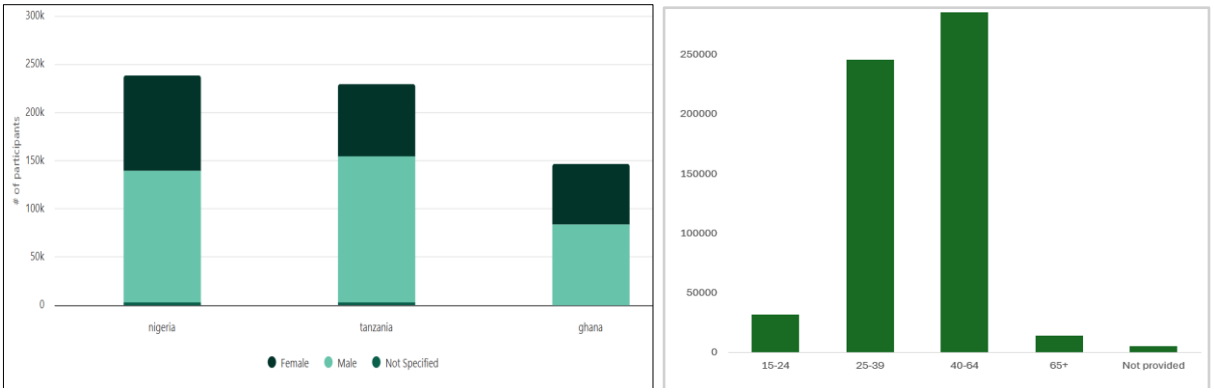


Figure 2. Sex disaggregation of Extension agents and other partner staff trained

Farmers reached with AKILIMO content

Over 613,929 (Tanzania- 229,257, Nigeria – 238,470 Ghana - 146,202) with 39% female smallholder cassava farmers have been reached through the various events and channels. These events include demonstrations, group training, sensitization, video sessions, etc. **Error! Reference source not found.** shows the number of farmers reached across the three countries. Majority (51%) of the farmers reached are within 40 – 64 age brackets, 43% within



25 – 39.

Figure 3. (a) Farmers reached in Ghana, Nigeria and Tanzania, (b) Age categories of farmers reached

Farmers reached overtime

The trend of participants reached across Ghana, Nigeria, and Tanzania reflects different entry points and implementation dynamics across countries. In 2019 and 2020, AKILIMO activities were concentrated in Nigeria and Tanzania, with Nigeria engaging over 18,000 participants in 2019 and scaling up to 68,392 in 2020. Tanzania recorded the largest early growth, reaching more than 107,000 participants in 2020. These peaks highlight strong momentum during AKILIMO's early rollout, supported by direct sub-contracting between partners and IITA.

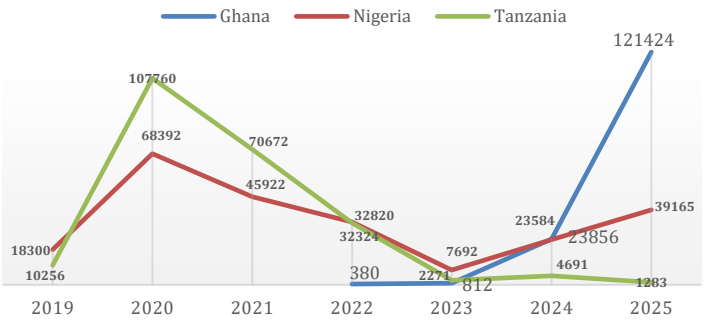


Figure 4. Number of farmers reached overtime

From 2021 onwards, both Nigeria and Tanzania experienced gradual declines as strategies shifted from sub-contracting arrangements to a more partnership-driven approach, with partners embedding AKILIMO interventions directly within their networks. By 2022, outreach stabilized at 32,820 in Nigeria and 32,324 in Tanzania, with numbers continuing to fall slightly as partner-led systems took greater ownership. Interventions in Ghana started beginning of 2022 when AKILIMO was adapted for its agroecological context. Initial outreach was modest, but by 2024–2025, Ghana showed exponential growth, from just 2,271 participants in 2023 to nearly 121,424 in 2025. This reflects the power of a phased approach: building contextual readiness first, then scaling rapidly once conditions and partnerships aligned.

