Report of the Stakeholder Mapping and Crop Prioritization workshop for the BOLDER Project on Neglected and Underutilized Species (NUS) in Uganda

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Moureen Awori, Daudi Mubiru and Gloria Otieno

Building Opportunities for Lesser-known Diversity in Edible Resources (BOLDER)

A Report of the Stakeholder Mapping and Crop Prioritization workshop for the BOLDER Project on Neglected and Underutilized Species (NUS)

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Kampala, Uganda

Moureen Awori, Daudi Mubiru and Gloria Otieno

Alliance of Bioversity International and CIAT (ABC)

2024

The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) delivers research-based solutions that address the global crises of malnutrition, climate change, biodiversity loss, and environmental degradation.

The Alliance focuses on the nexus of agriculture, nutrition and environment. We work with local, national and multinational partners across Africa, Asia, and Latin America and the Caribbean, and with the public and private sectors and civil society. With novel partnerships, the Alliance generates evidence and mainstreams innovations to transform food systems and landscapes so that they sustain the planet, drive prosperity, and nourish people in a climate crisis.

The Alliance is part of CGIAR, a global research partnership for a food-secure future dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources.

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MaRCCI
Makerere University Regional Centre for Crop Improvement

NARO

Norwegian University of Life Sciences

Acknowledgements

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We acknowledge the support and collaboration of our partner organizations and organizers of the workshop, including, the Alliance of Bioversity International and CIAT, the Crop Trust, NARO, Makerere University's Regional Centre for Crop Improvement, and the Norwegian University of Life Sciences.

Special thanks go to Dr. Nora Castaneda, Dr. Gloria Otieno, Dr. John Adriko, Stephen Angudubo, Prof. Elizabeth Kizito, Richard Guloba, Dr. Alfred Ozimati, Dr. Dorothy Masinde, Lewis Sylus Rwakatale, and Nasser Mulumba for their informative presentations and engaging discussions.

We are grateful for the active participation and contributions of all attendees, which have enriched our understanding of Neglected and Underutilized Species (NUS) and their potential to enhance food and nutrition security in Uganda.

The BOLDER initiative looks forward to continued collaboration and knowledge sharing to promote the conservation, use, and value of NUS in sustainable agri-food systems.

Contents

Acronyms and Abbreviations

ABC	Alliance of Bioversity International and CIAT
ACSA	Advocacy Coalition for Sustainable Agriculture
AGRA	The Alliance for Green Revolution in Africa
AUPWAE	Association of Uganda Professional Women in Agriculture and Environment
BOLD	Biodiversity for Opportunities, Livelihoods and Development
CAES	College of Agricultural and Environmental Sciences
CSBs	Community Seed Banks
DLLN	Developing Lives Livelihoods and Nutrition
FAO	Food and Agriculture Organisation
ISSD	Integrated Seed and Sector Development Uganda
ISU-UP	Iowa State University-Uganda Program
MAAIF	The Ministry of Agriculture, Animal Industry and Fisheries
MAK	Makerere University
MaRCCI	Makerere University Regional Centre for Crop Improvement
MbaZARDI	Mbarara Zonal Agricultural Research and Development Institute
NaCRRI	National Crops Resources Research Institute
NARL	National Agricultural Research Laboratories
NARO	The National Agricultural Research Organisation
NaSARRI	The National Semi Arid Resources Research Institute
NEC	Nutritional Education Centre
NUS	Neglected and Underutilized Species
PELUM	Participatory Ecological and Land Use Management
PGR	Plant Genetic Resources
PGRC	Plant Genetic Resource Centre
QDS	Quality Declared Seed
RUCID	Rural Community in Development
TRICOT	Triadic Comparison of Technologies
UCU	Uganda Christian University
UPA-FNS	Uganda Parliamentary Alliance on Food and Nutrition Security
USTA	The Uganda Seed Trade Association
WFP	World Food Programme
WorldVeg	World Vegetable Center

Executive Summary

The BOLDER initiative, part of the BOLD project, aims to enhance nutrition security in West and East Africa by promoting Neglected and Underutilized Species (NUS) that are resilient to climate change and sustainable. Focusing on Uganda, Tanzania, Benin, and Ghana, the project convened a regional workshop in Uganda that brought together 79 diverse stakeholders to identify and prioritize NUS crops, map stakeholders, clarify roles, review existing initiatives, and foster partnerships.

The workshop emphasized the critical role of diversifying traditional agricultural practices to combat malnutrition and address environmental vulnerabilities. It highlighted the significance of Neglected and Underutilized Species (NUS) in strengthening seed systems, enhancing value chains, and improving health systems.

A stakeholder mapping exercise identified key stakeholders in Neglected and Underutilized Species (NUS) food and seed systems, categorizing them into five groups. These groups - Human Health and Nutrition, Gene Banks/Researchers/Breeders/Seed Sector, Private Sector, Cross-Cutting, and Farmers and Local Communities - collaborate with various partners to promote NUS consumption, research, conservation, and utilization. Partners include private sector stakeholders, NGOs, research organizations (e.g., NARO, CGIAR, WorldVeg), and government agencies (e.g., MAAIF, FAO). Strategic partnerships have been forged to enhance agricultural productivity, drive sustainable agricultural development, and promote NUS, with key collaborations focusing on value addition, market access, policy reforms, seed production, and conservation.

Uganda has prioritized five **Neglected and Underutilized Species (NUS)** for their potential to enhance food security, nutrition, and economic growth. Among these, **jackfruit** stands out with the highest ranking (11.6), valued for its adaptability to climate change, rich nutritional content, and widespread cultural acceptance. **Pearl millet**, scoring 11.4, is recognized for its exceptional drought tolerance and importance in traditional ceremonies, such as marriages. **Pumpkin**, with a score of 11.2, is celebrated for its nutritional and medicinal properties, as well as its broad acceptance among communities. **Cowpea**, scoring 11.0, is notable for its seasonal adaptability, nutritional richness, and cultural significance. In addition, **amaranth**, both as a grain and a leafy vegetable, was included among the priority crops due to its vital role in promoting food security, nutrition, and health. These species collectively offer immense potential for strengthening Uganda's food systems, improving dietary diversity, and fostering sustainable economic development. By focusing on their promotion and utilization, Uganda can leverage their climate resilience, nutritional benefits, and cultural relevance to address malnutrition and support long-term growth.

Stakeholders from various groups also prioritized traits for the five Neglected and Underutilized crops to enhance their potential for improved nutrition, food security, climate resilience, and market value. Common priorities included nutritional value, drought tolerance, yield, pest and disease resistance, and quality traits. Crop-specific priorities included sweetness and texture for Jackfruit, lodging resistance for Pearl Millet, shelf life for Pumpkin, and shatter resistance for Cowpea. Different stakeholder groups emphasized distinct traits: Human Health and Nutrition focused on nutritional value, Farmers and Local Communities prioritized food security and yield, Gene banks and Researchers emphasized climate adaptability, and the Private Sector focused on market traits. Understanding these priorities will inform targeted strategies to improve these crops, enhancing food security, nutrition, and livelihoods worldwide.

The initiative's success will depend on demand-led research, building on existing efforts, and diverse stakeholder engagement, as emphasized by Halid during his closing remarks. Recommendations include promoting prioritized NUS crops, fostering collaborations, supporting capacity-building initiatives, and developing targeted strategies to address global food challenges. By promoting NUS, Uganda can enhance its food systems, improve nutrition, and support sustainable economic growth.

1 Background

The *Building Opportunities for Lesser-known Diversity in Edible Resources* (BOLDER) initiative, newly introduced as Work Package 7 within the *Biodiversity for Opportunities, Livelihoods and Development* (BOLD) project, represents an exciting step towards improving nutrition security in West and East Africa. This effort is focused on the value of nutritious, underutilized crops that are naturally resilient to climate change and environmentally sustainable. The project emphasizes that a heavy reliance on just a few staple crops can heighten the risk of micronutrient deficiencies and negatively affect the resilience of food systems. By expanding the diversity of crops grown and consumed, BOLDER aims to create food systems that are both diverse and sustainable.

Central to BOLDER's mission is the promotion of *Neglected and Underutilized Species* (NUS)—plant species often marginalized by mainstream agricultural research, breeding, and policy, despite their potential benefits. This initiative prioritizes NUS in Uganda, Tanzania, Benin, and Ghana, focusing on boosting national gene banks' technical capacities to conduct gap analyses and organize targeted collecting missions. Furthermore, BOLDER will evaluate select NUS for cultivation and resilience to climate change. The project also includes innovative methodologies to analyze NUS value chains within local food systems, utilizing participatory approaches to ensure solutions are relevant and widely applicable. Through these initiatives, BOLDER seeks to build resilient, multi-functional agri-food systems that support diverse diets, enhance nutrition, and empower communities across Africa.

The purpose of the workshop was to conduct stakeholder consultations across selected countries—Uganda, Tanzania, Benin, and Ghana—to foster collaboration and insights on strengthening the role of underutilized, resilient crops within local food systems. These consultations brought together a diverse array of stakeholders, including farmers and farmer groups, representatives from ministries responsible for health, agriculture, and nutrition, as well as research breeding programs from National Agricultural Research Organizations and CGIAR centers like IITA, CIAT, ICRAF, CIRAD, and the World Vegetable Center. Additional participants included institutions involved in public food procurement (such as WFP), national gene banks, NGOs, private sector actors, and consumer organizations. Through these varied perspectives, the workshop aimed to gather valuable input that would shape strategies for promoting nutritious, underutilized crops in sustainable and resilient food systems, addressing the unique needs and opportunities identified in each country.

1.1 Workshop objectives

By Dr. Gloria Otieno – Alliance of Bioversity International and CIAT (ABC)

The objectives of the workshop included:

i) Identify and prioritize a list of four NUS crops for conservation and further research with stakeholders in a participatory manner
ii) To develop a comprehensive list of stakeholders in the NUS food systems taking into consideration conservation, seed production, breeding and variety development, food production and value chains and policy.
iii) To identify stakeholder roles and functions within the NUS food systems
iv) To have an overview of current existing NUS research, breeding value chains development or food systems issues being implemented by stakeholders
v) To identify areas of synergy and collaboration in the NUS food systems Research and Development (R&D) in each country.

1.2 Workshop participants and facilitators

The workshop served as a valuable platform for bringing together a diverse group of seed system actors and stakeholders, with 79 participants (31 women and 48 men) representing national gene banks, breeding programs, farmers, Community Seed Banks (CSBs), NGOs, seed companies, seed certification authorities, Local Seed Businesses (LSBs), extension services, and CGIAR Centers. The sessions were facilitated by Nora Castaneda and Juna Thimnu from Crop Trust, with additional support from co-facilitators from the Alliance of Bioversity International & CIAT and WorldVeg. Farmers were represented by Joy and Family Demonstration Farm in Sheema district who showcased the diversity of crops they have on their farm and value-added finger millet and sorghum products, demonstrating their commitment to value addition.

Table 1. Workshop participants description

S/N	STAKEHOLDER CATEGORY	NUMBER OF PARTICIPANTS
1	Farmers	2
2	Private sector organizations	4
3	Government Organizations	4
4	Government Research Organizations	27
5	CGIAR centers	10
6	Non-Government Organizations	6
7	International Non-Government Organizations	5
8	Universities	13
9	Government Ministry	8
	TOTAL	**79**

The full list of participants is available in **Annex 1** of this report.

The workshop presentations are available on this link BOLDER UG Presentations

The workshop pictures are available at: Uganda - https://flic.kr/s/aHBqjBUp49

2 Welcome Remarks

By Dr. John Adriko Head Agro-biodiversity and Biotechnology - NARO

John welcomed participants from various sectors, representing the National Forestry Resources Research Institute, and shared his honor in delivering the opening remarks. He highlighted the challenge of traditional agriculture's reliance on monocultures and limited staple crops, which has led to imbalanced diets, malnutrition, and increased vulnerability to environmental shocks. John cited FAO data showing a loss of 75% of crop diversity since 1900.

He discussed the potential of Neglected and Underutilized Species (NUS) to improve food security and livelihoods, noting that although there are over 399 such species providing valuable nutrients, they remain largely overlooked by policy and markets. Key barriers include limited data, market infrastructure, and enabling policies. However, NUS offer critical benefits, including nutrient density, climate resilience, and local availability.

John encouraged participants to create sustainable management practices, explore market opportunities, and conduct food composition analyses of NUS to inform policy and breeding programs. He concluded by mentioning WorldVeg's African vegetable biodiversity rescue plan and expressed optimism about the export potential of prioritized NUS before officially opening the meeting.

3 BOLDER Initiative project – Objectives and components

By Dr. Nora Castaneda (Crop Trust) - Facilitator

Nora warmly welcomed participants, expressing her gratitude for their attendance. She assured them of an engaging meeting and mentioned that she would be presenting on her work with Crop Trust. She shared that the workshop was a collaborative effort organized by five key organizations: Crop Trust, the Alliance of Bioversity International and CIAT, NARO, Makerere University's Regional Centre for Crop Improvement (MaRCCI), and the Norwegian University of Life Sciences.

