

**Diversity for Resilient Agroforestry Banana plantations in East Africa
(D4RABs)**

Workshop Report



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EXECUTIVE SUMMARY

Banana is an important perennial crop that produces year-round fruit and contributing significantly to food, nutrition and income security for millions of smallholder farmers in Uganda. However, productivity has declined due to poor management practices as well as abiotic and biotic constraints. In Western Uganda, banana monoculture has expanded since the 1980s, driven by increasing market demand, particularly for large bunches, which has discouraged intercropping. As a result, these banana production systems have become more vulnerable to climate change, pests and diseases, while banana-dependent households have become more prone to malnutrition.

There is therefore an urgent need to improve the resilience of these production systems. The Alliance of Bioversity and CIAT (the Alliance) is implementing a three-stage project in Uganda titled “Diversity for Resilient Agroforestry Banana plantations in East Africa (D4RABs)”, which aims at developing a polyculture concept to banana cultivation that increases system resilience and ecological functionality. The D4RABs project seeks to strengthen local livelihoods, food and income security, well-being and biodiversity.

To support this objective, the Alliance organized a participatory meeting with 25 diverse stakeholders who play a crucial role in promoting agroforestry systems at local level. The highly interactive discussions highlighted banana polyculture as a promising and practical solution to address the major challenges facing the dominant banana monoculture system. Stakeholders emphasized that monocultures systems are increasingly unsustainable, with declining productivity driven by soil depletion, increasing pest and disease pressure, and growing climate variability.

Participants also noted that since bananas are a key cash crop in the district, successful adoption of banana polyculture will require mindset changes and practice changes among farming households. Encouragingly, increased awareness of the economic, nutritional, and ecological benefits of polyculture has already translated into tangible demand, with farmers reporting a steady increase in requests for tree seedlings and expressing strong interest in piloting different polyculture concepts. Moreover, farmers proposed that the project expand its scope beyond banana plantations to include reforestation of degraded hill tops, underscoring strong local ownership and potential for broader landscape level impact.

Bananas are a commercial crop, so a high level of advocacy will be needed to promote the adoption of banana polyculture systems. Consulted stakeholders emphasized that the project should pay close attention to the following key areas: (1) Scale up resilient banana polyculture systems and increase farmer access to indigenous tree and fruit species across districts ; (2) Establish inclusive farmer training hubs that serve as centers of excellence in agroforestry, supporting skills development, knowledge exchange, and digital extension services; (3) Integrate digital tools and platforms to support large-scale adoption and monitoring of agroforestry practices; (4) Enhance nutritional outcomes and incorporate behavioural insights to encourage adoption and demonstrate contributions to household food and dietary diversity; (5) Embed the D4RABs initiative within policy and market systems to unlock sustainable incentives, financing mechanisms, and long-term scaling pathways; (6) *Planting* some trees in existing degraded and bare land whilst the project works towards building mindset changes; (7) *Developing* incentive mechanisms to overcome initial commercial losses due to tree integration to encourage polyculture adoption.

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List of Acronyms

Alliance	Alliance of Bioversity International and CIAT
NFA	National Forestry Authority
D4RABs	Diversity for Resilient Agroforestry Banana plantations in East Africa
DPO	District Production Officer
FGD	Focus group discussions
GHG	Greenhouse gas
KII	Key Informant Interviews
NaFORRI	National Forestry Resources Research Institute
MAAIF	Ministry of Agriculture, Animal industry and Fisheries
MoU	Memorandum of Understanding
NGOs	Non-Governmental Organizations
NARO	National Agricultural Research Organization
PI	Principal Investigator
Q&A	Question and Answer

WORKSHOP BACKGROUND

Bananas are an important perennial crop that produces year-round fruit. It provides food and income security, and boost livelihoods for millions of smallholder farmers in Uganda. Banana production in Uganda is typically rain-fed and mostly grown on smallholdings under diverse production systems. In recent years Ugandan banana productivity has significantly declined. This decline has largely been attributed to poor management practices, biotic constraints such as pests and disease, abiotic factors such as drought stress and increasing temperatures, and changes in rainfall regimes due to climate change. The changes in climate are largely driven by human activities, including deforestation, expansion of cultivation into marginal lands, degradation of wetlands, and increased greenhouse gas (GHG) emissions.