Channels accessing AKILIMO recommendations

There are four main pathways through which farmers and other stakeholders' access AKILIMO information. These channels include a (i) Face-to-face, comprising farmer field schools, demonstration plots, field days, group training, coaching, video sessions, etc. These channels are mostly facilitated by public, private and NGO extension agents, using different AKILIMO formats (ii) a Digital/mobile channel, made up of Short Messaging Service (SMS), WhatsApp, AKILIMO App, farmer friendly short videos, which shares information directly with farmers and extension agents, (iii) Mass media, which includes radio and (iv) Peer-to-peer involving farmer-to-farmer through lead farmers, local champions., etc.

Formats used across different scaling channels

Figure 5 shows that paper-based tools remain the dominant channel (46.4%), followed by video (30.2%) and two-way Short Messaging Service (SMS) (14.6%). The AKILIMO app (6.2%) and interactive voice response-ivr (2.6%) are less commonly used directly by farmers but play an important role in reaching farmers with limited literacy or digital access through extension agents. This mix demonstrates the need for multi-channel approaches to ensure inclusivity and broad uptake of AKILIMO recommendations.

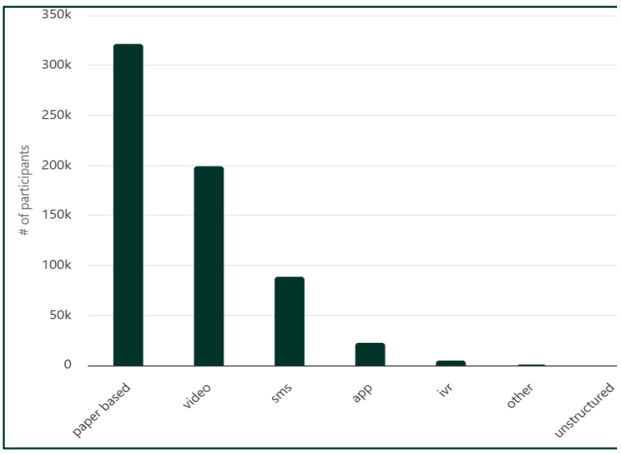


Figure 5. Scaling formats used to disseminate

Evolution of AKILIMO Scaling Channels and Formats

Figure 6 illustrates the evolution of AKILIMO's scaling channels and formats from 2019 through 2025, reflecting a deliberate shift towards more targeted and effective approaches based on farmer feedback and inclusivity needs. In 2019, outreach relied heavily on traditional channels such as agricultural shows, sensitization campaigns, trainings, and demonstrations, supported by video and paper-based formats.

By 2022, AKILIMO diversified into digital delivery mechanisms, introducing the AKILIMO App, SMS, IVR, and expanded video formats, while still maintaining traditional approaches like trainings and agricultural shows. This phase marked the beginning of blended strategies to address literacy, language, and accessibility barriers.

Looking ahead to 2025, the approach consolidates into a partnership- and community-driven model, with scaling channels anchored in trainings, sensitization, agricultural shows, demonstrations, and stronger community engagement. Formats have also expanded to include chatbot alongside the AKILIMO App, videos, and paper-based materials, ensuring wider reach through platforms.

Overall, the progression shows a shift from multiple broad channels to fewer, more impactful and farmer-preferred formats, ensuring efficiency, inclusivity, and adaptability in knowledge dissemination.

