ENHANCING AGRICULTURAL RESILIENCE AND SUSTAINABILITY IN EASTERN AND SOUTHERN AFRICA

Key Findings and Recommendations for Uganda

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SIMLESA
Sustainable Intensification of Maize and Legume Systems for Food Security in Eastern and Southern Africa
Australian Government
Australian Centre for International Agricultural Research

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List of Acronyms

ACIAR	Australian Centre for International Agricultural Research
AIP(s)	agricultural innovation platform(s)
CASI	conservation agriculture-based sustainable intensification
CIAT	International Center for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Center
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ILRI	International Livestock Research Institute
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries (Uganda)
NARO	National Agricultural Research Organisation (Uganda)
NGOs	nongovernmental organizations
QAAFI	Queensland Alliance for Agriculture and Food Innovation, University of Queensland, (Australia)
SIMLESA	Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa

AGRICULTURE IN UGANDA

Agriculture is vital to the development goals of promoting growth and reducing poverty in Uganda. The sector contributes 25 percent to gross domestic product (GDP), and provides employment for about 72 percent of the working population [1]. In addition, about 73 percent of households primarily derive their livelihoods from agriculture [2]. In absolute terms, of a population of 35 million people, about 6 million Ugandans engage in smallholder/subsistence agriculture [1].

Despite its importance, agriculture in Uganda is characterized by low production and productivity due to poor land management, depleted soils and total dependence on rainfall [3]. The production system is predominantly small scale and is limited by rudimentary production tools and low use of improved seed, agrochemicals and fertilizer. These factors, coupled with the impacts of climate change and variability — including severe drought, flooding, storms, and epidemics of pests and diseases [4] — have increased the risks associated with farming and left rural households highly vulnerable to food insecurity and poverty [3]. According to a report by the Food and Agriculture Organization of the United Nations (FAO), about 4 million Ugandans are severely food insecure [5]. Although Uganda has the capacity to produce sufficient food, much of the population faces the threat of hunger, and 70–80 percent of children survive on a diet of limited nutrients and inadequate diversity. With a diverse agricultural production system, Uganda produces a variety of crops, including bananas, root crops, cereals and legumes [6]. As primary staples for much of the population, maize and beans are major contributors to food and nutrition security.

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A New Approach to Agriculture

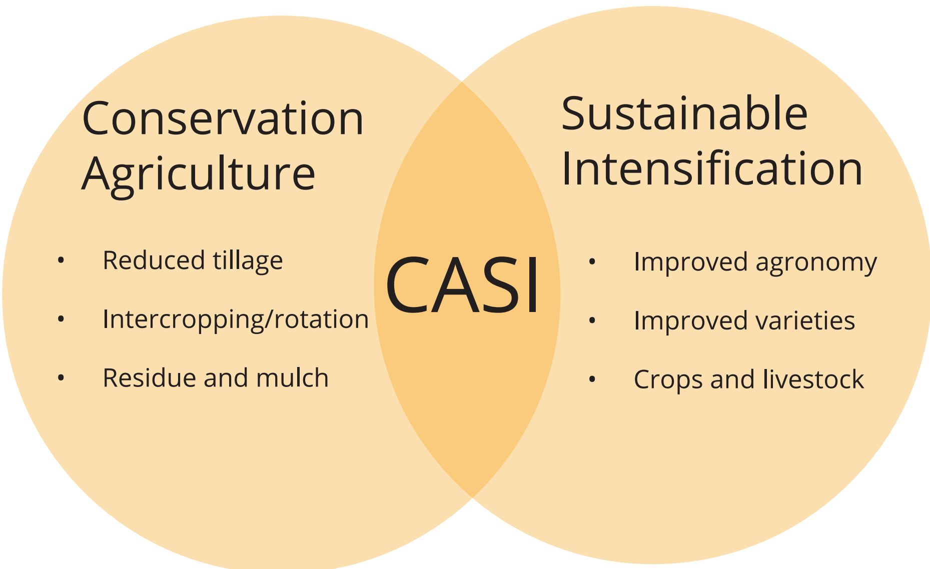
Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) was a project implemented between 2010 and 2018 in five African countries (Ethiopia, Kenya, Malawi, Mozambique and Tanzania) and two spillover countries (Rwanda and Uganda). The project's goal was to increase African smallholders' food security, productivity and income levels by integrating sustainable intensification practices to increase productivity, while simultaneously protecting the natural resource base. The particular mix of technologies developed by SIMLESA are known as "conservation agriculture-based sustainable intensification," or CASI (Fig. 1). By utilizing these technologies, SIMLESA sought the dual outcomes of sustainably raising yields by 30 percent, while decreasing the risk of crop failure by 30 percent. In short, SIMLESA focused on and promoted maize and legume cropping systems to improve food and income security and resilience to climate change on African farms.

The project — financed by the Australian Centre for International Agricultural Research (ACIAR) — was led by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with numerous partners, including national agricultural research institutes (NARIs), in this case, the National Agricultural Research Organisation (NARO); CGIAR centers, such as the International Center for Tropical Agriculture (CIAT), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and the International Livestock Research Institute (ILRI); and the Queenland Alliance for Agriculture and Food Innovation (QAAFI) of the University of Queensland, Australia.

Project Overview

SIMLESA undertook onfarm research in different agro-ecological zones to assess the benefits of conservation agriculture-based sustainable intensification and to develop appropriate technology packages for smallholder farmers. The project succeeded in increasing the range of maize, legume and fodder/forage varieties available, and involved farmers in seed-selection trials so they could identify their preferences. SIMLESA helped establish agricultural innovation platforms (AIPs) to progress members — including farmers, seed producers, agro-input dealers, nongovernmental organizations (NGOs) and extension workers — along the value chain. The platforms serve farming communities, help mobilize resources, and support up- and out-scaling. SIMLESA also provided training and capacity strengthening for national agricultural research systems and worked with government, business and civil society organizations to provide an enabling environment for the benefits of the newly introduced technologies to be realized by farmers.