In Isingiro and other districts in Western Uganda, banana monoculture has expanded since the 1980s. This has been driven by the increasing market demand for bananas, consumer preference for large bunches, and extension messages that have discouraged intercropping to meet these market needs. However, this has made these banana production systems and landscapes more vulnerable to climate change and pests and diseases, and banana-dependent households more prone to malnutrition. Measures are thus urgently needed to improve the resilience of these production systems. The Alliance of Bioversity and CIAT (the Alliance) is therefore implementing this project titled “Diversity for Resilient Agroforestry Banana plantations in East Africa (D4RABs)” aimed at developing a polyculture concept for banana cultivation that increases the resilience of banana cultivation as well as the ecological functionality of the cultivation area. An important part of the project's success depends on involving stakeholders in the project implementation across all phases. To achieve this, the Alliance organized a participatory meeting with 25 diverse stakeholders including farmers, government agencies, civil society and research that are crucial to locally promoting agroforestry systems in Isingiro district, Uganda. The objectives of the meeting were twofold: (1) Report on the status of the project to assess implementation progress and identify areas for improvement; and (2) Discuss and outline future plans for co-developing a scaling roadmap to guide project expansion and sustainability.

2.0. Methodology

Presenters used presentations and question and answer (Q&A) sessions to foster interactions and learning during the sessions. The presentations also included a session detailing the progress made since the project's inception. The aim was partly to ensure that participants appreciate the principles of polyculture and benefits of integrating agroforestry into their banana cropping system, challenges and opportunities encountered during implementation and offer recommendations for the planned activities in the next phase.

2.1. Presentations

The facilitator and presenters used visual presentations to present insights on the project background, current implementation progress, opportunities and challenges encountered during implementation, lessons learned and future for scaling out project implementation.

2.2. Q&A sessions

The Q&A sessions helped clarify key points and allowed participants to provide valuable input.

3.0. Workshop Proceedings

3.1. Opening remarks



Chris Kettle (Alliance), the Principal Investigator of the D4RABs project, explained that the project aims to address three major global challenges: biodiversity loss, climate change, and food system vulnerabilities. These challenges are addressed by promoting diversity, resilience, and ecological functionality within the banana producing landscapes specifically in Isingiro district. A key insight of the project is that integrating trees into banana systems presents an opportunity to respond to these challenges by providing nutritious foods such as fruits, conserving soil and water, and contributing to climate change mitigation through a landscape approach. The project seeks to understand how banana monoculture systems can be improved by strengthening resilience to pests, diseases, and climate change while sustaining productivity.

3.2. Progress of D4RABs project since its inception

Enoch Kikulwe (Alliance) reviewed the steps taken by the project team between 2022-2025. A pre-phase of the project involved several field visits, multi-stakeholder workshops, focus group discussions (FGDs) with farmers and key informant interviews (KIIs) with experienced actors. These engagements enabled a deeper understanding of the impact of banana monoculture and supported the framing of the problem targeted by D4RABs. This ensured that key stakeholders were actively involved in the co-design and co-creation of the project's interventions, helping ensure that these interventions addressed community needs and maximized project impact. Engagements with the different stakeholders also enabled the project team to identify native tree species that are known to be compatible with bananas, which can be integrated into the dominant monoculture systems. Nyamuyanja and Rugaaga sub-counties were purposively selected as project sites due to their high levels of banana production and their increased vulnerability to adverse effects of climate change. The project documented promising polyculture examples and developed a documentary that is being used to train farmers and promote different polyculture concepts.

He explained that in March 2024, an inception meeting was held in Isingiro with local stakeholders to introduce the project and initiate the implementation of its activities. This was followed by a baseline study that provided an in-depth understanding of the banana cropping system in the district, including the extent of banana monoculture practices. Using the baseline data, the project team categorized farmers into three typologies to support the development of best-fit farm adjustments, improved policies, and tailored innovations, considering that typologies help accommodate variabilities within farming systems. Results from the baseline survey revealed that limited access to seedlings, inadequate knowledge of tree management, fear of competition between bananas and trees, and land constraints are key barriers to integrating trees into banana systems. These insights further underscore the importance of building the capacity of local nursery operators and establishing demonstration sites to showcase the appropriate tree management practices and their positive impacts on banana productivity.