Nora then introduced the Building Opportunities for Lesser-known Diversity in Edible Resources (BOLDER) project, part of work package 7 within the BOLD project, which focuses on utilizing Neglected and Underutilized (NUS) Crops to enhance food and nutrition security. She highlighted Crop Trust's commitment to conserving crop diversity and ensuring access to a wide variety of crops. Established in Rome in 2004 and later moved to Bonn, Germany in 2012, Crop Trust collaborates closely with the Norwegian Ministry of Agriculture and partners with over 150 organizations, primarily focusing on Gene Banks and seed availability.

3.1 Project goal and outputs.

The BOLDER initiative aims to improve ***nutrition security*** in West and East Africa by promoting the use and value of ***nutritious, underused, climate-resilient,*** and ***environmentally friendly*** crops. Key project outputs include:

- Secure conservation, characterization, and evaluation of Neglected and Underutilized Species (NUS), making them accessible to breeders, researchers, and farmers.
- Enhanced use and value of NUS within sustainable agri-food systems.
- Improved support for NUS use among farmers and researchers through capacity building and supportive policies focused on use and conservation.

Funded by a $20 million grant from the Norwegian Ministry of Foreign Affairs and NORAD, BOLDER will be implemented from 2024 to 2030 across Benin, Ghana, Uganda, and Tanzania. Lead implementing partners include the Alliance of Bioversity International and CIAT (ABC), NARO, Makerere University's Regional Centre for Crop Improvement (MaRCCI), and the Norwegian University of Life Sciences.

Nora further explained that the workshop entailed a two-day consultative process, with the first day involving presentations from stakeholders on existing NUS projects followed by a stakeholder mapping exercise outlining the roles and responsibilities of each of the stakeholder in the NUS food systems. And finally, NUS prioritization and trait prioritization exercise on the second day.

4 Crowd-sourced Citizen-science Approach for Participatory Evaluation and Selection

By Stephen Angudubo – Alliance of Bioversity International and CIAT

This approach engages numerous individuals to gather data through small experiments and observations. It's valuable because it allows testing of different crop varieties under local production conditions while incorporating end-user preferences. Additionally, it facilitates the dissemination of these varieties to farmers, enabling them to explore a broader range of options. Data analysis then yields insights on adoption rates, sales potential, genetic improvements, breeding priorities, and other factors.

The approach employs ***the Triadic Comparison of Technologies (TRICOT)*** methodology, which involves farmers and end-users as citizen scientists. In this system, farmers test three technologies from a selected set, determining the best or worst based on given criteria. The resulting data is processed with **ClimMob**, a statistical model/software that identifies the top-performing technology.

Lessons learned indicate that co-ownership of this approach is key to success, and steps are underway to strengthen this ownership. The method also has potential applications beyond basic ranking, with efforts being made to address this. Next steps include building farmer capacity for cultivating NUS crops, developing protocols tailored to specific crops and contexts, continuing software development, and forming new partnerships across crop sectors. Stephen concluded by directing participants to ClimMob website, and YouTube channel for additional information.

Participants raised questions about farmer selection, risks of farmer fatigue versus data quality, partnerships, data regulation, and the availability of free software. Stephen explained that they work closely with farmer organizations knowledgeable about local farmers, who assist in selecting participants. To address concerns about farmer fatigue, he noted that experiments are designed to be straightforward, with manageable plot sizes to lighten farmers' workload.

Stephen outlined key partnerships, including policy makers, research and extension agencies, and civil society organizations. He clarified that TRICOT is an on-farm testing method integrated into, but not altering, the breeding process. The team has begun engaging data regulators, providing discussions and training to seed certification staff, with plans to further demonstrate the technology's value. Lastly, he confirmed that ClimMob is available at no cost for public research institutions and organizations for data analysis.

5 Existing NUS projects and Programmes in Uganda

5.1 Traditional leafy vegetable collections and breeding at Uganda University

By Prof. Elizabeth Kizito – Uganda Christian University (UCU)

Uganda Christian University (UCU), established in 1997 by the Anglican Church of Uganda and chartered in 2004 as the country's first private university, has developed a robust research and breeding program focused on traditional leafy vegetables. In her presentation, Elizabeth highlighted the potential of indigenous vegetables in addressing household challenges and shocks. These crops are increasingly cultivated for income generation, creating positive community impacts. Despite high demand for vegetables in restaurants, there is still a limited access to quality seeds, superior varieties, pest and disease issues, climate variability, and resource limitations among farmers. Despite this, there are numerous benefits of growing indigenous vegetables including their nutritional benefits, high appeal to women and youth (80% of whom grow them) as a way of getting income, and rising consumer interest.

Uganda has significant diversity in African eggplant (e.g., Solanum aethiopicum Shum, such as Nakati and Ntula), with self-pollinated species maturing in six to eight months. The research program at UCU is working on variety development for solanum and advances in breeding have included compatibility tests and flowering studies for optimal breeding. Over 80 hybrids and 15 pure line families have been developed, though some challenges with cross compatibility remain. UCU has also trained farmers on market cultivation, noting that men often prefer the bitter Solanum variety. Current efforts include vegetable preservation training, with three climate-resilient Solanum varieties released, one tolerant to water deficit. She emphasized the importance of incorporating resilience into breeding for long-term success. UCU is also currently characterizing and building data on the diversity of Amaranth for breeding.

The questions and discussions primarily focused on the bitterness trait in Nakati, nutrient profiling, and breeding for preferences for specific traits. In response, Elizabeth noted that nutrient profiling for indigenous vegetables remains limited and emphasized the need for further research to better understand consumer preferences and conduct organoleptic testing. She recommended that any breeding efforts be market-driven to align with consumer demand and enhance the adoption of indigenous vegetable varieties.

5.2 Farmer Managed Seed System and NUS - PELUM Uganda's experience

By Richard Guloba – PELUM Uganda

PELUM is a network of 74 organizations supporting over 3 million smallholder farmers in Uganda. PELUM supports seed system development specifically training and capacity development on see production, conservation through Community Seed Banks (CSBs), participatory variety selection through Farmer Field Schools (FFS), value addition and linking farmers to markets.

PELUM recognizes the importance of informal, farmer-led seed systems which focuses on indigenous seeds and NUS. This unregulated, community-based model allows farmers to grow, harvest, and sell seeds independently. To address challenges like limited seed access, quality, and loss of preferred varieties, PELUM developed the community-managed seed security model.

Richard explained that this model empowers communities to design their own seed security measures, improving productivity and seed sovereignty. This model is distinct for its emphasis on farmer-led participation, gender equality, and a crop diversity approach – for most of the NUS crops such as pearl millet. Through it, PELUM has enhanced stakeholder

capacity and advocated for farmer-led systems as a means of protecting farmers' rights, improving food security, and reducing reliance on commercial seed markets. Additional initiatives include advocacy, cross-learning, participatory variety selection, a guide on indigenous foods in Uganda, and the establishment of 20 seed banks. However, PELUM faces challenges, such as research influences on farmer priorities, limited access to indigenous seeds, and insufficient private sector support.

5.3 Research and Breeding of NUS at Makerere University Regional Centre for Crop Improvement (MaRCCI)

By Dr. Alfred Ozimati – MaRCCI

Makerere University Regional Center for Crop Improvement (MaRCCI) is hosted at the College of Agricultural and Environmental Sciences (CAES) of Makerere University. MaRCCI builds on two existing regional graduate programs, a PhD in Plant Breeding and Biotechnology (PBB) and an MSc in Plant Breeding and Seed Systems (PBSS), initiated by Makerere University and diverse partners in 2008. MaRCCI runs a vibrant research and breeding program which also extends to seed technology. MaRCCI also has a Gene Bank with collections of 602 accessions of tomatoes, 589 accessions of pepper,25 accessions of amaranth and 30 accessions of pumpkin.

The research program at MaRCCI has played a key role in advancing amaranth, a widely consumed vegetable in Uganda, often found growing in the wild. Amaranth's popularity is due to its resilience to drought, short maturity period, and high nutritional content, particularly in Vitamin A. Additionally, it holds strong market potential, especially in urban areas, providing a source of income for many farmers. However, amaranth producers encounter several challenges, including pest and disease issues, low yields, poor post-harvest handling, and an underdeveloped seed system. Addressing these barriers could enhance its contribution to nutrition and livelihoods.

Alfred shared MaRCCI's breeding goals for amaranth, aiming to develop high-yielding, nutritious grain and leafy varieties that are resilient to common environmental and biological stresses. The breeding targets are categorized as follows:

1. **Short-term (1-2 years):** Focuses on trait prioritization, pest and disease monitoring, and germplasm characterization.
2. **Mid-term (2-3 years):** Targets the development of high-yield, pest- and disease-resistant varieties.
3. **Long-term (3-6 years):** Aims to produce high-yield varieties with strong pest and disease resistance.

Alfred highlighted two main market segments that they are targeting for breeding: a well-established market for leafy greens and a growing market for amaranth grain. MaRCCI has set up grain amaranth trials and gathered data on accessions, as well as supported capacity building through graduate programs.

5.4 Grain Amaranth and Community Based Management of Moderate Acute Malnutrition in Rural Uganda

By Dr. Dorothy Masinde - Iowa State University (ISU)

Dorothy began by highlighting the nutritional benefits of grain amaranth, a gluten-free pseudo-cereal rich in lysine and oil, commonly used in porridge and for fortifying maize meal in Uganda. She shared that Iowa State University (ISU) has set up ten nutrition centers in hospitals to support health and nutrition for mothers of premature babies by using local foods. Each child receives three cups of amaranth-fortified porridge daily, and those living further away receive composite flour to prepare at home.

In partnership with a local NGO, ISU introduced amaranth production in Kamuli district in 2006, promoting it through farmer field days and recipe development. Dorothy noted a strong market for amaranth in Kenya, where it sells for USD 1 per kilogram, with local prices ranging from USD 0.5 to USD 0.75 per kilogram. She concluded by underscoring amaranth's promising potential in both local and international markets.

Participants asked about the seed system for grain amaranth, the edibility of its leaves, and the potential of the weed variety for grain production. Dorothy explained that a formal seed system is not yet established; most grain amaranth in Uganda originates from their program in Kamuli, though its spread is helping minimize risks. She confirmed the leaves of the grain amaranth are edible, though they harden as they mature and can also serve as livestock feed. She added that farmers are encouraged to consume their grain amaranth, as only those producing over 50 kg are allowed to sell. As for the weed variety,

she noted that while it yields little grain, varieties producing enough grain are profitable, with one acre needing only 1 kg of seed and yielding up to 300 kg within 2–3 weeks under low-input conditions.

5.5 NUS contribution to malnutrition and school feeding programs: the case of Community Food Basket Initiative (CFBI)

By Lewis Sylus Rwakatale – CFBI

CFBI is a registered non-profit organization dedicated to improving lives, focusing on food and education as fundamental rights. Their vision is a hunger-free world, pursued through the provision of nutritious food and education for those in need. CFBI does value addition of NUS producing nutrient-rich products, including a porridge flour blend called the "immunity booster", containing nine ingredients like yellow corn, rice, millet, soy, moringa, pumpkin seeds, and oats, with plans to add amaranth grain.

Lewis shared that CFBI began by providing porridge to school children and has now reached over 20 districts, extending support to street children with food and clothing. He highlighted their new "10 million Nutritious Meals" campaign, which aims to supply porridge and other meals to food-insecure school children. The porridge is also available in supermarkets for USD 4.50 per kilogram.

5.6 Access to and Utilization of Wild Species for Food and Nutrition Security in Teso and Acholi Sub regions of Uganda

By Nasser Mulumba – Alliance of Bioversity International and CIAT (ABC)

Nasser presented findings from a study by the Alliance of Bioversity International and CIAT on factors affecting the availability, accessibility, and use of wild foods for food and nutrition security between 1997 and 2017. Using a four-cell analysis tool, agrobiodiversity data was collected from purposively selected districts. Results from the Teso sub-region showed a decline in species diversity and availability, driven by habitat loss, reduced consumption, and minimal trade in wild species. Nasser recommended a coordinated approach to address the decline in species in the Acholi sub-region, which is even more pronounced than in Teso. He emphasized creating synergies between wildlife and forestry sectors and fostering a supportive policy environment. The introduction of exotic species has shifted interest away from natural habitats and wild food foraging, further contributing to the decline. Additionally, wild foods are often stigmatized as "foods of the poor," reinforcing negative perceptions that link them to poverty and backwardness.

6 Stakeholder Mapping

The stakeholder mapping exercise involved three main steps:

i. First the workshop participants were classified into different categories based on the NUS food and seed system functions covered in Table 2. below.

Table 2. NUS food and seed system functions and stakeholder categories.