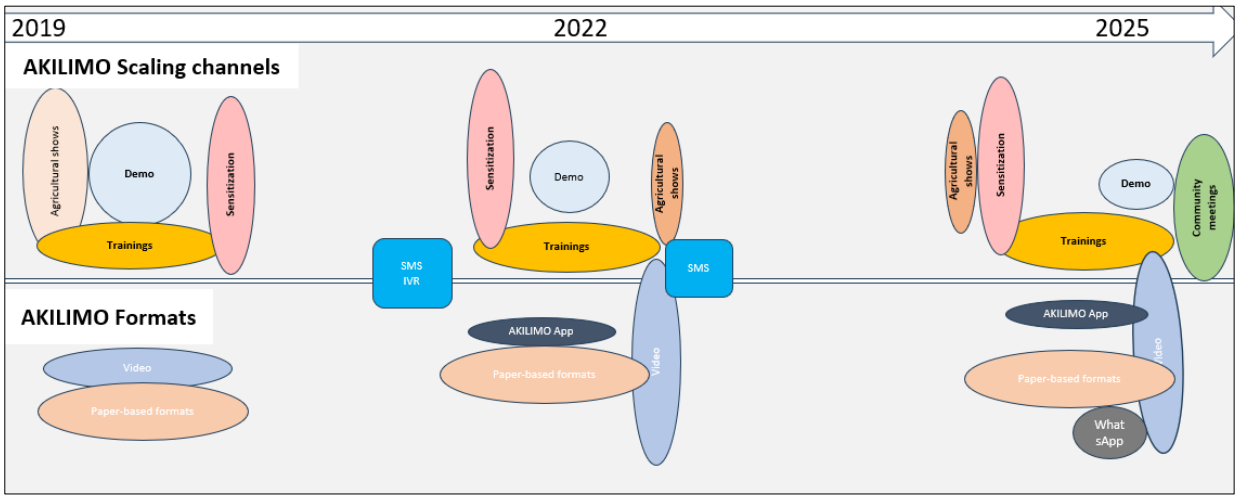


Figure 6. Evolution of scaling channels and formats

3. Results - Awareness, Knowledge, Uptake, and Use of Tools

This section of the report provides feedback on the awareness, knowledge gained, uptake of AKILIMO content per Use Case by farmers reached. It also provides feedback on the performance of the recommendations (yield, revenue, land area applied, etc).

Methods

The data presented in this section was gathered through telephone surveys with sampled farmers reached through various scaling channels from 2022 to 2025. Data was collected from a total sample of 2,512 respondents (average 49% female) across the three countries as shown by Figure 8. The database of participants of the various partner scaling events served as the sampling frame for the surveys. The database included details of participants such as names, sex, age, locations, contact numbers, partners names, content received, etc.

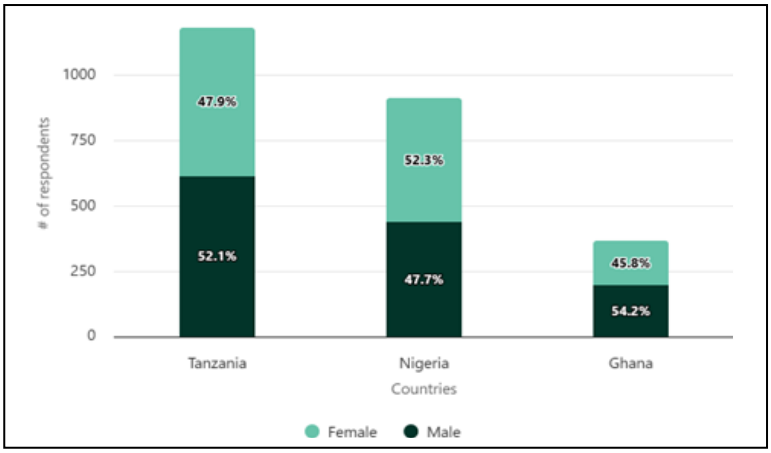


Figure 7. Sampled Farmers

A multistage cluster sampling design was used considering - sex, location, partner, and event type. This design is used to allow us to consider all relevant parameters and to enable us provide sex and partner specific feedback.

Awareness creation and understanding of recommendations among Smallholder farmers

Awareness and understanding levels were assessed first by respondents confirming participation in a scaling event and receipt of new knowledge. About 71% (40% female) of participants confirmed having received new information or knowledge from the different partner networks and scaling events. Content received cuts across all the AKILIMO Use Cases (**Figure**).