Several agroforestry innovations have been promoted since the start of the project. These include **spot planting** in gaps within banana plantations, with spacing ranging from **5 to 15 meters** depending on the tree species, for example, 5 meters for

pawpaws (*Carica papaya*) and 15 meters for mangoes (*Mangifera indica*). **Boundary planting** has also been encouraged, using a spacing of 0.5 meters for **Calliandra** and **15–20 meters** for **Markhamia** species. In addition, alley planting has been promoted as a multifunctional practice that integrates fodder production with soil and water conservation, typically using 0.5-meter spacing. This approach is particularly beneficial for livestock farmers, with Calliandra being widely promoted as a key fodder species.

Furthermore, **compound planting** has primarily focused on fruit trees to enhance household nutrition and income. Although planting materials for these species are currently scarce, efforts are underway to improve their availability. To date, **48**



demonstration plots, each averaging **0.5 acres**, have been established, with **10 Trainers of Trainers (ToTs)** linked to each demonstration farm. Farmers surrounding the demonstration sites have also been trained in various aspects of tree management, including species selection, spacing, planting, placement, pruning and pest management, with the aim of maximizing productivity of both trees and bananas while minimizing competition. Agriculture officers in the project sites have been actively

involved in all aspects of project implementation to ensure long-term sustainability of the interventions.

A major challenge identified has been changing farmers' perceptions and attitudes toward tree planting. This has been addressed through awareness-raising activities focused on the impacts of climate change and the role of trees in both mitigation and adaptation. As a result, approximately **1,200** farmers have been reached through training and sensitization activities, during which participants receive one or two tree seedlings.



A cost-benefit analysis was conducted for selected tree species integrated into banana plantations, including avocado (*Persea americana*), mango, jackfruit (*Artocarpus heterophyllus*), castor oil (*Ricinus communis*), and *Markhamia lutea*. When discounted over a ten-year period, the benefit–cost ratios ranged from **2.0 to**

2.92, all above one, indicating that the benefits of integrating trees into banana systems outweigh their associated costs. This integration also creates opportunities for farmers with **carbon markets**.

To ensure that farmers realize early economic gains while longer-maturing tree species develop, fast-growing species such as castor oil (*Ricinus communis*), pawpaw (*Carica papaya*) and tree tomato (*Solanum betaceum*) have been strategically promoted. These provide quick returns and help sustain farmer interest and confidence in agroforestry innovations.

Ongoing activities include the management of existing tree species and the promotion of cover crops such as *Mucuna* (*Mucuna pruriens*) to provide mulch and improve soil fertility. Efforts are also underway to map potential seed sources in response to rising demand, using approaches supported by institutions such as NFA and NAFORRI. Additionally, the project has also embarked on developing selected value chains, including mangoes, castor oil, pawpaws, and Calliandra, to ensure that farmers have reliable market opportunities as an incentive for tree integration. The establishment of strategic partnerships is expected to further strengthen these initiatives.

He emphasized that past experiences underscore the importance of tree integration. For instance, during the disasters in Isingiro between 2016 and 2018, farmers reported that the most severe impacts were linked to poor farming practices, particularly cultivating bare hillsides without trees. The absence of trees significantly reduced the landscape's capacity to buffer environmental shocks.

3.3. Farmer Voices and Reflections

The farmer reflection session commenced with the narrative of the major disaster that



occurred in Isingiro between the years 2016 – 2018, where a farmer indicated that it was due to bad farming methods and that the hills were plain without trees and the problem was compounded as they generally lacked trees to mitigate the effects for that drought. Following this brief overview, the farmers then

submitted their views regarding the current project expressing its positives, negatives and opportunities for improvement and wider scaling as detailed below.

Beshumbe Steven (Farmer from Rugaaga Town council) explained that before the project was started in Isingiro, farmers focused solely on growing bananas for income and food security, and little consideration was given to the effects of the monoculture system on nutrition security and the environment. The monoculture banana cropping system has become increasingly vulnerable to biotic and abiotic stresses. As a result, farmers were compelled to apply large quantities of manure to maintain a certain level of productivity, which significantly reduced their profit margins. He noted that previous training provided encouraged farmers to focus almost exclusively on maintaining the banana monoculture system. However, the training delivered under the D4RABs project has enabled farmers to better understand and appreciate the value of integrating trees within their banana plantations.