NUS FOOD AND SEED SYSTEM FUNCTIONS	STAKEHOLDER CATEGORIES AND THEIR ROLES
NUS BIODIVERSITY USE AND MANAGEMENT CONSERVATION RESEARCH AND BREEDING SEED SYSTEMS CROP PRODUCTION **NUS FOOD SYSTEMS** VALUE ADDITION & PROCESSING MARKETING CONSUMPTION **CROSS CUTTING** KNOWLEDGE VALIDATION, POLICY FORMULATION AND IMPLEMENTATION CAPACITY DEVELOPMENT COMMUNICATION	**Farmers and local communities** – are primary custodians of NUS and conserve them in-situ and on-farm **Genebanks** – conserve NUS ex-situ **Researchers and breeders** – evaluation, breeding and development of new technologies and innovation they also provide scientific knowledge **Private sector including restaurants and chefs**– invest in value chains and market development, seed sector **Non-Governmental organizations** – capacity development, value addition, policy advocacy, consumer awareness **Knowledge management organizations, Government agencies** – formulate policies, laws and regulations and provide funding **Media** – consumer awareness and knowledge dissemination

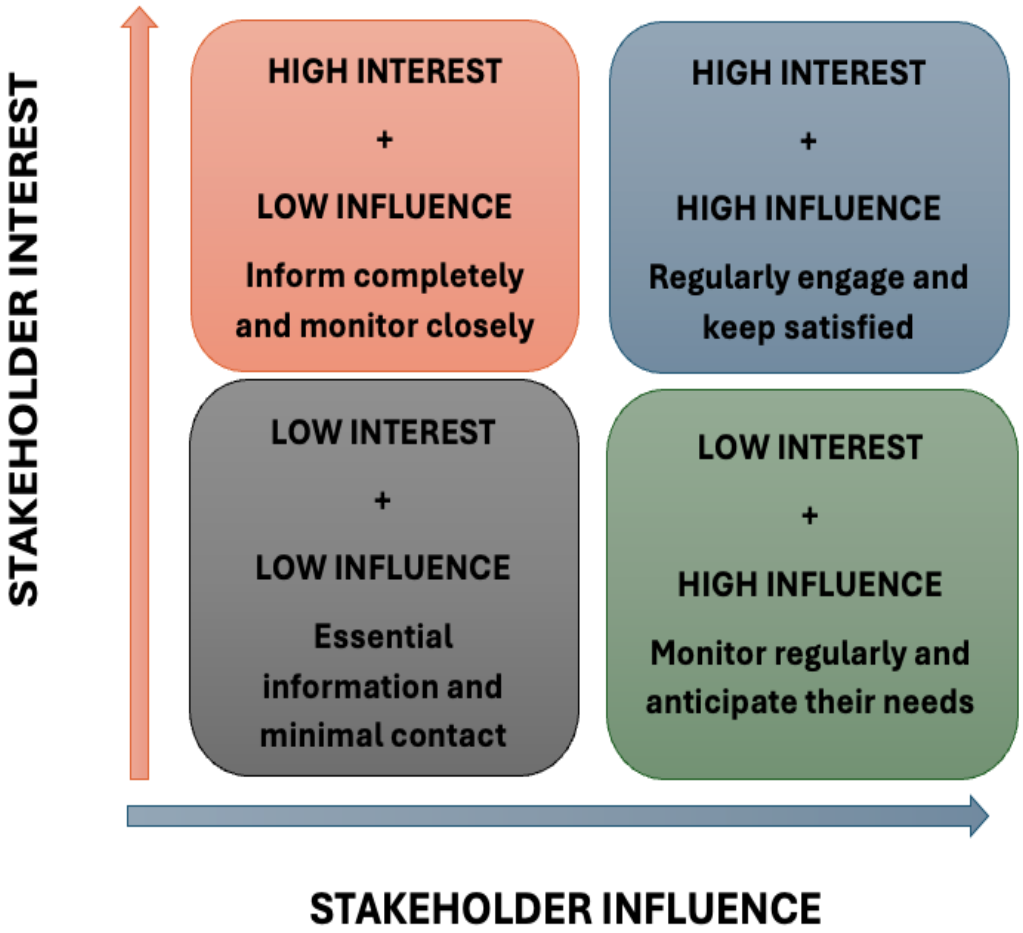
The end-result was 5 main groups classified as below

Stakeholder groups and facilitators

1. NUS biodiversity uses and management - farmers and local communities (Gloria Otieno - ABC and Joyce Adokorach – NARO-PGRC)
2. NUS biodiversity uses and management – Gene Banks, researchers, breeders and seed sector (Nasser Mulumba - ABC and Abdul Shango - WorldVeg)
3. NUS food systems - human health and nutrition + NGOs (Daudi Mubiru - ABC, Nora Castaneda – Crop Trust)
4. NUS food systems - private sector (value addition, marketing, consumption) (Juana Thimnu – Crop Trust, Anastasia Wahome - ABC)
5. Cross-cutting: policy formulation and implementations, capacity development, communication + NGOs (Stephen Angudubo and Rosina Wanyama from ABC)

ii. The stakeholders were then asked to work in their groups to identify other stakeholders that they work with and summarize them in a table based on the above-mentioned categories and functions. See the stakeholder mapping table template in annex 3.

iii. Using a flip chart, **participants** classified stakeholders according to the interest and capacity to influence using the following matrix:



All the stakeholders listed in the 'high interest' and 'high influence' categories are then listed separately with their contact information as these are the stakeholders that are critical for the success of the project.

CROP TRUST

Alliance Bioversity & CIAT

CGIAR

Group work sessions










MaRCCI
Makerere University Regional Centre for Crop Improvement

NARO

NMBU Norwegian University of Life Sciences

6.1 Stakeholder Mapping: The Human Health and Nutrition Group

The human health and nutrition expert group collaborates with **private sector stakeholders**, including maize/grain millers (Mama Jane Sabi Flour, Nutreal), agricultural producers (Bana Farmers, Bangi Robert & Associates), and healthcare providers (Whispers Magical Children Hospital). These partners provide value addition, supply chain management, and capacity building. Notably, Whispers Magical Children Hospital also offers shelter and nutrition support to orphaned children who can be easily accessed and fed through ISU's feeding program. The identified **producer organizations** - Youth Entrepreneurship Program, MUARIK, and Kamuli households - focus on producing and marketing amaranth and soybean grain, with MUARIK also providing capacity-building training for students to enhance research skills

Busoga Kingdom – DLLN-Uganda and Plan Uganda were the two **NGOs** identified by the human health and nutrition group with main roles to purchase and distribute composite flour in the community. Plan Uganda plays a key role in value addition, capacity building, and policy influence, notably supporting Uganda's National Nutrition Policy (UNAP-II) development and implementation, while empowering smallholder farmers, particularly women and youth, to enhance agricultural productivity and market access.

The human health and nutrition group collaborates with **national research organizations** (NARO-NaSARRI, MaRCCI) and international partners mainly WorldVeg and universities like Iowa State and Makerere University to advance breeding, research, capacity building, and germplasm conservation. Notably, WorldVeg distributes 10,000 seed samples annually to researchers Worldwide (The World's Largest Public Vegetable Genebank, 2022), leading to hundreds of vegetable varieties being released globally. NaSARRI, on the other hand supports semi-arid seed systems, providing high-quality seeds (finger millet and cowpea seeds mentioned) to smallholder farmers, while Iowa State University funds IOS Uganda programs, demonstrating its commitment to improving lives. Key **consumer groups**, including Nutrition Education Center clients and schools in Kamuli (such as Nakanyonyi, Namasagali Kasozi, and Nalwoli senior secondary school), have benefited from IOS drinks and amaranth products produced by ISU, with schools also purchasing amaranth planting materials to cultivate and consume the nutritious grain and leaves

Government agencies - Kamuli General Hospital, Kamuli Local Government, MAAIF, and Food Right Alliance - have collaborated with the human health and nutrition group. Key contributions include, Capacity building (hospital, MAAIF, local government), Nutrition sensitization and demonstration gardens (hospital, local government), Extension services, quality seed distribution (MAAIF), and farmer training (local government), Certification of Quality Declared Seed (QDS) for high-quality seeds (local government), Policy advocacy for equitable, sustainable food systems (Food Right Alliance).

The human health and nutrition group also partners with the Plant Genetic Resource Center (PGRC) and MaRCCI to conserve and manage Genetic Resources, ensuring access, capacity building, and promotion of Plant Genetic Resources for Food and Agriculture (PGRFA). MaRCCI also conducts breeding programs for Neglected and Underutilized Species (NUS) and research initiatives to address related challenges.

For a comprehensive stakeholder mapping of the human health and nutrition group, please refer to Annex 4

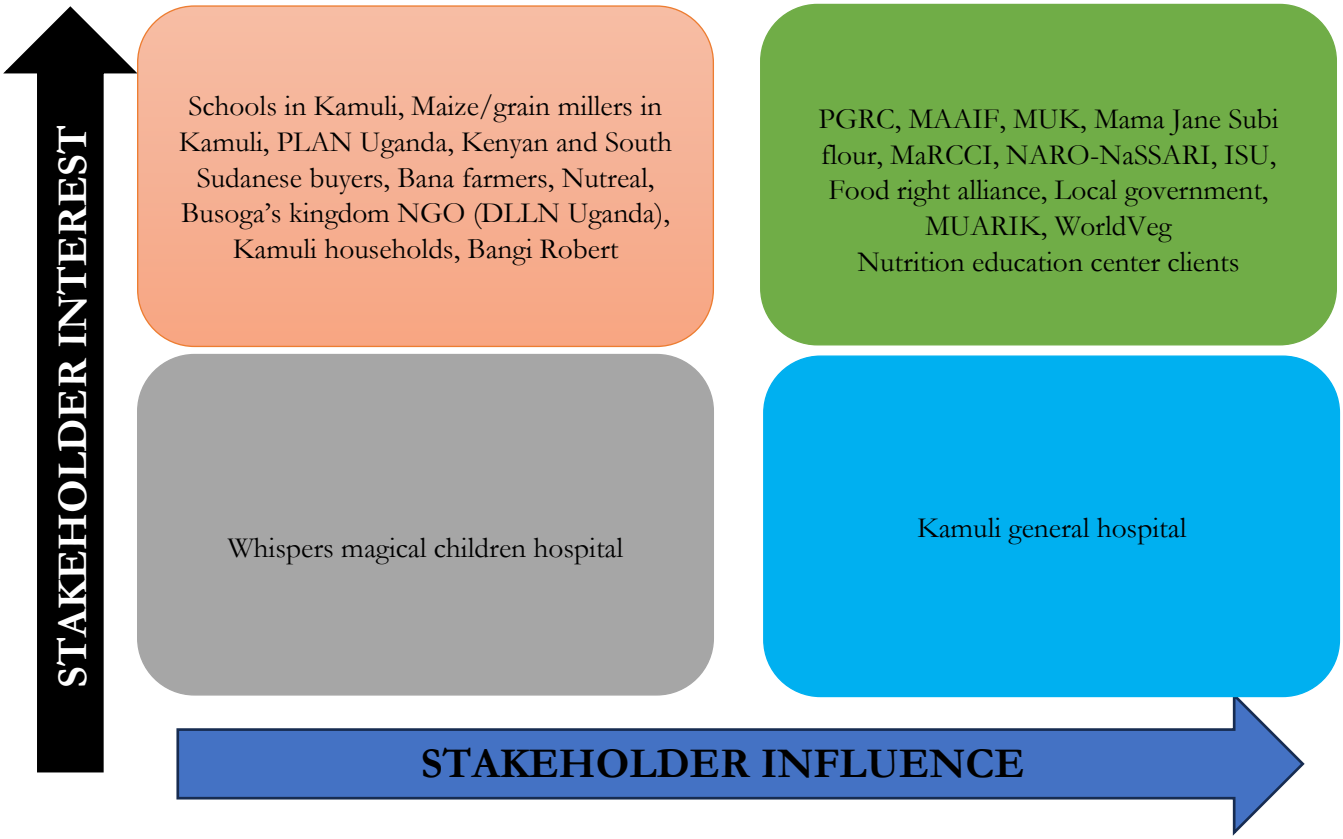


Figure 1. Influence Vs. Interest Chart for the Human Health and Nutrition Group

6.2 Stakeholder Mapping: Gene banks, researchers, breeders and seed sector actors

The stakeholder group, comprising gene banks, breeders, and researchers, collaborates with **private sector actors**, including; Seed companies (USTA, MADIFA, East West, Hoima Community Seed, Syova Seeds, Simlaw Seeds) for quality seed supply, National Horticulture Laboratory (NHL) that has played a crucial role in seed distribution, Uganda Breweries Limited and RUCID for NUS value addition, Uganda Millers Association, Hortfresh for marketing, Centenary Bank for credit services, SAIMCO Uganda for agricultural machinery fabrication and National Horticulture Laboratory (NHL) for seed quality and health assurance. Additionally, the group partners with advocacy organizations (Advocacy Coalition for Sustainable Agriculture, United Nations Forum on Forests) and international organizations (Prometra) for capacity building, advocacy, and traditional medicine development.

The group identified five key **producer organizations** that drive agricultural productivity and community empowerment. These include the District Farmers Association, which mobilizes farmers into groups, and Community Seed Banks, which conserve and promote agricultural biodiversity. Local Seed Businesses produce and market high-quality seeds to meet local farmers' needs, while BUCADEF focuses on mobilizing coffee farmers. Additionally, SOCADIDO empowers marginalized communities, including youth, women, girls, and people with disabilities. These organizations collectively enhance collective strength, ensure food security, and promote sustainable agriculture. In addition, the group recognized several **NGOs**, including Integrated Seed and Sector Development-UG, Oxfam, FAO, PELUM, ACSA, ESSAF, and Slow Food, for their contributions in advocacy, capacity building, policy influence, production, training, and value addition, particularly promoting sustainable agriculture and supporting locally sourced traditional foods.