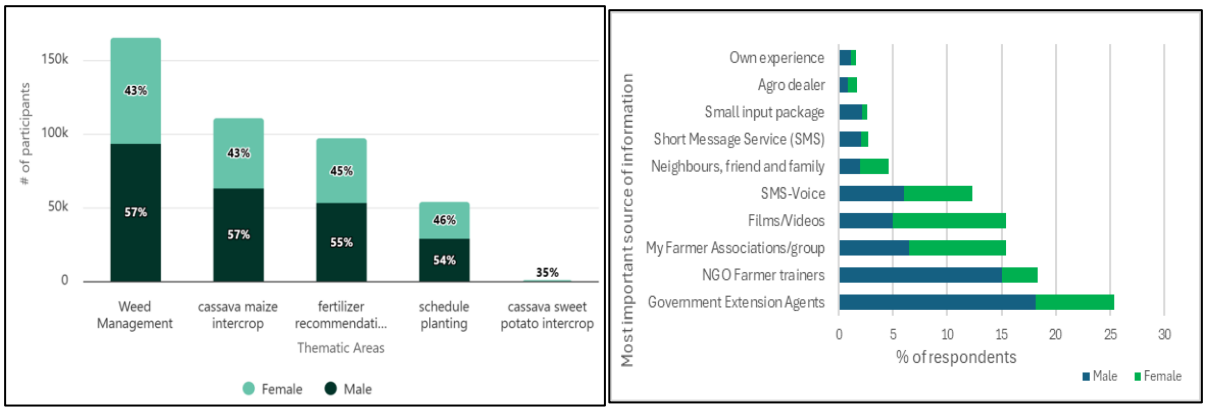


Figure 8. AKILIMO content received by participants by sex, Figure 9. Most important channels indicated by respondents

Respondents appreciated the different sources of information used by partners to engage them and indicated their most important sources of such information (***Error! Reference source not found.****9*). Among the ten most important sources, 87% of the respondents (36% female) indicated government extension agents, NGO farmer trainers, farmer associations, films/videos and SMS-voice were the most important. Government extension agents and NGO farmer trainers use demonstrations, field days, paper-based materials and apps in reaching out to farmers. Most female respondents indicated their farmer associations, film/videos and SMS voice as the most important. A further assessment of knowledge was also conducted using ten AKILIMO Use Case specific recommendation questions with “True” or “False” answer options. An automatic Score is calculated at the end of the section for each respondent and an average can be calculated across all respondents. This assessment helps to know the extent of knowledge gained per each AKILIMO recommendation and where there are gaps to follow up. **Figures 10, 11 and 12Error! Reference source not found.**, show the scores of the different AKILIMO Use Cases, indicating that the respondents of each Use Case had a good understanding of what the recommendation entails.

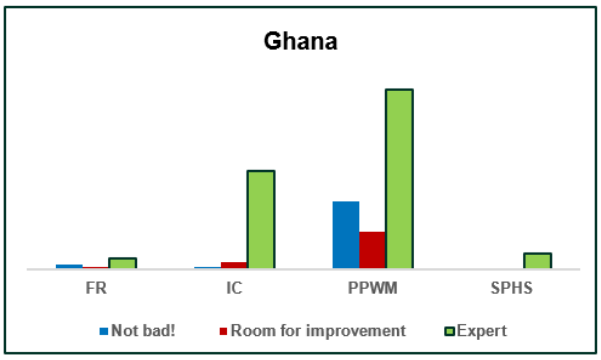


Figure 10. Average knowledge score levels across AKILIMO Use Cases-Ghana

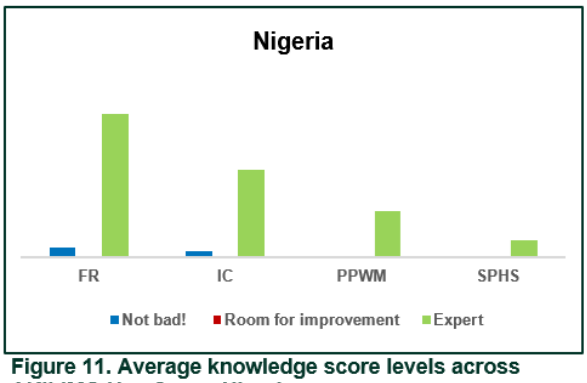


Figure 11. Average knowledge score levels across AKILIMO Use Cases-Nigeria

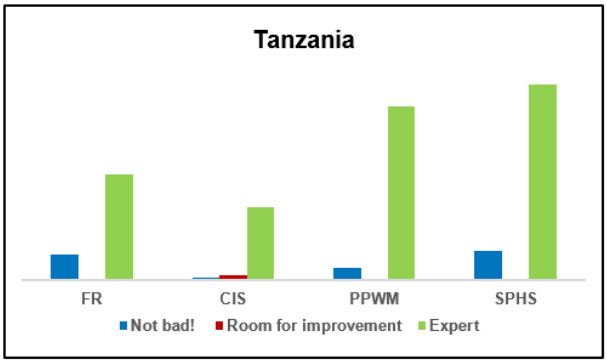


Figure 12. Average knowledge score levels across AKILIMO Use Cases - Tanzania

Uptake of AKILIMO recommendations

Uptake was assessed focusing on key recommendations of each AKILIMO Use Case (fertilizer recommendation, best planting practices, scheduled planting and high starch and intercropping) and what respondents are doing regarding practices in their cassava fields and compared with the recommendations.