He emphasized that fruit trees are contributing to improving household nutrition and generating an additional source of income. Nonetheless, he noted that farmers still require more training to deepen their understanding of the different aspects of tree management and to encourage wider adoption of agroforestry practices across their communities.

“Due to the numerous engagements with the project team, I now believe that we need to integrate trees within our plantations and environment due to their enormous benefits.”

Zam Abdul Marik (Farmer from Nyamuyanja Sub-county) expressed her gratitude to



the project team and highlighted the growing satisfaction among farmers already benefiting from the interventions. As a demonstration farmer, she noted that many community members are watching her farm closely observing to assess the effectiveness of the practices before adopting them. She explained that while Calliandra had previously been used for livestock fodder, farmers are now beginning to appreciate its soil improvement benefits as well. In the past, farmers kept

a few scattered trees around their compounds and banana fields but lacked knowledge on proper management practices such as pruning, skills they have now gained through the project, resulting in better tree performance.

Zam also pointed out several challenges, including misleading information spread by untrained farmers, insufficient supply of seedlings to meet the increasing demand, drought, soil exhaustion, re-emergence of Banana Xanthomonas Wilt, and limited landholdings, which make tree integration difficult for some households. She also suggested that demonstrations of gardens should be expanded beyond the current group of demo farmers to reach more members of the community.

Robert Mpairwe (Farmer from Nyamuyanja subcounty) thanked the project team for organizing the meeting and expressed his gratitude for being included. He explained that some community members had initially feared joining the project due to misconceptions related to land issues and fears of possible arrests. Now, as a fodder demonstration host, he has already begun harvesting fodder and feels optimistic about future benefits. Robert also requested that project offices be established closer to the community for easier access to services. In response, the team clarified that extension officers already stationed within the community are available to provide ongoing support.



“We appreciate the project because it is helping us to understand how we can help ourselves to overcome the challenges within our farming systems.”

David Tumwesigye from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) appreciated the opportunity to hear directly from farmers and acknowledged the challenges they shared. He encouraged farmers to take advantage of the nutritional benefits of tree tomato and explored value addition options for bananas, such as wine processing, which MAAIF can support once production volumes increase. He advised farmers to prioritize adopting the newly introduced innovations before moving into value addition. He emphasized that Isingiro, as a drought-prone district within the cattle corridor, urgently needs greater tree integration in banana plantations to help mitigate climate-related impacts.

“Isingiro lies within the cattle corridor, like it or not, droughts will remain a persistent challenge, now worsening due to climate change. However, the polyculture concept presents an opportunity to enhance resilience to these climate change stresses while simultaneously supporting household food, nutrition and income security”

3.4. Technical Insights from Agricultural Officers

The agricultural officers provided an in-depth perspective on the current agricultural landscape of Isingiro and the implications for the project’s interventions.

Doreen Mpuhuuka, Agriculture officer for Rugaaga TC, explained that Isingiro is predominantly a banana-growing district, with approximately 61% of its agricultural land under banana cultivation. An estimated 180 banana lorries leave the district daily, indicating that over 95% of households depend on banana production for their livelihoods. She noted that the district is largely hilly, yet many of these hillsides remain bare and without tree cover, resulting in severe runoff during rainy seasons. She expressed appreciation for the project’s efforts to introduce interventions that can form the basis for addressing these environmental challenges.

On soil fertility and nutrient management, she highlighted the positive impact of cover crops such as mucuna, promoted through the project, which are already showing visible benefits. However, she pointed out that limited access to organic fertilizers

remains a major constraint. She requested further project support in providing organic manure to demo host farmers to enable future comparisons of results. She also appreciated the promotion of Calliandra for nutrient improvement and recommended planting it along trenches to enhance soil health and control erosion.

Regarding pests, diseases, and weed, the officer highlighted the ongoing guidance to farmers on planting, spacing, trenching, and pest and disease management. She noted that banana thrips and nematodes remain significant threats and may also affect the newly introduced tree species. She further raised concern about the rapid spread of a parasitic weed, dodder, and called upon the Ministry to urgently devise control measures.

On species selection and climate information, she underscored the importance of ensuring that promoted tree species align with farmers' preferences. She also stressed the need to improve farmers' access to timely weather information to support climate-responsive decision-making. She welcomed the diversification efforts being introduced, noting that they will strengthen households income and resilience. Lastly, she emphasized that agro-ecological training should enhance plantation productivity and recommended mindset-change initiatives to reduce dependence on monoculture farming systems.