The group recognized several research organizations for their contributions to agricultural research and capacity building. These organizations include: National Agricultural Research Organisation (NARO) institutes (NaSARRI, NARL, NaCRRI, NaCORI, NaFORRI, NaLIRRI), Plant Genetic Resource Center, Uganda Industrial Research Institute (also a government agency focused on value addition), Uganda National Bureau of Standards, Zonal Agricultural Research and Development Institutes (ZARDIs), CGIAR centers (ICRISAT, ABC, WorldVeg, IITA, ICARDA, CIMMYT, IRRI, IFPRI), Universities: MUNI, UCU, MUK, Uganda Martyrs – Nkozi, Mount of the moon, Gulu University, ISU, Busitema and Kyambogo Universities. These organizations have played key roles in conducting research, breeding, capacity building, extension, outreach, policy, and advocacy to promote sustainable agricultural development.

The stakeholder group collaborates with various **consumer groups**, including Ugachic, Biyinzika, Maganjo, Nuvita, Kazire and Kayebe Sauce Packers, involved in animal feeds, processing, and value addition, as well as schools, universities, Kiganda Coffee, and humanitarian organizations like Oxfam and World Vision. Additionally, the group partners with government agencies, such as the National Forestry Authority, National Environment Management Authority, Uganda Coffee Development Authority, Uganda Wildlife Authority, Uganda National Council for Science and Technology, and Uganda National Bureau of Standards, to drive progress in research, policy development, quality control, sustainable forestry, conservation, and environmental protection.

Through a collaborative framework, the stakeholder group has strategically partnered with; Community Seed Banks, Uganda Wildlife Authority, Plant Genetic Resources Centre, National Agricultural Research Organisation, Universities, National Forestry Authority, Food and Agriculture Organization, Crop Trust, Alliance of Bioversity International and CIAT, International Potato Center, International Rice Research Institute, Millennium Seed Bank, Royal Botanic Gardens, International Crops Research Institute for the Semi-Arid Tropics, International Institute of Tropical Agriculture, and Botanic Gardens Conservation International - to collectively strengthen the conservation, management, and utilization of Genetic Resources for sustainable agricultural development and biodiversity preservation. It is worth noting that the stakeholder group has extended its impact through policy engagement with MAAIF, National Planning Authority, Parliament, ACODE, District Local Governments, IFPRI, and donors, fostering an enabling environment for Genetic Resource management, agricultural growth, and sustainable development.

For a comprehensive overview of the stakeholder mapping for the Gene banks, researchers, breeders and seed sector group, please refer to the detailed table provided in Annex 5.

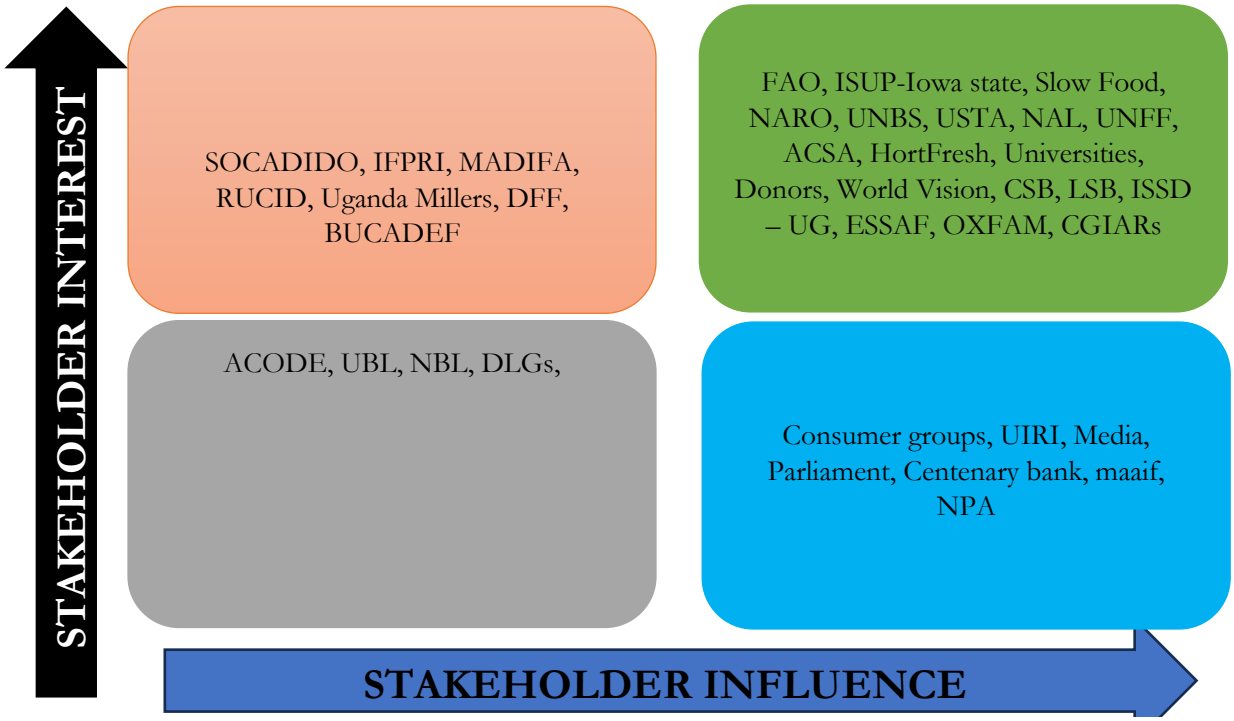


Figure 2. Influence Vs. Interest Chart for Gene banks, breeders and Researchers Group

6.3 Stakeholder Mapping: Private sector actors

The private sector actors' group has fostered strategic partnerships with key organizations, including NECOFAM Uganda, specializing in indigenous seed production and marketing, Jero Farm, focusing on growing indigenous crops, value addition, business incubation, and agro-tourism, and Hello Mushrooms, expertise in mushroom growing and value addition to indigenous crops, to drive sustainable agricultural development, entrepreneurship, and market access. Extending their collaborative efforts, the private sector actors group has also engaged with producer organizations, including Kasawo Millers, specializing in producing and marketing indigenous crops with value addition, Gladys, focusing on cultivating a diverse range of indigenous crops such as maize, soya, bambara nuts, beans, tomatoes, and leafy vegetables, and GLOWISH Agro Solutions, promoting the growth, utilization, sale, and export of Neglected and Underutilized Species (NUS) crops.

The private sector group mentioned collaborating with various NGOs to promote sustainable agriculture and indigenous food systems. Key partners include Slow Food (advocacy and promotion of indigenous food), PELUM and African Food Sovereignty Alliance (advocacy for NUS), AFAS (extension services), Advocacy Coalition for Sustainable Agriculture (policy and organic farming), World Vision (advocacy and extension services), CEFROHT (legal advice and food rights), Centre for Agriculture and Biosciences International (seed production and farmer support), and Food Rights Alliance (advocacy and food systems). These partnerships enhance advocacy, extension services, policy influence, and support for indigenous crops, promoting food sovereignty and sustainable agriculture.

The private sector group accelerates agricultural Research and Development progress through strategic alliances with, **CGIAR centers**, and **Universities** to drive agricultural innovation and conservation. Key partners include the National Agricultural Research Organisation (NARO) for agricultural research, International Institute of Tropical Agriculture (IITA) for Neglected and Underutilized Species (NUS) seed conservation, Uganda Martyrs University for capacity building, Uganda Christian University for research on indigenous crops, Makerere University Agricultural Research Institute (MUARIK) for research, and Alliance of Bioversity International and CIAT for reserahc on indigenous crop species conservation. Additionally, expanding the reach of indigenous cuisine, the private sector group partners with **consumer groups** like 2K, Moriza Farm, Community Food Basket Uganda, and Amic Worlds, pioneers in cooking, promoting, and adding value to Neglected and Underutilized Species (NUS) to delight local palates.

The private sector group has forged powerful alliances with key **government agencies** and organizations to champion agricultural growth and conservation. Notably, they've collaborated with the Ministry of Agriculture to maintain the country's vital Gene Bank, develop regulations, and craft policies. Additionally, they've worked closely with Uganda's Parliament to shape laws and policies that foster a conducive environment for agricultural development. In the realm of conservation and Genetic Resource management, the group has partnered with; Joy and Family Demo Farm, pioneering local seed bank conservation and community engagement, Rural Community Development, dedicated to preserving indigenous crop species and promoting sustainable agriculture, NiCOFAM, focused on conservation efforts that protect Uganda's rich biodiversity, National Agricultural Research Organisation (NARO), safeguarding national seed resources for future generations. Additionally, organizations like PELUM have drafted and initiated policies, and Uganda National Farmers Federation has advocated for farmers' rights and policy changes, demonstrating the group's commitment to holistic agricultural development. These strategic partnerships demonstrate the private sector group's commitment to holistic agricultural development, bridging the gap between research, policy, and community action.

For a comprehensive overview of the stakeholder mapping for the private sector group, please refer to the detailed table provided in Annex 6.

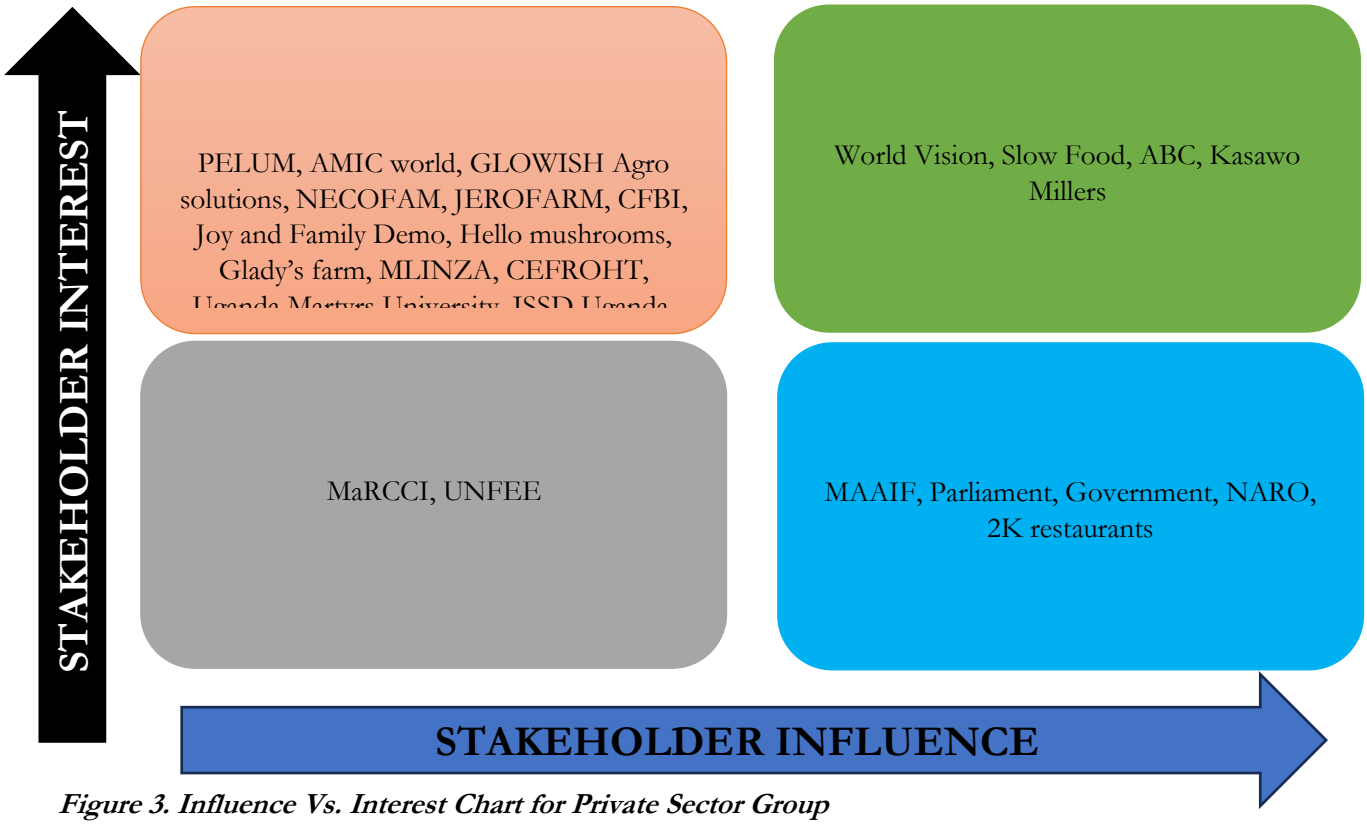


Figure 3. Influence Vs. Interest Chart for Private Sector Group

6.4 Stakeholder Mapping: Cross-cutting Group

The cross-cutting group has successfully collaborated with **private sector** to boost agricultural productivity and innovation. Through strategic partnerships with Nutreal and Peak Value, the group has driven value addition and product development, unlocking new market opportunities. Additionally, local machinery fabricators like Munyegera and Tonnet have played a vital role in fabricating machinery, managing field agronomics, and streamlining processing systems, further enhancing the sector's competitiveness. Complementing its private sector partnerships, the cross-cutting group has also fostered strong alliances with **Producer Organizations**, including Gombe Amaranthus Producer Association, District Farmers Associations, and Uganda National Farmers Federation, empowering farmers through seed production, advocacy, marketing, and credit provision.