An average of 76% (466,101 farmers, 49% female) participants (Ghana - male: 56,668, female: 54,445, Nigeria - male: 92,431, female: 88,806, and Tanzania - male: 88,860, female: 85,375) applied at least two of the AKILIMO recommendations across the different Use Cases.

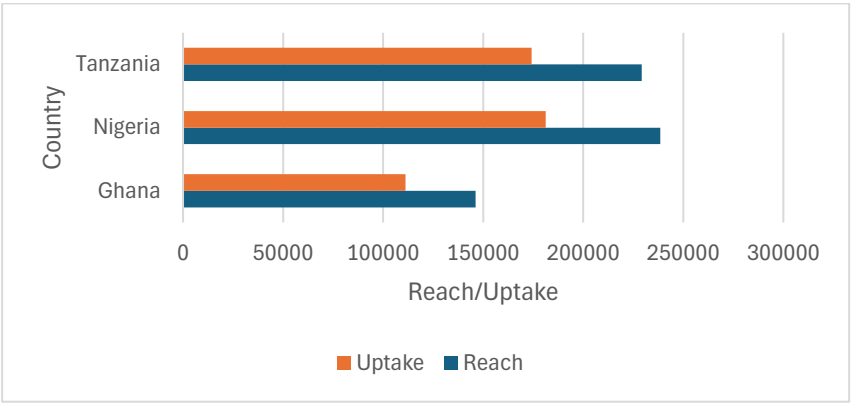


Figure 13. Reach and Uptake per Country

These recommendations include land selection and preparation, plant spacing, weeding, fertilizer type, method and time of application, etc (Figure 14). An average of 47% respondents applied fertilizer according to the recommended types, and rates compared to a zero-fertilizer application during baseline. Whereas fertilizer application is almost similar across male and female participants (Figure 15), there is a gap in the application of plant spacing between male and female participants (Figure 16) which is as results of limited access to labour by female participants and where available, female pay higher compared to men. As such, many prefer to plant by themselves. Other factors include limited access to credit input and output markets.