Peter Arinaitwe, Agriculture Officer for Nyamuyanja sub-county, reiterated the initial challenges faced during the project's introduction in Isingiro. Political leaders had to support early sensitization efforts because many farmers were initially resistant and struggled to understand the project's objectives. Through continuous engagement, however, farmers have since embraced the interventions and are increasingly integrating trees into their plantations, though the supply of seedlings remains inadequate.

He emphasized the importance of the project's pest and disease management efforts. Farmers were encouraged to plant castor oil trees, which serve as trap crops for caterpillars that attack banana plants, leading to increased demand for castor oil seedlings. Farmers have also begun requesting more fruit tree species after observing strong performance in the demonstration plots. Additionally, the demos have

highlighted the value of improved pasture species, prompting more farmers to seek planting materials from those who have already established them.

Peter also noted a gap in the frequency and clarity of project implementation updates. Overall, he recommended the following actions:

- Synchronizing seedling distribution with the onset of rain.
- Recruiting and supporting community-based facilitators to ease the workload on the limited number of extension agents.
- Avoiding excessive or repetitive farmer training to prevent fatigue.
- Improving communication on project implementation progress.
- Providing additional facilitation for sub-county extension officers, especially to strengthen monitoring efforts.

He stressed that addressing climate change impacts requires timely interventions, particularly prompt delivery of seeds and planting materials. He also highlighted that the district's reliance on banana monocultures has contributed to firewood shortages, a challenge that can be alleviated by integrating trees into banana plantations.

3.4.1. Reactions

Participants expressed appreciation to the project team and meeting organizers, noting their satisfaction with the integration of trees into what had previously been a predominantly monoculture banana production landscape. While acknowledging progress in disease management, they cautioned that fruit flies may use bananas as alternative hosts. They therefore recommended early planning for fruit flies' prevention and management before the pest becomes a threat in integrated banana fields. Based on observations from another external progressive farmer, one participant proposed that farmers could also start planting plantains along plantation boundaries and explore value addition opportunities. They further encouraged wider boundary planting using species such as fig, passion fruit, and medicinal trees.

Regarding firewood shortages, participants suggested prioritizing fast-growing tree species, particularly those that coppice well. They advised farmers not to depend solely on pawpaw, even though it is among the species promoted in the project. The MAAIF representative expressed his appreciation to the agricultural officers

supporting the ministry and raised concern about the rapid spread of dodder weed across East Africa. He explained that this weed has already severely affected fodder and tree species in Kenya and poses a threat to local species as well. He encouraged farmers to remain committed to integrating recommended trees while working closely with extension staff to explore management options for the dodder. As immediate measures, he recommended manual pruning, uprooting, and burning of affected plants, noting that longer-term efforts are underway to identify biological control solutions rather than resorting to chemical methods.

A farmer expressed gratitude for the project's efforts, noting that after previous drought-challenges, the introduction of trees now offers renewed hope. However, she highlighted the limited availability of seedlings and reported incidents where other farmers stole seedlings she had planted because they missed out during distribution. She also raised concerns about goat diseases, which she suspected might be linked to dodder weed, and requested support from the Ministry to investigate the matter.

In response, the MAAIF representative acknowledged the concerns and indicated that they would prepare a report for the permanent secretary, including recommendations on the dodder weed and addressing goat disease issue raised by farmers. In relation to livelihoods and value addition, Chris emphasized that diversification through polyculture is itself a form of value addition, bringing both ecological and economic benefits. While not all areas of value addition fall within the current project's scope, many of the ongoing activities remain important and will continue to be considered moving forward.

3.5. Pest and disease management

Walter Ocimati (Alliance) highlighted several emerging concerns affecting banana production, integrated tree systems, fodder crops, and other species. He emphasized the need to continue expanding fodder integration and improving access to banana agroforestry advisory services.

He noted that Banana Bunchy Top Disease (BBTD) is already present in plantations, though often silently, with hotspots in Kasese, West Nile, Wakiso, and Kampala. Risk maps shared during the session placed in Isingiro within a high-risk zone. Walter

further shared the distribution of thrips in Isingiro and the anticipated threat they pose. He stressed the importance of promoting best practices to manage both nematodes and thrips.