Collaborating with **NGOs** like; FAO (farmer training, field schools, resource mobilization), PELUM (policy initiation, community mobilization, advocacy, training), ISSD (local seed business promotion, climate-smart agriculture, advocacy), Sasakawa Africa Association (climate-smart technology promotion, farmer training), and OXFAM (farmer field schools, Community Seed Banks, policy advocacy), the cross-cutting group accelerates agricultural growth through farmer-centric initiatives, policy reforms, technology dissemination, and resource mobilization, fostering resilient and sustainable agricultural communities. It is also important to note that the cross-cutting group's partnerships with **CGIAR centers** (CIMMYT, IITA, ABC) and academic institutions (Makerere, Uganda Christian universities) has fostered cutting-edge research, capacity building, and innovation, while collaborations with NARO and Plant Genetic Resource Centre ensure technology dissemination, germplasm conservation, and community engagement.

The cross-cutting group has strategically collaborated with **government agencies**, including local government authorities (CAO, DAO, DPO) for resource allocation, planning, and project supervision, and policy actors like MAAIF (crop inspection and certification, policy initiation), Policy Unit - MAAIF (policy development), Local Government extension agencies (technology dissemination, community training), Parliament (food and nutrition security committees, appropriation, oversight), and Cabinet Sectoral Ministry (policy approval process), to drive agricultural growth, policy reforms, and service delivery.

For a comprehensive overview of the stakeholder mapping for the cross-cutting group, please refer to the detailed table provided in Annex 7.

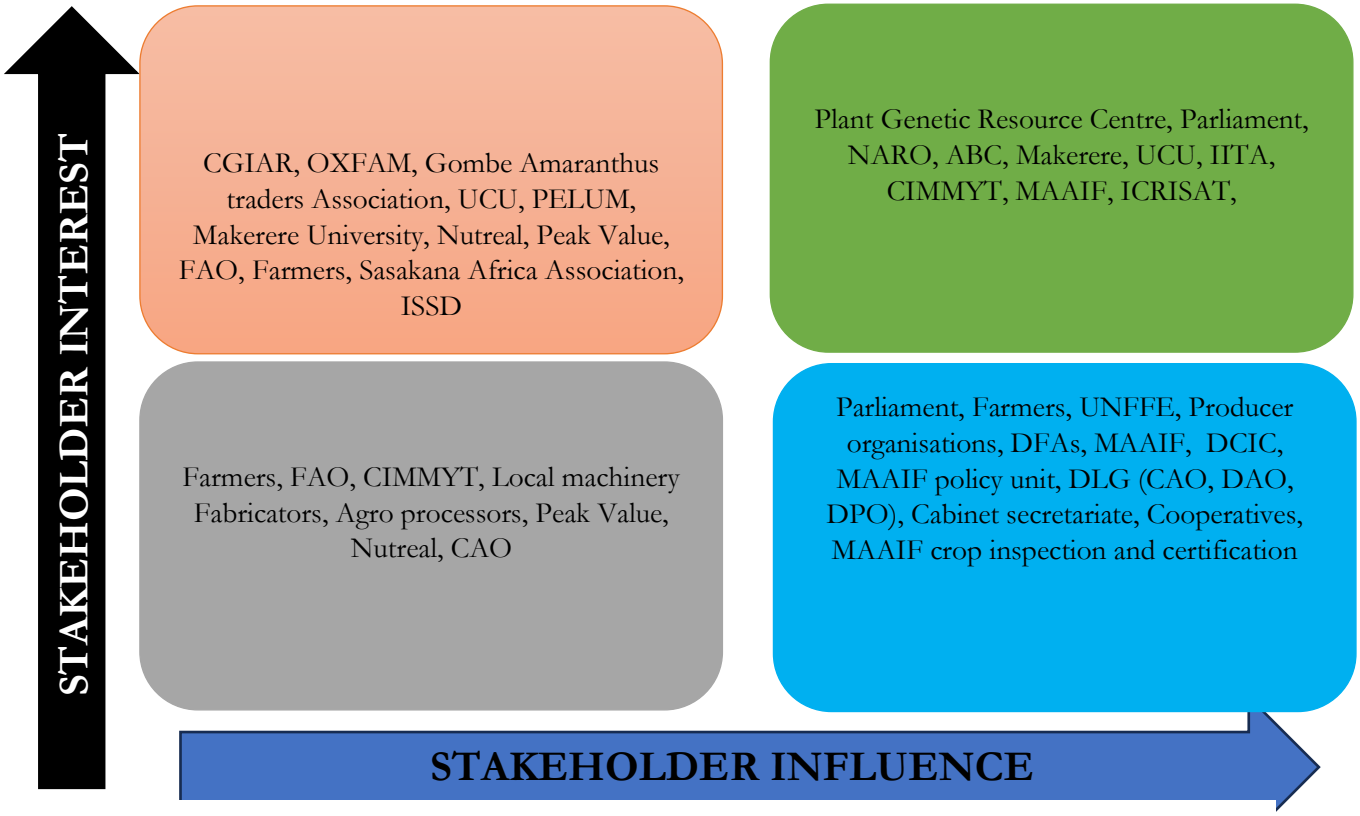


Figure 4. Influence Vs. Interest Chart for the Cross-cutting Group

6.5 Stakeholder Mapping: Farmers and local communities' Group

Farmers and local communities group have worked together with private **sector actors**, including CBI (oil crop value chain and export support), Serere Seeds Limited (seed supply), Joy and Family Demo Farm (millet, amaranth, and chia seed production and value addition), Equator Commercial (pumpkin value addition), Aunt Porridge, Sage (chia seed supply), NARO Holdings Limited (seed production and dissemination), Katunkuma Limited (seed provision and value addition), and Camelot (tomato seed supply), to enhance agricultural productivity, value chains, and market access. Extending its outreach, the farmers and local communities' group has engaged with producer organizations - ESAFF (policy influence),

Community Seed Banks (seed production), Homeland Organics (seed and tree production), UyDNET (pumpkin seed production), and MADIFA (seed production) - and consumer groups, including Mwanamujimu Consent (marketing and awareness), and institutional consumers like schools, hospitals, and prisons.

Farmers and local communities have joined forces with NGOs to drive agricultural transformation, leveraging expertise from PELUM (policy, capacity building), Iowa SU (seed provision, value addition), ACSA (marketing, farmer development), RUCID (seed multiplication, market linkages, value addition), Slow Food (consumer awareness), CARITAS (seed multiplication, capacity building), AUPWAE (capacity building), TEDO (market linkages, value addition), and CIDI (market linkages, value addition) to enhance productivity, market access, and resilience. They have also worked collaboratively with National Research Organizations like NARO, MaRCCI, UCU, UMU, ARU, AWU, Muni University, Mt. of the Moon university, Gulu university, CERD, Makerere and CGIAR centers like ABC, INVC, IITA and ICRAF to advance agricultural Research and Development agenda.

Through strategic partnerships, the farmers and local communities' group has worked closely with MAAIF to shape agricultural governance and policy, Local Government to ensure policy alignment, and the Plant Genetic Resources Centre (PGRC) to ensure quality assurance, training, and conservation of Plant Genetic Resources, driving sustainable agricultural growth.

For a comprehensive overview of the stakeholder mapping for the Farmers and Local Communities group, please refer to the detailed table provided in Annex 8.

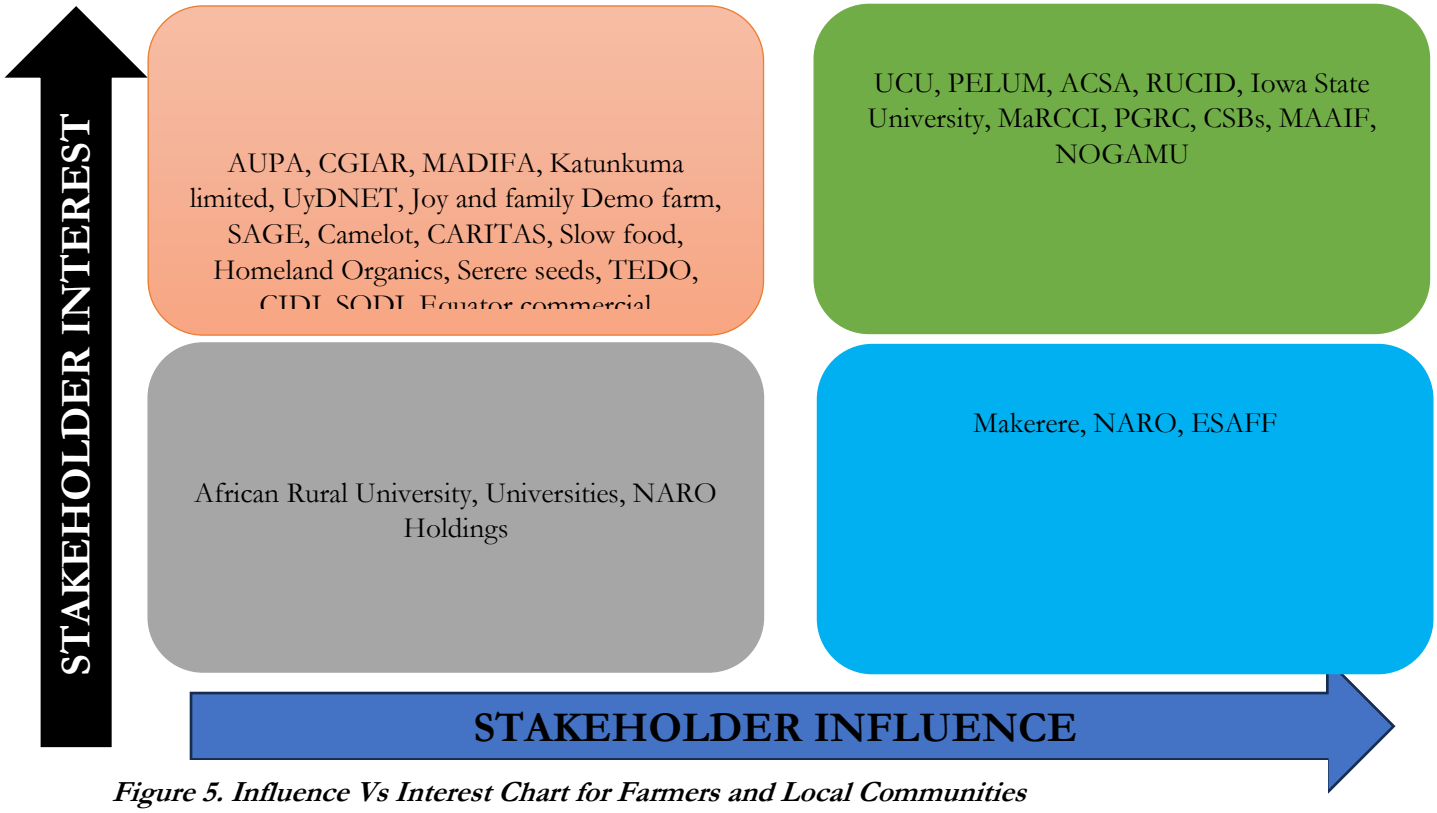


Figure 5. Influence Vs Interest Chart for Farmers and Local Communities

7 NUS and Trait Prioritization Group exercise

The second day of the workshop entailed **a NUS prioritization exercise** to determine the four/five NUS crop species of focus within each country and their **prioritized traits**.

The NUS prioritization exercise involved preparing a master list comprising 186 Neglected and Underutilised Crops to guide the crop prioritization exercise with the meeting participants. This list was obtained from the 150 crops identified during Phase 1 of the prioritization exercise of the Vision for Adapted Crops and Soils (VACS) (https://www.state.gov/the-vision-for-adapted-crops-and-soils/), 99 species of the African Orphan Crops Consortium (https://africanorphancrops.org/), 97 species of FAO's compendium of forgotten foods in Africa (https://www.fao.org/family-farming/detail/en/c/1681304/), 50 species prioritized in van Zonneveld et al., 2023 and 21 crops NUS community. i.e.,

Table 3. Table summarising the crop category and number of crops

Crop Category	*Number of crops*	*Crop Category*	*Number of crops*	*Crop Category*	*Number of crops*
Vegetables	49	Nuts, seeds and oilseeds	19	Legumes	14
Fruits	71	Cereals	14	Roots and tubers	11

Participants engaged in a process to redefine and clarify the concept of "Neglected and Underutilized Species" (NUS), including identifying crops that do not qualify as NUS. They were encouraged to list crops that, by consensus, should not be considered NUS. To guide the discussion, participants considered key questions such as:

- Is this crop widely consumed in the country, but still lacking in research?
- Is there a dedicated breeding or agronomy program in the country focusing on this crop?