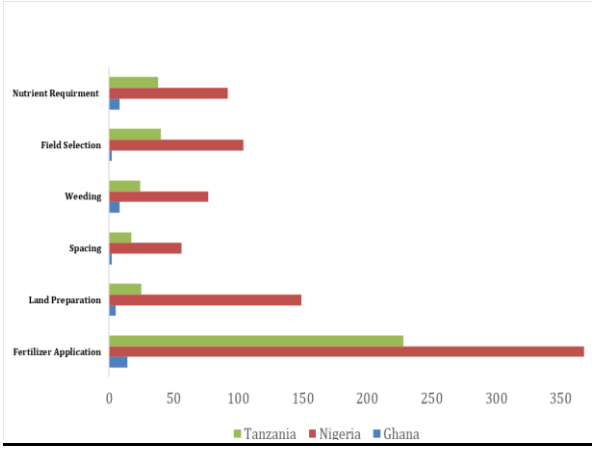


Figure 14. Uptake of AKILIMO recommendations

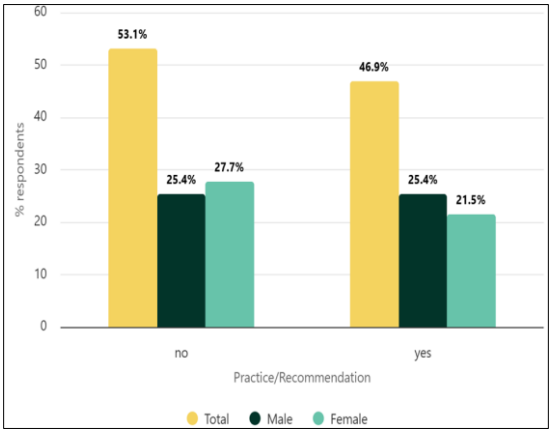


Figure 15. Fertilizer application by sex

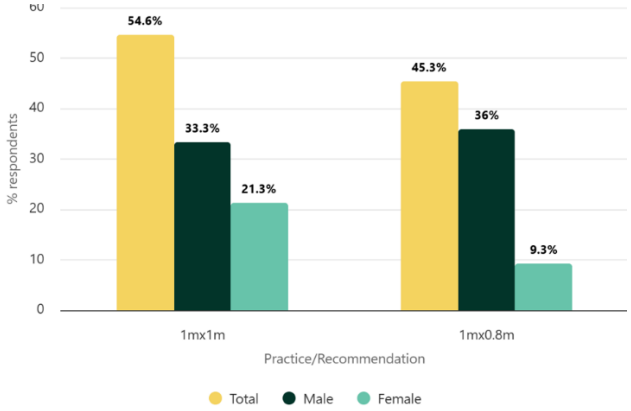


Figure 16. Uptake of recommended plant spacing

4. Results – Key benefits after AKILIMO uptake

Key among the impacts measured through the uptake of AKILIMO are yields, land area under application, assets improvement, etc. This section provides updates of these impacts across the three countries.

Land area applied with recommendation and related yields gains

Participants, through the telephone survey provide the total and proportion of land area cultivated with cassava and applied with the recommendations respectively. An estimated 512,711 hectares have been cultivated using AKILIMO recommendations across the three

countries. On average, each respondent applied the recommendations for 1.1 hectares, an increase of 0.63 hectares per farmer, representing a 57% rise compared to the baseline of 0.5 hectares per farmer. In addition, the uptake of the various recommendations has contributed to an increase in cassava yields (Ghana – 17.9tons/ha, Nigeria12.4ton/ha, Tanzania – 9tons/ha). These yields vary based on locations, farm sizes and the level of uptake. In addition to the increase in yield, participants confirmed an increase in investments in the form of increased land area for cassava cultivation and assets.

Drivers of Uptake

Over the years, the feedback generated indicates that uptake of AKILIMO is driven by key issues around personal knowledge, institutional capacities and enabling environment. Table 1 highlights some of the factors and general questions asked during the survey. Responses (either agree or disagree) to the questions indicate which factors may require further support and which ones are already supporting uptake of AKILIMO. Different factors were rated almost the same across male and female respondents in the three countries. Figure 9 presents the percentage of respondents across all AKILIMO Use Cases for specific factors.

Table 1: Drivers of uptake questions

Factors affecting uptake	Question asked
Easy to understand	*The recommendation/advisory is easy to follow and understand.*
Recommendation affordable	*The cost of the recommended practice is affordable.*
Access to Agro dealer	*I can find an agrodealer that sells the required input types to apply the recommendation*
Access to credit	*I can access credit for my farming business*
Access to inputs	*I can access inputs required for my farm at any time I want*
Access to EA	*I am able to talk to an extension agent/lead farmers/other farmers to learn more about the recommendation/advisory.*
Event organized at relevant time	*The event (field day, training, sensitization, etc) / SMS was organized/sent at a relevant time to allow me to apply the knowledge.*
Access to market	*I have access to a market to sell my ${Crop} produce.*
Made substantial investments	*I have made changes and substantial investments in my farm during the past 2 years.*
Recommendation can increase yield	*The recommended practice will increase my ${Crop} yield.*
Access to tools	*I have access to the ${UseCase} advisory tool.*
Can apply the tool by myself	*I am able to apply the tool on my own.*