Another presentation by **Gloria Mbabazi** projected [economic consequences of BBTD](#), based on mathematical modeling under three management scenarios (No control, conventional control, and intensive control) for a period spanning 15 years. Outcomes of the model projection are presented in the table below.

Scenario	Loss at Peak (after 15 yrs)	Annual Loss	NPV Loss (USD)
No control	41.09	60%	1.46 billion
Conventional (rogueing)	21.77	22%	1.51 billion
Intensive (awareness + rogueing + aphid control + clean planting material)	0	3%	0.91 billion

In summary, the findings indicate that intensive management provides the most favorable outcomes. Walter interjected, stressing that preventing disease introduction at the farm level is critical; however, he also underscored the need for a government-led contingency plan to curb wider spread and to protect unaffected zones.

A farmer raised a question about the safety of consuming thrips-infested matooke. Walter responded that although it is technically safe to eat, it may require a longer cooking time and may not always be palatable. Participants also requested additional guidance on clearly identifying symptoms of banana bunchy top disease (BBTD), noting that farmers may misinterpret symptoms and trigger unnecessary alarm.

During the discussion on policy implications, the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) expressed strong interest in the findings from the BBTD study presented during the workshop. **Joseph Okee**, the Senior Agricultural Extension Coordinator at MAAIF, proposed that the Alliance of Bioversity International and CIAT should utilize these results to jointly develop a policy statement with the Ministry. He explained that such a policy statement would inform a more holistic Government intervention for the control and management of BBTD in Uganda. He requested that Alliance share the full report.

3.6. Fodder Integration

The District Production Officer shared insights on fodder development, noting the strong interest the initiative has attracted from the state minister for Agriculture. **Ruth Odhiambo** (Alliance) then presented results from the fodder integration trials, explaining that nine dairy farmers were initially selected, although one later dropped out. Prior to the trials, these farmers typically grew pure forage stands without integrating them into banana farming systems. The promoted forages included lablab, *Calliandra*, and *Desmodium*—species that not only provide dry-season feed but also help to reduce soil erosion.

Ruth recommended several forages categories for integration: Brachiaria hybrids, legumes such as lablab, *Crotalaria*, *Desmodium*, and *Calliandra*, trees including *Sesbania sesban*, and mulberry (*Morus*). She further reported that seven of the eight demonstration plots achieved a 90% germination rate, with pure Lucerne showing particularly strong performance.

Ongoing hands-on training promotes conservation practices and drought-tolerant approaches. Robert, one of the host farmers, expressed appreciation of the fodder initiative and requested its expansion to reach more farmers. Walter added that leguminous species are especially well-suited for use as both cover crops and fodder. He highlighted that *Mucuna* has been particularly effective in suppressing resistant weeds such as *Oxalis* (locally known as Mabati weed). He also emphasized the importance of incorporating such protein-rich options like *mucuna* into livestock feed and recommended providing farmers with specialized nutrition training.

A question was raised about harvesting and adding value to *mucuna* seeds. *“Currently, seeds can only be stored for sale or replanting, although demand is growing, especially from processors producing nutritional supplements, as mucuna is a precursor to dopamine used in mental-health formulations. Currently, there is weak market linkage for farmers, which limits their ability to benefit from this emerging opportunity.”*

On productivity expectations, Ruth explained that four seasons of data will be required to assess the impact of fodder on dairy output in Uganda. She noted, however, that

evidence from similar trials in Kenya indicates a potential yield increase of up to 40% for animals fed on the promoted fodder species. The host farmer shared that only marginal improvements have been observed on his farm so far, possibly due to the local livestock breeds he keeps.

3.7. Digital Tools Integration: MyFarmTree

An introduction was presented by **Chris Kettle** on how to use the MyFarmTree and Diversity for restoration (D4R) digital platforms, which provides support for seed systems, species selection, site-matching recommendations, restoration verification, and incentive mechanisms. He described how these tools can be scaled through partnerships with national extension services like Kenya's iShamba, which allows farmers to send queries and receive real-time extension advice.