These guiding questions helped participants distinguish NUS from other crops and form a clearer, shared understanding of which species align with NUS criteria.

Participants were then tasked with prioritizing selected NUS crops within major crop categories: fruits, vegetables, cereals, roots and tubers, legumes and nuts, and seeds and oilseeds. The crops were selected based on the following criteria:

1. **Climate Adaptability**: Potential to adapt to climate change, including resilience to high temperatures, long dry spells, low precipitation, and arid conditions.
2. **Nutritional Value**: Contribution to improving nutrition and health.
3. **Cultural Acceptance**: The extent to which the crop is part of local diets and traditional food practices.
4. **Local Market Potential**: Opportunities for market expansion and demand growth within the country.

These criteria ensured a comprehensive approach to selecting crops that could sustainably enhance local food systems and contribute to resilience.

7.1 Prioritised NUS and the rationale for their selection

Following the thorough evaluation, four Neglected and Underutilized crops were prioritized for their potential to enhance food security and economic benefits in Uganda. **Jackfruit** topped the list with a score of **11.6**, boasting high climate change adaptability, nutritional value, and cultural acceptance. As a perennial tree, it fruits throughout the year and thrives in various conditions. **Pearl millet f**ollowed closely with a score of **11.4,** demonstrating drought tolerance, high shelf life, and significance in traditional marriages. **Pumpkin** ranked third with a score of **11.2**, offering high nutritional value, medicinal properties, and widespread acceptance. **Cowpea** completed the top four with a score of **11.0**, showcasing seasonal adaptability, high nutritional value, and cultural significance in celebrating twins.

It is worth noting that the four prioritized NUS offer opportunities for improved food security, nutrition, and economic benefits, particularly in Uganda. Their potential uses range from food and animal feed to medicinal applications and export markets, making them valuable assets for sustainable development.

Key highlights of the prioritized crops include:

- High climate change adaptability and drought tolerance
- Rich nutritional profiles, including essential vitamins, minerals, and antioxidants
- Cultural significance and widespread acceptance
- Strong local market potential, with opportunities for export and value addition

By promoting these Neglected and Underutilized Crops, Uganda can enhance its food systems, improve nutrition, and support sustainable economic growth.

A comprehensive table outlining the prioritized NUS and the justification for their selection is provided in the table in Annex 9

7.2 Trait Prioritization for the Four NUS

Stakeholder groups, including Human Health and Nutrition, Farmers and Local Communities, Cross-cutting, Gene banks, Breeders and Researchers, and Private Sector, prioritized traits for four Neglected and Underutilized crops: Jackfruit, Pearl Millet, Pumpkin, and Cowpea, with the goal to enhance the crops' potential for improved nutrition, food security, climate resilience, and market value.

Key priorities across crops and stakeholder groups included:

1. Nutritional value
2. Drought tolerance and adaptability
3. Yield and food security
4. Pest and disease resistance
5. Quality traits (taste, texture, color)

Specific priorities varied by crop:

- **Jackfruit**: sweetness, texture, crunchiness and reduced flower abortion rate.
- **Pearl Millet**: stronger stem, grain size, lodging resistance and resistance to bird attacks.
- **Pumpkin**: softness of cover, time to cook, smoothness of pulp and longer shelf life.
- **Cowpea**: shatter resistance, shorter cooking time, bigger pods and dual-purpose varieties.

Stakeholder-Specific Priorities:

Different stakeholder groups emphasized distinct traits:

- **Human Health and Nutrition Group**: focused on nutritional value and satiety.
- **Farmers and Local Communities Group**: prioritized food and nutrition security, yield, and adaptability.
- **Gene banks, Breeders and Researchers Group**: emphasized pest and disease resistance, drought tolerance, and climate adaptability.
- **Private Sector Group**: focused on market traits, postharvest properties, and industrial use.

These priorities reflect the diverse needs and goals of different stakeholders, from improving human health and nutrition to enhancing crop resilience and market potential. By understanding these priorities, researchers, policymakers, and stakeholders can develop targeted strategies to improve these Neglected and Underutilized crops, enhancing food security, nutrition, and livelihoods for communities worldwide.

For detailed information, please refer to the table in the Annex 10.

8 Closing remarks

By Gloria Otieno - ABC

Gloria concluded by appreciating stakeholders for their participation in the workshop, she noted that she is hoping to hold a conference for NUS crops next year bringing together all stakeholders working around NUS.

By Nora Castaneda – Crop Trust

Nora thanked participants for attending the workshop and informed them that a meeting with all national Gene Banks will be held later this month to discuss the way forward. She also noted that Crop Trust is working closely with WorldVeg and ABC who will analyse the selected crops to establish how the project can contribute to them.

By Halid Kirunda – NARO- MBAZARDI

Halid acknowledged the benefit of the two days of the workshop thanking both the participants and organisers for setting aside the resources. He noted the challenge of the world's growing population and land encroachment which needs a solution. He informed the participants about the critical events that happened within the same period in his organisation leading to the engagement of all scientists forcing him, a non-subject matter specialist to represent the team in the workshop. He however, appreciated the diverse stakeholder categories which enhances better results. Halid recommended demand led research and building on existing efforts to create more solutions.

9 Annexes

9.1 Annex 1: Workshop Participants

No	Name	Organisation	Email
1	Ddamulira Gabriel	NARO	
2	Mulumba Nasser	ABC	
3	Ssembajjwe David	Camelot Agroecology Farm	
4	Elizabeth Kabakoyo	Amic World	
5	Stuart Nyanzi	RUCID (Ruifresh)	
6	Daudi Mubiru M.	ABC	
7	Rwakatale Sylus Lewis	Food Basket	
8	Rosina Wanyama	ABC	
9	Sharifah Nambirige	UG Parliamentary Alliance on F&NS	
10	Abaca Alex	Muni University	
11	Stephen Angudubo	ABC	
12	Mulumba John Wasswa	NARO - PGRC	
13	Kalule Okello David	NaSSARI	
14	Kamusiime Azaria	Amic World	
15	Eve Luvumu	AUPWAE	
16	Joseph Ekwangu	NARO -BULINDI	
17	Adriko John	NARL	
18	Harriet Nakasi	ACSA Uganda	
19	Florence B Kyazze	MAK	
20	Joy Mugisha	Joy & Family Demo Farm	
21	Rose Mary Bulyaba	UCU	
22	Kakeeto Ronald	NARO - NaSARRI	
23	Wambi Wilber	NARO-BULINDI	
24	Mugenyi William	NARO-BULINDI	
25	Gloria Otieno	ABC	
26	Francis Onyilo	Lira University	
27	Mitala Moses	NECOFAM Uganda	
28	Caroline Nambafu	ISU - UP	
29	Mbeiza Moureen	ISU - UP	
30	Juana Thimnu	Crop Trust	
31	Ssendowooza Kizito	Parliament (UPA – FNS)	
32	Luyombya Juma	Parliament (UPA – FNS)	
33	Abdul Shango	WorldVeg	
34	Anastasia Wahome	ABC	
35	Kaisuka Reagan	Parliament (UPA – FNS)	
36	Dorothy Masinde	Iowa State University	
37	Pricilla Marimo	ABC	
38	Moreen Nansamba	ABC	
39	Benard Yada	NARO	
40	Daniel Bomet Kwemoi	NARO - NaCRRI	
41	Kasumba Joseph	NARO - BULINDI	
42	Oniro Mathew	NARO	
43	Nyabasha Sylvia	Joy and Family Demo Farm	
44	Robert Guloba	PELUM -UG	
45	Halid Kirunda	NARO- MBAZARDI	
46	Lucy Mulugo Were	MAK-CAES	
47	Dramadri Isaac O	MAK-MaRCCI	

48	Alfred Ozimati A.	MAK - MaRCCI	
49	Catherine Kiwuka	PGRC	
50	William Tinzara	ABC	
51	Fiona Ibudi	ISSD	
52	Joyce Adokorach	NARO - PGRC	
53	Chika Kondo	Oxfam	
54	Eva Zaake	NARL-PGRC	
55	Brenda Namulondo	NARL-PGRC	
56	Tugume Joab	MAAIF	
57	Mary Teddy Asio	MAAIF	
58	Agudoai George	NaCRRI	
59	Lutwama Emmanuel	NaCRRI	
60	Joseph Isaac Mugagga	NARO	
61	Wandulu Joseph	NARO-NaSARRI	
62	Wassajja Stanley	NARO - Mbarara	
63	Wamatsembe Issac	MAAIF	
64	Wandera Walter	MAAIF	
65	Caroline Nankinga	NARO	
66	Ssentongo Geofrey	MAAIF	
67	Elizabeth Kizito	UCU	
68	Manyindo John	MAAIF	
69	William Esuma	NARO	
70	Sharon Mbabazi	AGRA	
71	Brenda Kisingiri	MAAIF	
72	Nam Bonny Ogwang	MUNI University	
73	Emong David	NARL	
74	Masereka Nelson	USTA	
75	Moureen Awori	ABC	
76	Kisekig Charles	NaSSRI	
77	Matovu Juma	Iowa State University	
78	Nora Castaneda-Alvarez	Crop Trust	
79	Kato Stephen	NARO - PGRC	

9.2 Annex 2: Agenda

DAY 1		
Time	**Activity**	**Responsibility**
8:00-9:00	**Arrivals, Registration, Introductions**	
9:00 to 9:30AM	Welcome remarks	John Adriko Head Agro-biodiversity and Biotechnology-NARO
9:30-9:45 AM	Workshop Objectives and Agenda	Gloria Otieno – Alliance of Bioversity International and CIAT
9:45-10:30AM	BOLDER Initiative project – objectives and components Crowdsourced Citizen-science Approach for Participatory Evaluation and Selection.	Nora Castaneda Crop Trust Stephen Angudubo – Alliance of Bioversity International and CIAT
10:30 -10:45AM	Q&A on Bolder project	ALL
10:45-11:15AM	**TEA BREAK**	
11:30-12.45 PM	Existing Nus projects and Programmes in the country 1. Traditional leafy vegetable collections and breeding at Uganda University 2. Farmer Managed Seed System and NUS-PELUM Uganda's experience 3. Research and Breeding on NUS at MaRCCI 4. Access to and Utilization of Wild Species for Food and Nutrition Security in Teso and Acholi Sub-regions of Uganda 5. NUS contribution to malnutrition and school feeding programs: the case of Community Food Basket Initiative (CFBI)	Elizabeth Kizito – Uganda Christian University Richard Guloba – PELUM Uganda Alfred Ozimati – MaRCCI Nasser Mulumba – Alliance of Bioversity International and CIAT Lewis Sylas Rwakatale – Community Food Basket Initiative (CFBI)
12:45 – 13:00	Q&A and Discussions	ALL
13:00-14:00PM	**LUNCH**	
14:00- 14:15PM	Stakeholder mapping - objectives and methodology and instructions for participants	Nora Castaneda/Gloria Otieno
14:15 – 15.00PM	Group exercises to map stakeholders and their functions	All + Organizers
15.00 – 15.30PM	Plenary -session reporting back	ALL
15:30-16:00 PM	Summary day 1	Gloria Otieno – Alliance of Bioversity International and CIAT
16:00PM	**TEA BREAK AND DEPARTURE**	

DAY 2		
8:00-9:00	**Arrivals and registration**	
9:00 to 9:30AM	NUS crop prioritization – guidelines and methodology (and instructions for participants) Results of the preliminary online survey	Nora Castaneda /Juana Thimnu– Crop Trust
9:30-10:45 AM	NUS crop prioritization exercise – Group work	ALL
10:45-11:15AM	**TEA BREAK**	
11:15-12:15PM	Plenary and discussions on NUS prioritization	
13:00-14:00PM	**LUNCH**	

14.00-15.00 PM	Stakeholder Maps (draft) Final List of Prioritized NUS	Gloria Otieno – Alliance of Bioversity International and CIAT Nora Castaneda – Crop Trust
15.00 – 16.00PM	Next Steps	Nora Castaneda
4:00PM	**TEA BREAK AND DEPARTURE**	

9.3 Annex 3: Stake holder Mapping template

Stakeholder	Local (Name)	National	Regional organizations and global	Main roles/functions
Private sector				
Producer organizations				
NGOs			SWISSAID, Slow Food	
National Research organizations				
CGIARs			ICRISAT ABC, World Veg, IITA, ICARDA, CIMMYT	
Universities				
Consumer groups				
Government AGENCIES				
Conservation and management of genetic resources				
Policy				