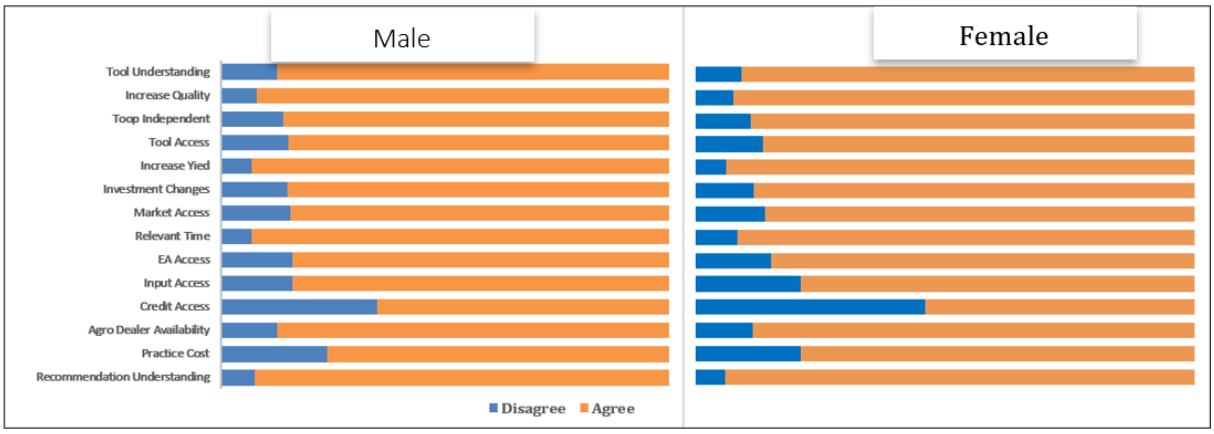


Figure 16. Feedback on drivers of uptake

Figure highlights male and female feedback on the drivers of AKILIMO tools and recommendations. Overall, both groups showed strong agreement on benefits such as tool understanding, increased yield and quality. However, gaps are evident in access-related areas. Women reported greater challenges in input access, credit access, and practice costs compared to men. These differences underline the importance of gender-responsive strategies as implemented earlier in 2019 to ensure equitable access to resources, services, and benefits from AKILIMO interventions.

Usability of AKILIMO Tools (UMUX)

Telephone survey respondents assess on regular basis the usability of AKILIMO tools and formats for adjustments to ensure meeting the needs and requirements of users. This process uses the Usability Metric for User Experience (UMUX) framework, which measures whether tools meet user requirements and align with their capabilities. The tools and formats assessed include videos, paper-guides, and SMS.

Results show consistently high usability ratings across both sexes, with only slight variations between male and female participants. In all countries, most respondents agreed that the tools are easy to use, effective in providing knowledge and well-suited to their skills and contexts (local languages and context specific references). Female participants tended to give marginally higher ratings than men on tool relevance and ease of use in relation to videos in local languages, reflecting strong acceptance of AKILIMO's design for inclusivity. Male respondents also reported high satisfaction, though with slightly lower scores in some dimensions.

Overall, the findings indicate that AKILIMO tools are widely perceived as usable, practical, and relevant across both women and men farmers. The minor gender differences suggest opportunities to tailor further tools and support materials to ensure inclusivity and maximize uptake, example, translating AKILIMO content into more local languages across the countries and inclusion of input and output market information.

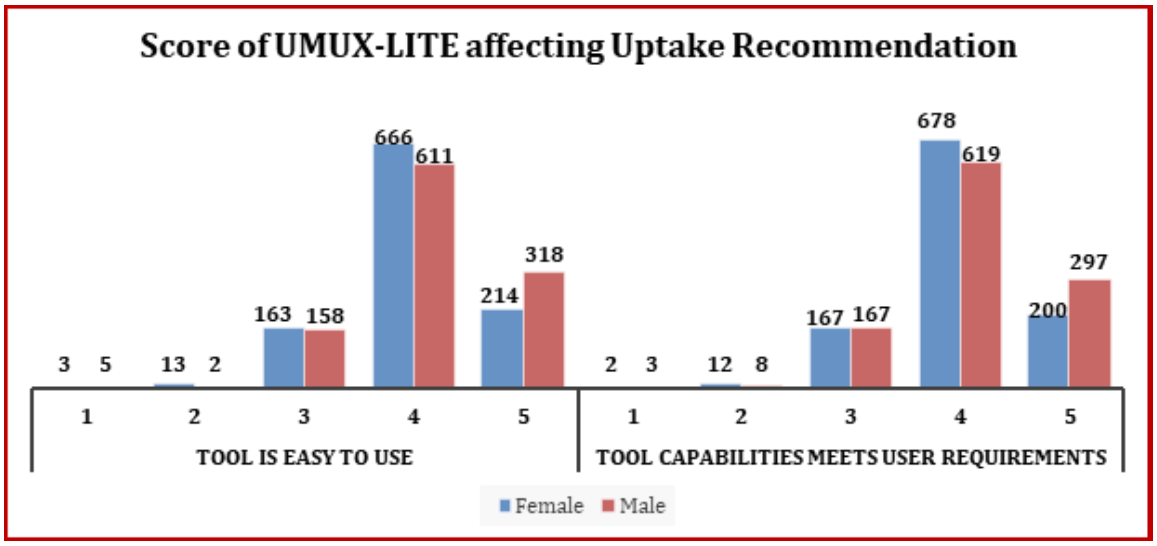


Figure 17. Score of Useability of AKILIMO Tool

6. Conclusions and key Learnings from Scaling AKILIMO

Effective methods to reach smallholders: The scaling of AKILIMO has demonstrated that effective methods to reach smallholders evolve over time. Early approaches relied heavily on sensitization campaigns, demonstrations, and trainings, while recent efforts have shifted toward embedding recommendations within partner networks and leveraging digital tools (apps, SMS, IVR, WhatsApp). These adjustments have improved efficiency, reduced duplication, and increased farmer accessibility, highlighting the benefits of adapting delivery channels as contexts change.