Key features of D4R and MyFarmTree include:

- Species selection and seed source recommendations
- Traceability from seed to mature tree
- Incentives for biodiversity, conservation, and tree care
- Blockchain-enabled verification
- Registration options for nursery operators, tree farmers, and seed distributors
- Real-time monitoring of restoration and conservation activities

A demonstration, including a video illustration, was provided by Chris to show how the MyFarmTree platform operates. The session highlighted how users can register on the platform as nursery operators, tree farmers, seed distributors, and more. Chris noted that nearly half a million dollars has been already disbursed to farmers in Kenya and Cameroon through the system, demonstrating its potential to improve livelihoods by enabling market transactions, facilitating real-time tracking of restoration activities, and supporting payments for biodiversity conservation and tree care. The platform also incorporates blockchain-enabled traceability for monitoring and verification from seed to mature tree. Piloted with approximately 6,000 farmers in Cameroon and other

countries, the tool has attracted strong interest from funders for expansion in future project phases.

The MAAIF representative asked how farmers can join the MyFarmTree platform and what the enrolment requirements are. In response, Chris clarified that while Cameroon and Kenya previously benefited from a USD 2 million pilot fund that enabled full operationalization of the platform, the current project in Uganda does not yet have adequate resources to fully operationalize the platform to scale. However, there is potential to link the initiative to other funding schemes to validate the model locally. He noted that one farmer from Isingiro attending the meeting has already been registered. The App is available on the Google Play Store, and farmers with basic feature phones can still participate through ToTs, who can register them using smartphones.

Another question was raised regarding whether the platform is limited to Isingiro farmers and whether it only supports indigenous tree species. He clarified that while implementation is currently focused on Isingiro, the system is not restricted to Isingiro and indigenous species. When a farmer maps a tree, they earn points based on the species type.

A representative from Toro Botanical Gardens noted that trading in tree seedlings remains challenging under Uganda's 2018 Seed Policy, which requires strict and often costly traceability measures for producers. The MyFarmTree platform, however, provides an opportunity for farmers to engage more effectively in the seed value chain by producing and marketing seed with variable origin. Over the next five years, farmers stand to benefit significantly from seed production, provided they can demonstrate, through the App, that their seed is coming from conservation-friendly sources rather than forest degradation.

The MAAIF representative further noted that such a platform could help the government enhance its traceability systems and recommended exploring options to expand the initiative to other regions when additional funding becomes available. Training for farmers in other districts could also be incorporated in subsequent phases.

A beneficiary trained in using the app appreciated its user-friendly traceability features, especially compared to tools like ArcGIS. He asked whether local tree names could

be recorded and how species identification and carbon credit calculations are determined. In response Chris clarified that both local and scientific names can be documented, and each tree is recorded individually. He emphasized that although farmers can earn carbon credit benefits individually, it is more effective to aggregate points at the community level and channel their points into reputable carbon projects for greater collective gains.

4.0. Discussion around scaling road map

A proposal was made to demonstrate the digital platform through farmer hubs and ToT networks to accelerate adoption. It was also suggested that the Chief Administrative Officer and District Production Officer be brought on board, particularly because they can help extend the initiative to refugee-hosting communities in Isingiro. Given that the collaboration with MAAIF must be channelled through the Permanent Secretary, the ministry's accounting officer, the team emphasized the need to align the project with broader climate-smart and transformative initiatives that could unlock additional funding. Refugee-hosting districts were identified as promising areas for strengthened collaboration. In addition, the Ministry of Trade and Industry was highlighted as a key partner, especially for strengthening market linkages for SMEs. Formal collaboration through Memoranda of Understanding will be required for both ministries.

The National Forestry Authority (NFA) expressed willingness to continue its partnership, particularly in supplying seed and seedlings. They noted that future engagements may require formal agreements and emphasized the importance of training farmers in nursery management. Although NFA is piloting its own digital tool, they acknowledged that MyFarmTree could complement their efforts and provide a useful avenue for collaboration. NFA also supported working through the Mbarara zonal center to reduce transportation costs and minimize seedling damage, though financial constraints had limited nursery operations there. NAFFORI reaffirmed its readiness to support seed establishment in different ecological zones and offered to conduct soil tests where non-indigenous seedlings are proposed, ensuring appropriate species selection for Isingiro.