9.4 Annex 4: Stakeholder Mapping for the Human Health and Nutrition Group

Stakeholder	Local	National	Regional	International	Main roles/functions
Private sector	Maize/grain millers				Value addition composite flour
	Mama Jane Sabi flour				Value addition, Retailer of composite flour, capacity building for mothers and childcare and development, buy from farmers, support group coordinators
	Whispers magical children hospital				Orphanage (children's home), treat severe acute malnutrition, capacity building for public health
	Nutreal				Buyers of produce, processors, wholesaler, value addition (flour), retailers
	Bana farmers				Value addition (flour), buy grain, retailers
	Bangi Robert & associates				Supplies amaranth, finger millet and soybean, aggregator (smallholder farmers produce), value addition
				Kenyans and South Sudanese	Buy grain amaranth and grains
Producer Organizations	Youth entrepreneurship program (out of school youth)				Producers (amaranth) and sell
		MUARIK			Research, produce seeds (soybean), capacity building
	Kamuli households				Purchasers and consumers of flour
NGOs		Busoga Kingdom – DLLN-Uganda			Purchase composite flour from Iowa State University – Uganda program, capacity building, distribute composite flour in the community, Making nutrition food
		Plan Uganda			Buy composite flour, capacity building, value addition
National research organizations		NARO-NaSARRI			Breeding, support seed system, provide finger millet and cowpea seeds, capacity building
		MaRCCI			Breeding, capacity building (students and farmers), germplasm conservation and distribution (genebank). Introducing germplasm (amaranth), research, demonstration site.
CGIAR				WorldVeg	Breeding amaranth, capacity building, germplasm conservation and collecting, demonstration site, varietal release
Universities				Iowa State University	Capacity building, research, extension, breeding amaranth, germplasm conservation and distribution, funding (of IOS – Uganda program)

Stakeholder	Local	National	Regional	International	Main roles/functions
		Makerere University			Capacity building, research, human resource, breeding, demonstrations, extension
Consumer groups	Nutrition education center clients				Consume IOS- drink, purchase planting materials and seed
	Schools in Kamuli Nakanyonyi, Namasagali Kasozi, Nalwoli, primary schools Namasagali college staff' children school (Kasubi), Nalwoli senior secondary school, Namasagali college				Consume IOS-drink, consumers of amaranth leaves in school lunch, produce grain and leave amaranth
Government agencies	Kamuli general hospital				Consumers, capacity building (grain amaranth and finger millet and how to use it to prepare the composite flour), demonstrations
		MAAIF			Extension, distribution of seed, capacity building
	Local government				Extension, agronomy of NUS, capacity building, demonstration, certification of Quality Declared Seed
		Food Right Alliance			Lobbying, advocacy and policy
Conservation and management of GR		PGRC			Germplasm conservation, source of germplasm, demonstration, capacity building
		MaRCCI			Breeding, capacity building, conservation PGR, research, demonstration

9.5 Annex 5: Stakeholder Mapping for the Gene banks, Researchers, Breeders and Seed Sector Group

Stakeholder	Local	National	Regional/Global	Main roles/functions
Private sector		Uganda Seed Trade Association		Umbrella for seed companies
		NHL		Seed distribution
		MADIFA		Seed company
		Uganda Breweries Limited		Breweries
	RUCID			Value addition
			East West	Seed company
	Hoima community seed company			Seed company
			Syova seeds	Seed company
			Simlaw seeds	Seed company
		Uganda millers Association		
		United Nations Forum on Forests		
	Advocacy Coalition for Sustainable Agriculture			Umbrella extension advocacy,
	SAIMCO			Fabrication of tools
		Hortfresh		Marketing
		Centenary bank		Credit
	Prometra			Capacity building, Advocacy
Producer organizations	District Farmers Association			Mobilisation of farmers into groups
	Community seed banks			Conservation
	Local seed business			Produce and market
	BUCADEF			Coffee mobilization
	SOCADIDO			Mobilisation
NGOs			PELUM	Advocacy
		Advocacy Coalition for Sustainable Agriculture		Policy

Stakeholder	Local	National	Regional/Global	Main roles/functions
		Integrated Seed and Sector Development -UG		Advocacy, Capacity building, policy
			ESSAF	Production, extension, capacity building
			Oxfam	Advocacy, Capacity building, policy
			FAO	Advocacy, Capacity building, policy
		ISUP – Iowa state		Capacity building, Advocacy
			Slow food	Production, training, value addition
Research organizations		NARO (NaSARRI, NARL, NaCRRI, NaCORI, NaFORRI, NaLIRRI)		Research, Capacity building
		PGRC		Research, Capacity building
	ZARDIs			Dissemination
		Uganda Industrial Research Institute		Research, Capacity building
		Uganda National Bureau Of Standards		
CGIAR			ICRISAT, ABC, WorldVeg, IITA, ICARDA, CIMMYT, IRRI, IFPRI	Research, Policy, Breeding
Universities		MUNI, UCU, MUK, Uganda Martyrs – Nkozi, Mount of the moon, Gulu University, Busitema and Kyambogo Universities		Capacity building, Research, Breeding, Extension, Outreach
Consumer groups		Maganjo, Nuvita		Value addition
		Ugachic, Biyinzika		Animal feeds
		Breweries, Numa foods, Kayebe sauce packers		Value addition
		Kazire		Processors
	Schools	Universities		Consumption
	Kiganda coffee, District Farmers Association			

Stakeholder	Local	National	Regional/Global	Main roles/functions
			Oxfam, World Food Programme, World Vision	
Government agencies		NARO		
		National Forestry Authority		Protection
		National Environment Management Authority		Conservation
		Uganda Industrial Research Institute		Value addition
		Uganda Coffee Development Authority		
		Uganda Wildlife Authority		
		Uganda National Council for Science and Technology		Policy
		Uganda Bureau of Statistics		Research
		Uganda National Bureau of Standards		Quality Assurance
Conservation and management of genetic resources	Community Seed Banks			
		UWA, PGRC, NARO, Universities, NFA,		
			FAO, Crop Trust, ABC, CIP, IRRI, Millenium Seed Bank, Royal Botanical Garden, ICRISAT, IITA, Botanical garden conservation International, International PGR	
Policy		MAAIF		
		National Planning Authority		
		Parliament		
		ACODE		
	District Local Government			

Stakeholder	Local	National	Regional/Global	Main roles/functions
			IFPRI	
			Donors	

9.6 Annex 6: Stakeholder Mapping for the Private Sector Actors' Group

Stakeholder	Local	National	Regional and global	Main roles/functions
Private sector		Necofam Uganda		Indigenous seed production and marketing
	Jero Farm			Grow indigenous crops, Value addition, Business cafeteria, Agro-tourism
	Hello Mushrooms,			Grow Mushrooms, Value addition to indigenous crops
Producer organizations		Kasawo Millers		Produce indigenous crops, Value addition, Market the crops
	Gladys			Produce indigenous maize, Soya, bambara nuts, beans, tomatoes, leafy vegetables
			GLOWISH Agro solutions	Encourage growth and utilization of NUS crops, Sale and export
NGOs			Slow Food	Advocacy and promotion of indigenous food
			PELUM	Advocacy for indigenous foods
			African Food Sovereignty Alliance	Advocacy, Support organizations that promote indigenous crops
		UFAS	African Forum for Agriculture Advisory Services (AFAS)	Support extension services
		Advocacy Coalition for Sustainable Agriculture		Policy, advocacy, organic farming
			World Vision	Advocacy, Extension services to farmers
			CEFROHT- Centre for Food and Adequate Living Rights	Legal advice and support for indigenous food systems and food rights, Promote food, economic and climate justice
			Centre for Agriculture and Biosciences International	Improving seed production, supporting farmers who grow indigenous crops
		Food Rights Alliance		Advocacy, Food systems
Research organizations		NARO		Gather data in Agriculture Research
			IITA	NUS seed conservation

		Uganda Martyrs University		Capacity building
		Uganda Christian University		Research in Indigenous crops
		MUARIK		Research
CGIARs			IITA	NUS conservation
			ABC	Research in indigenous crop species conservation
Universities		Makerere University,		
		Uganda Martyrs University		
Consumer groups	2K			Cook indigenous meals
	Moriza farm			Farm and cook indigenous foods, agrotourism
		Community food basket in Uganda		Grow NUS, Value addition
	Amic Worlds			Value addition
Government Agencies		Ministry of Agriculture		Maintain the country's genebank, Regulation and policy making
		Uganda Parliament		Policy and law creation
Conservation and management of genetic resources	Joy and Family Demo Farm			Local seed bank/conservation
	Rural Community Development			Seed/species conservation of indigenous crops
		NiCOFAM		Conservation
		NARO		Conserve national seed resources
Policy			PELUM	Draft and initiate policies
		Uganda National Farmers Federation		Advocacy for farmers and policy

9.7 Annex 7: Stakeholder Mapping for the Cross-cutting Group

Stakeholder	Local	National	Regional and global	Main roles/functions
Private Sector	Nutreal			Value addition, product development

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Stakeholder	Local	National	Regional and global	Main roles/functions
	Peak Value			Product development and value addition
	Local machinery fabricators (Munyegera, Tonnet)			Fabrication of machinery, field agronomic management and processing
Producer Organizations	Gombe Amaranthus producer association			Seed production, Grain production
	District Farmers Associations	Uganda National Farmers Federation		Advocacy, mobilization, marketing, product development, seed multiplication, credit provision, Extension/advisory
	Cooperations	Cooperations		Input distribution, marketing, credit provision
	Farmers			Seed production, Marketing, germplasm provision, host and manage trials, seed selection/multiplication
NGOs			FAO	Farmer training, Farmer field schools, Resource mobilisation, support seed production
			PELUM	Policy initiation recommendation, Community and farmer mobilization, Advocacy, Farmer training, Advisory services, Technology dissemination
			ISSD	Promoting local seed businesses, CSA, Advocacy
			Sasakawa Africa Association	Promoting climate smart technologies, Farmer training
			OXFAM	Farmer field schools, community seed banks, Policy advocacy, Resource mobilization
CGIARs			CIMMYT, IITA, ABC	Source of germplasm, technical backstopping, Capacity development, Resource mobilization, Stakeholder engagement, Research/development of technologies, Dissemination of TIMPs
Universities			Makerere University	Capacity building, Research/Innovation, Dissemination of products – outreach, farmer training, development of information, education, and communication materials
			Uganda Christian University	
National Research Organizations		NARO		Development of technologies, Capacity building, Dissemination of TIMPs
		Plant Genetic Resource Centre		Germplasm conservation assembling and sourcing, production of EGS, Genetic conservation in community genebanks
Policy		MAAIF crop inspection of certification		Training, Policy initiation and lobbying, Conservation and traceability, Seed certification (variety registration), Quality assurance, Germplasm regulation

Stakeholder	Local	National	Regional and global	Main roles/functions
		Policy Unit - MAAIF		Policy development
	Local Government Agencies	Extension services		Dissemination of technology, Community training, Training packages
		Parliament (Alliance on food and nutrition Security agricultural committees		Appropriation, Oversight, Representation, Legislation, Advocacy,
		Cabinet Sectamate		Policy development/ approval process
Government Agencies	Local government authorities (CAO, DAO, DPO)			Allocation of resources, Planning, Supervision and coordination of agricultural projects

9.8 Annex 8: Stakeholder Mapping for Farmers and Local Communities Group

Stakeholder	Local	National	Regional	Main roles/functions
Private sector			CBI	Support value achin and exports for oil crops i.e., sesame, shea nut, chia seed
	Serere seeds limited			Supply millet gram, sorghum, sesame, g.nuts, pearl millet
	Joy and Family Demo farm			Produce millet, amaranth, chia seeds and value addition
	Equator commercial			Pumpkin value addition
	Aunt Porridge			
	Sage			Chia seed
		NARO holdings limited		Produce and disseminate seeds,
	Katunkuma limited			Seed and value addition
	Camelot			tomato seed,
			ESAFFI	Policy
	CSBs			Seed production

Stakeholder	Local	National	Regional	Main roles/functions
Producer Organizations	Homeland Organics			Seed production and trees
	UyDNET			Seed production - pumpkins
	MADIFA			Seed production
Consumer Groups	Mwanamujimu consent			Marketing and awareness creation
		Schools, hospitals, prisons		Consumption
NGOs			PELUM	Training and capacity building, policy
			Iowa SU	Provide seed, value addition, capacity building
		ACSA		Capacity building, marketing, policy, farmer development
	RUCID			Capacity building, seed multiplication, value addition, Market linkages,
	Seed Oriented Development Initiative			Capacity building, seed multiplication, value addition, Market linkages,
			Slow Food	Consumer awareness
		CARITAS		Seed multiplication, Capacity building
		AUPWAE		Capacity building
	TEDO			Market linkages and value addition
		CIDI		Market linkages and value addition
National Research Organizations		NARO, MaRCCI, UCU, UMU, ARU, AWU, Muni University, Mt. of the Moon university, Gulu university, CERD, Makerere		
	PROMETRA			
CGIARs			ABC	
			INVC	
			IITA	Seed distribution, Capacity building
			ICRAF	
		MAAIF		Governance and policy

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Stakeholder	Local	National	Regional	Main roles/functions
Government Agencies	Local Government			Governance and policy
		PGRC		Quality assurance, trainings, collection and conservation