Partnerships as a foundation for scaling: Scaling AKILIMO has been largely partnership-driven, with governments, private sector actors, farmer organizations, and NGOs playing central roles. Strong coordination among partners has enabled wider reach, streamlined resource use, and created opportunities to align agronomic recommendations with complementary services such as input access, market linkages, and insurance.

Packaging AKILIMO content for easy access and uptake: Recommendations have been packaged in multiple formats—including apps, SMS, videos, flyers, and paper-based guides—to support both extension systems and direct farmer use. MELIA tracking shows farmers prefer accessible formats such as voice-SMS and association-led dissemination. Tailoring content to farmer realities is critical to overcome barriers related to literacy, language, and digital access.

Approaches to stimulate uptake: Uptake of AKILIMO recommendations is strongest when bundled with complementary innovations and services. Integrating agronomic guidance with fertilizer and input access, mechanization, market opportunities, and credit has been shown to accelerate adoption and sustain use. Cost-benefit analyses during pilots further improve uptake by demonstrating profitability and affordability to farmers.

Initial benefits observed: Farmers applying AKILIMO recommendations have reported increases in yield, improvements in assets ownership, and greater inclusion through targeted engagement of farmer groups and associations. These benefits strengthen the case for continued investment in scaling.

Gender-responsive opportunities: AKILIMO has created important entry points for women farmers, particularly through farmer associations and accessible delivery formats such as voice-SMS and community-based dissemination. While participation levels vary due to social norms and logistical barriers, these experiences highlight opportunities to design more inclusive strategies. Targeted gender approaches—such as women-focused delivery formats, flexible training schedules, and direct engagement of association leaders—can further enhance women's participation and ensure they fully benefit from AKILIMO recommendations.

Sustaining and expanding AKILIMO recommendations: Scaling requires a multi-pronged approach that combines strong public–private partnerships, bundling with services, and embedding AKILIMO within existing farmer networks. Sustained adoption depends on continuous adaptation, regular feedback loops, and integration of insights into national frameworks to institutionalize agronomic solutions.

Integrating MELIA feedback loops: MELIA tools have been critical in tracking reach, monitoring uptake, and refining strategies in real time. Feedback loops enabled by MELIA have improved farmer engagement approaches and adoption rates. Ongoing capacity strengthening

of partners and extension agents, as well as harmonization of MELIA with existing systems, are essential for long-term integration and sustainability.

About CGIAR Sustainable Science Program Report

This research was conducted as part of the CGIAR Sustainable Farming Science Program. This research is being implemented by CGIAR researchers from in close partnership with implementing partners. CGIAR is a global research partnership for a food-secure future. Its science is carried out by 15 Research Centers in close collaboration with hundreds of global partners. www.cgiar.org

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Key Words:

Innovation, scaling, impact, strategy, digital, Africa, target, business, models

Partners

AKILIMO Partners in Ghana, Nigeria and Tanzania

About CGIAR Sustainable Farming Science Program

The CGIAR Sustainable Farming Science Program will address key challenges in agrifood systems by fostering efficient production of nutritious foods and safeguarding the environment to create fair employment opportunities, as we simultaneously tackle climate change, soil degradation, pests, diseases, and desertification.

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BETTER DIETS AND NUTRITION

BREEDING FOR TOMORROW

CAPACITY SHARING

CLIMATE ACTION

DIGITAL TRANSFORMATION

FOOD FRONTIERS AND SECURITY

GENDER EQUALITY AND INCLUSION

GENEBANKS

MULTIFUNCTIONAL LANDSCAPES

POLICY INNOVATIONS

SCALING FOR IMPACT

SUSTAINABLE ANIMAL AND AQUATIC FOODS

SUSTAINABLE FARMING