Toro Botanical Gardens, already a collaborating partner, emphasized the importance of formalizing the partnership to strengthen ongoing collaboration. They explained that

their work is grounded in a landscape and ecosystem-based approach to ensure ecological suitability and long-term sustainability. The organisation contributes financially to support implementation, maintains trained personnel to deliver farmer trainings, and operates seedbanks that supply and track seedlings through their farmer networks. They also have an established market chain, for example, sourcing lemon grass from farmers for essential oils processing, and operate the largest improved nursery in the Toro region, complimented by satellite nurseries in Mitooma, Rubirizi, and neighbouring districts to reduce transport costs. Farmers in the meeting recommended organizing exchange visits to allow demonstration hosts to learn from peers in other locations.

Peter, the Agricultural Officer, advised involving political leaders in future activities, noting their strong influence in community mobilization and sensitization. However, its participants cautioned that measures should be put in place to prevent elite capture, a recurring challenge in situations where political may channel project benefits to close associates rather than a wider community.

On proposal writing and resource mobilization, Chris noted that several ideas generated during the meeting could form the foundation for funding proposals to major development partners such as the World Bank, the African Development Bank, and others. Toro Botanical Gardens expressed willingness to support the proposal-development process, given the cross-cutting nature of interventions. In response, Susan Ajambo confirmed that an email will be circulated to all partners to confirm their interest in jointly preparing a funding proposal.

4.1. Recommendations and Way Forward

- I. **Scale up resilient banana polyculture systems and increase farmer access to indigenous tree and fruit species across districts.** Strengthen collaboration among key stakeholders, including NAFORRI, NARO, NFA, MAAIF, private sector, and schools, to ensure coordinated efforts in seed sourcing, nursery development, and policy alignment that promote biodiversity and system resilience.

- II. **Establish inclusive farmer training hubs that serve as centers of excellence in agroforestry.** These hubs should support skills development, knowledge exchange, and digital extension services. Scaling efforts will involve mapping the existing nurseries, identifying demonstration clusters, developing district species menus, piloting forage-banana systems, and turning successful demonstration sites into fully functional training hubs with links to youth groups and educational institutions.
- III. **Integrate digital tools and platforms to support large-scale adoption and monitoring of agroforestry practices.** Digital solutions should support decision making, enable traceability, strengthen data-driven extension, and enhance coordination across the agroforestry value chain.
- IV. **Enhance nutritional outcomes and incorporate behavioural insights to encourage adoption.** Prioritize nutrition-sensitive agroforestry interventions that address dietary diversity and hidden hunger, with a strong focus on women's participation. Incorporate behavioural change strategies to motivate adoption and demonstrate clear contribution to household food security and improved nutrition.
- V. **Embed the D4RABs initiative within policy and market systems to unlock sustainable incentives, financing mechanisms, and long-term scaling pathways.** Strengthen policy engagement and donor alignment to streamline seed laws, integrate agroforestry into national policies, and demonstrate impact to policymakers over the next three to five years. The MAAIF representative recommended a review of current policy gaps, many of which may now be outdated, to ensure relevance, alignment and effective support for agroforestry and restoration efforts.
- VI. **Strengthen partnerships with NFA and the Ministry of Water and Environment especially following institutional mergers and plan to formally integrate community-based organizations (CBOs) in the next phase.** Given their strong role in grassroots mobilisation and community-level scaling, CBOs should be embedded as key implementation partner. Enhance collaboration with NFA and the Ministry will also help streamline restoration efforts and expand seed and seedling supply systems.
- VII. **Review the budget and timelines provided and engage with the MAAIF's project coordinator of the WB's funded climate-smart project to explore**

opportunities for accessing climate-related financing. This includes assessing potential windows under national and international climate funds to support long term agroforestry scaling, resilience building, and restoration investments.

5.0. Closing Remarks

All participants were thanked for honoring the invitation and for their active engagement throughout the workshop. Isingiro District reaffirmed its commitment to continued collaboration with the Alliance to ensure project success. Chris (the Alliance) expressed appreciation for strong participation and highlighted opportunities for advancing national-level restoration efforts. NFA appreciated the project's progress, assured continued ongoing support. The permanent Secretary, MAAIF (Directorate of Agricultural Extension) commended the initiative, and linked it to NDP4 priorities. He also questioned whether agricultural biodiversity is sufficiently advanced and emphasized the need for commercialization to drive adoption. He further noted the importance of integrating agribusiness into biodiversity-focused interventions. The Permanent Secretary requested a formal write-up summarizing the discussions and officially closed the meeting.

Appendices