9.9 Annex 9: A matrix of prioritised NUS and the rationale for their selection

Prioritized Crops	Climate change adaptability	Nutritional value	Cultural acceptance	Local market potential
Jackfruit -11.6 – 1st priority	High climate change adaptability. Fruits throughout the year – Perennial, It's a tree, grows everywhere in the country. Still grows under low water availability.	High nutritional value. Anticancer agents, vit A, vit C, Calories: increase lactation, animal feed, seeds five oil, Seeds can also be edible (potential). No anti-nutritional factor.	High cultural acceptance, Grown in Uganda	High local market potential
Pearl millet – 11.4 – 2nd Priority	High climate change adaptability, drought tolerant, can grow in marginal lands	High shelf life, Birds love, Used in porridge. Contains iron and micronutrients. Also used as starch.	High cultural acceptance, eaten by men but also by others, Most appreciated in areas where it is the staple, grown in Uganda, Used in traditional marriages. No taboos or stigmas associated.	High local market potential, constant (throughout the year). High volume
Pumpkin – 11.2– 3rd Priority	High climate change adaptability, Grows only in rainy season	High nutritional value. Antioxidants, zinc, Carbohydrates micronutrients, calcium, vitamins, fibre, immune function	All culture. Medicinal. Used in "Kwamjula", widely accepted, served in restaurants	High local market potential, higher return of investment
Cowpea – 11.0– 4th Priority	High climate change adaptability, seasonal crop	High nutritional value, Zn, Fe, Vit A and C, Eaten a lot	High cultural acceptance. Celebrating twins	High: local and export market potential, Poultry and chicken industry
Other crops				

Prioritized Crops	Climate change adaptability	Nutritional value	Cultural acceptance	Local market potential
Cashew nuts	High climate change adaptability	High nutritional value, Antioxidants, High potassium. Seed has anti-nutritional factors.	High cultural acceptance, Nuts are for the high-class.	High local market potential, Demand is constant (hotels).
Cocoyam	Needs a lot of water (grows in swamps), can survive on its own, can grow anywhere	Carbohydrates, minerals, Can be processed to other food forms, highly nutritious	Grown in Uganda. Well eaten, not so available	High market demand. Constant demand. High volume
Taro	Wetland, not climate resilient	High nutrients - Carbohydrates, minerals	Highly accepted, cultural myth – getting twins	Has a market potential, Niche market.
Oats	Seasonal crop, matures fast, Not known	Good substitute for milk, Gluten-free, good substitute of wheat, used for baby supplements. No anti-nutritional factor.	Not well known but bought in supermarket	Usually eaten by middleclass, No local market potential
Bambara groundnut	Very adaptive. Grows in dry and hot environments	Protein	Not widely cultivated in Uganda. No special social significance, nor taboos.	No demand
Passion fruits	Not climate adaptable, seasonal	Vitamins, leaves, and flowers have antioxidants, treat allergies	Widely eaten	Highly marketable
Shea	Climate adaptable	Fats, vitamins, Oil. Not commonly used in cooking, mostly used in cosmetics. Northern Uganda used for food.	Highly acceptable, Grown in northern Uganda.	Hair, skin, highly marketable, Nuts and oil sold.
Dioscorea	Seasonal	Carbohydrates	Highly acceptable	Takes long to grow, eating in evening in streets, High demand
Amaranth	Survives droughts, harvested throughout the year, matures fast	Rich in vitamins, zinc (grains), cleanser (digestive), High in protein, omega 1, oil and fats	Accepted by all, Good for managing malnutrition	Available, affordable,

9.10 Annex 10: A matrix of prioritized traits of the four priority crops for each stakeholder category

Order of priority/ Rank	Jackfruit - Preferred Traits				
	Human Health and Nutrition Group	**Farmers and Local Communities**	**Cross-cutting Group**	**Gene banks, Breeders and Researchers Group**	**Private Sector Group**
1st	Nutritional value (satiety)	Food and nutrition security	Quality (sweetness, texture, taste, colour, crunchiness)	Pest and diseases (abiotic and biotic stresses)	Higher yield
2nd	Early flowering	Adaptability	Yield	Yield	Longer shelf like (last longer before rotting)
3rd	Adaptability	Pest and disease tolerance	Pest and disease resistance	Maturity	Shorter period before it starts producing
4th	Acceptability (taste)	Medicinal	Early maturity	Nutrient content	Less or no sap
5th	Reduce flower abortion rate	Eaten in different forms	Postharvest properties: canning shelflife	Shelf life	Height: shorter preferred
6th		Fodder to animals			
		Source of fuels			
Pearl millet - Preferred Traits					
Rank	**Human Health and Nutrition Group**	**Farmers and Local Communities**	**Cross-cutting Group**	**Gene banks, Breeders and Researchers Group**	**Private Sector Group**
1st	Nutritional value	Food and nutrition	Yield	Biotic and abiotic stresses	Stronger stem
2nd	Drought tolerance	High yield	Quality: nutritional properties, taste, colour	Lodging (shorter plants)	Grain size
3rd	Resistance against bird attacks (grain)	Early maturity	Disease and pest resistance	Yield	More adaptable to different climatic conditions
4th	Tillering	Drought tolerance	Drought tolerance (early maturity)	Nutrient content	
5th	Increase panicle size	Industrial use (multiple)	Postharvest traits	Grain colour	
6th			Lodging resistance		
Pumpkin - Preferred Traits					

Rank	Human Health and Nutrition Group	Farmers and Local Communities	Cross-cutting Group	Gene banks, Breeders and Researchers Group	Private Sector Group
1st	Nutritional value	Nutrition	Quality: taste, texture, softness of cover, time to cook , smoothness of pulp	Biotic and abiotic seeds	Disease and pest resistance
2nd	Multi-purpose	Drought tolerance	Yield	Yield	Less water content
3rd	Drought tolerance	All parts edible	Pest and disease resistance	Dry matter	Higher yield
4th	Grows in poor soils	Long shelf-life	Early maturity	Nutrient content	Adaptable to less moisture, growth throughout the year
5th	Starchy texture	Grown in all zones	Drought tolerance	Market traits	Last longer after cutting (shelf life)
6th		Culturally accepted			
Cowpea - Preferred Traits					
Rank	**Human Health and Nutrition Group**	**Farmers and Local Communities**	**Cross-cutting Group**	**Gene banks, Breeders and Researchers Group**	**Private Sector Group**
1st	Nutritional value	Drought tolerance	Shatter resistance (post-harvest): it is a common problem which can lead to loss a whole crop	Biotic and biotic stresses	Shorter cooking time
2nd	Multi-purpose	Early maturity	Quality: taste, texture	Yield	Pest and disease resistance
3rd	Drought tolerance	Nutrition	Pest and disease resistance	Nutrient content	Adapt to different climate conditions
4th	Softer fibres leaves	Eaten in difference forms	Yield	Market traits	
5th	Bigger pods	Medicinal value	Early maturity	Dual purpose	
6th	Early-maturity		Drought tolerance		

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9.11 Annex 11: The list of crops Participants selected from

Crop group	Common name (English)	Crop group	Common name (English)	Crop group	Common name (English)
Fruits	Bitter-berry	Vegetables	Okra	Nuts, seeds and oilseeds	Vegetable tallow tree
Fruits	Turkey berry	Vegetables	Aibika, Sunset Muskmallow, Sunset Hibiscus	Nuts, seeds and oilseeds	Allanblackia
Fruits	Cooking banana	Vegetables	Onion	Nuts, seeds and oilseeds	Cashew
Fruits	Bananas	Vegetables	Prostrate Pigweed	Nuts, seeds and oilseeds	Groundnut
Fruits	Bananas	Vegetables	Smooth Amaranth, Slim Amaranth	Nuts, seeds and oilseeds	Aizen, Nabedega
Fruits	Indian fig	Vegetables	Spiny Amaranth, Spiny Pigweed	Nuts, seeds and oilseeds	Canarium nut, Ramy nut
Fruits	Prickly pear	Vegetables	Amaranth/Joseph's coat	Nuts, seeds and oilseeds	Safflower
Fruits	Baobab	Vegetables	Slender Amaranth, Green Amaranth	Nuts, seeds and oilseeds	Coconut
Fruits	African pepper	Vegetables	Vine spinach, Ceylon spinach, Malabar spinach	Nuts, seeds and oilseeds	Sickle Senna
Fruits	Pineapple	Vegetables	Blackjack	Nuts, seeds and oilseeds	Cumin
Fruits	Custard Apple	Vegetables	Boscia	Nuts, seeds and oilseeds	Bottle Gourd, Calabash
Fruits	Wild Custard Apple	Vegetables	Ethiopia Mustard	Nuts, seeds and oilseeds	Flax
Fruits	Sugar Apple, Sweetsop	Vegetables	Celosia	Nuts, seeds and oilseeds	Macadamia
Fruits	Breadfruit	Vegetables	Silver spinach	Nuts, seeds and oilseeds	Groundnut tree
Fruits	Jack Tree	Vegetables	Spiderplant	Nuts, seeds and oilseeds	Sesame
Fruits	Balanites	Vegetables	Ivy Gourd, Scarlet Gourd	Nuts, seeds and oilseeds	Shea
Fruits	Papaya	Vegetables	Jute mallow	Nuts, seeds and oilseeds	Chestnut
Fruits	Carissa	Vegetables	Yoruban bologi	Nuts, seeds and oilseeds	Tigernut
Fruits	White sapote	Vegetables	Pumpkin	Nuts, seeds and oilseeds	Chia
Fruits	Carob, locust bean	Vegetables	Pumpkin	Cereals	Love-lies-bleeding
Fruits	African star apple	Vegetables	Gourd species (bottle, luffah, bitter)	Cereals	Red Amaranth, Purple Amaranth, Mexican Grain Amaranth
Fruits	Star apple	Vegetables	Eru	Cereals	Oats
Fruits	Colocynth	Vegetables	African spiderflower	Cereals	Guinea Grass
Fruits	Watermelon	Vegetables	Wild lettuce	Cereals	Pearl Millet
Fruits	Melon	Vegetables	Leucaena	Cereals	Pearl millet
Fruits	Horned Melon	Vegetables	Vegetable sponge	Cereals	Fonio
Fruits	Tree tomato	Vegetables	Balsam apple	Cereals	Finger millet

Fruits	Safou, African plum	Vegetables	Bitter gourd	Cereals	Teff
Fruits	Sweet dattock	Vegetables	Drum stick	Cereals	Barley
Fruits	Dattock	Vegetables	White mulberry	Cereals	African Rice
Fruits	African persimmon	Vegetables	African Eggplant	Cereals	Kodo millet
Fruits	Kei Apple	Vegetables	Glossy nightshade	Cereals	Sorghum
Fruits	Apple-ring acacia	Vegetables	Tomato	Cereals	Little millet
Fruits	Bitter kola	Vegetables	African Eggplant	Roots and tubers (leaves included)	Taro
Fruits	African Mangosteen	Vegetables	African Nightshade	Roots and tubers (leaves included)	Yams
Fruits	Mangosteen	Vegetables	African Nightshade	Roots and tubers (leaves included)	Sweetpotato
Fruits	Roselle	Vegetables	Purslane	Roots and tubers	Enset
Fruits	False yam	Vegetables	Milk thistle	Roots and tubers	Cassava
Fruits	African bush mango	Vegetables	Dandelion	Roots and tubers	Kafir potato
Fruits	Wild bottle gourd	Vegetables	Fluted gourd	Root and tubers	Hausa potato
Fruits	African grape	Vegetables	Flameflower	Roots and tubers (leaves included)	Cocoyam/Elephant ear
Fruits	Mango	Vegetables	Coriander	Roots and tubers (leaves included)	Cocoyams, Arrowroots
Fruits	Noni	Vegetables	Cucumbers	Roots and tubers	Country potato
Fruits	Mobola plum	Vegetables	Pumpkin	Roots and tubers	Ginger
Fruits	Guinea Plum	Vegetables	Bitter leaf		
Fruits	Locust bean	Vegetables	Sweet bitterleaf		
Fruits	Passion Fruit	Vegetables	Bologi (worow)		
Fruits	Avocado	Vegetables	Redflower ragleaf		
Fruits	Cape gooseberry	Vegetables	Snake gourd		
Fruits	Rubber vines	Legumes	Pigeonpea		
Fruits	Nsaban, kabaa	Legumes	Jackbeans		
Fruits	Guava	Legumes	Chickpea		
Fruits	Marula	Legumes	Soybean		

Fruits	Natal orange, monkey orange	Legumes	Kersting's groundnut		
Fruits	African Orange	Legumes	Lablab/Bonavist		
Fruits	Sweet berry	Legumes	Grasspea		
Fruits	Jambolan (Java) plum	Legumes	Lentils		
Fruits	Water berry	Legumes	Lupin		
Fruits	Marama bean	Legumes	Kersting's groundnut		
Fruits	Wild loquat	Legumes	Lima bean		
Fruits	Blueberry	Legumes	Green bean, kidney bean		
Fruits	Wild medlar	Legumes	Peas		
Fruits	Common wild medlar	Legumes	African winged beans		
Fruits	African black plum	Legumes	Sicklepod, Chinese Senna		
Fruits	Sour plum	Legumes	Favabean		
Fruits	Jujube, ber	Legumes	Mung bean, Green gram		
Fruits	Tamarind	Legumes	Bambara Groundnut		
Fruits	Bell pepper	Legumes	Cowpea		
Fruits	Dragon fruit	Legumes	African yambean		
Fruits	Barbados cherry	Legumes	Fenugreek		
Fruits	Golden apple	Legumes	Sunn hemp		