Figure 1. Conservation agriculture based on sustainable intensification



Source: SIMLESA-Uganda.

Note: Improved agronomy includes the use of fertilizer and herbicide; crops and livestock include fodder and forage.

SIMLESA-Uganda

Despite the importance of maize and beans in Uganda, available data [7] indicate that maize yields are currently stagnating at 2.5 metric tons per hectare (t/ha) compared with attainable yields of 4–8 t/ha (8, 9, 10]. Uganda's average bean grain yield is 500 kilograms per hectare (kg/ha) compared with an attainable yield of 1.5–3 t/ha [11]. The project's goal was to unlock the potential of the maize-legume production system as a strategy for addressing food and nutrition security, incomes, and long-term environmental management through improved productivity. Given that Uganda generates technology spillovers to its regional neighbors, SIMLESA-Uganda primarily focused on three themes: socioeconomics, agronomy and outscaling.

Strategic Approach

To address production constraints, SIMLESA-Uganda first sought to identify sustainable intensification practices to increase yields and reduce production risks. The project then carried out demonstrations and promoted sustainable intensification practices and climate change adaptation technologies in tandem with the newly introduced conservation agriculture practices. Efforts to introduce conservation agriculture in Uganda were first made in the early 2000s through an FAO-supported project. SIMLESA-Uganda undoubtedly benefited from the efforts and experience of its forerunner, but SIMLESA's promotion of conservation farming technologies, such as permanent planting basins and rip lines, aided in scaling the approach. The second goal of SIMLESA-Uganda was to identify commodity-specific value-chain constraints in order to address market-related limitations to adoption and uptake.

Understanding that the country's extension system remains weak, SIMLESA-Uganda worked closely with the district specialists, coordinated by a district production officer, and also used the "farmer group" approach, which has since evolved into forums, or AIPs, designed to foster interaction by agricultural stakeholders around shared interests [12]. In Uganda, AIPs comprise key actors along commodity value chains and, in addition to farmers, include researchers, agro-input dealers, mechanization service providers, financial institutions, traders and agroprocessors.

CURRENT MAIZE YIELDS	ATTAINABLE YIELDS
2.5 metric tons per hectare	**4–8** metric tons per hectare
500 kilograms per hectare	**1.5–3** Metric tons per hectare

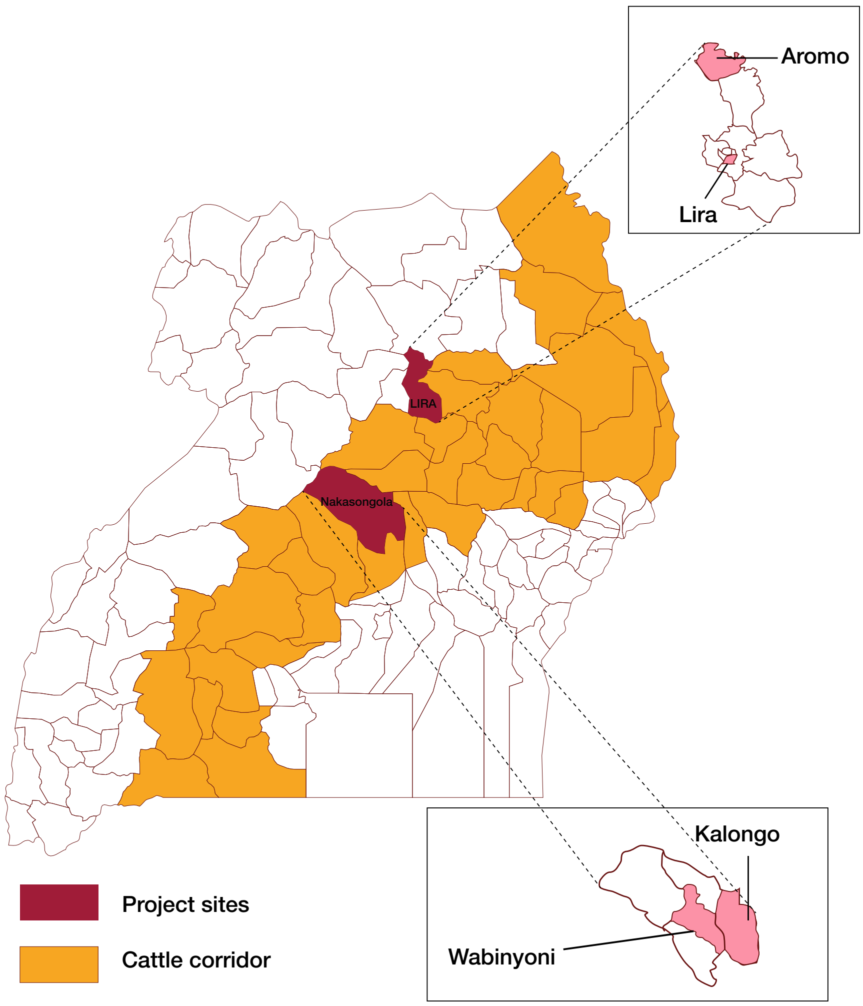
Project Sites

The project was implemented in 2012 in two rural districts: Nakasongola in central Uganda and Lira in the north (Fig. 2). In 2017, the combined — primarily smallholder — farming population of the two districts was 635,800 [1]. Nakasongola, an agropastoral setting, is located in what is known as Uganda's "cattle corridor," cutting diagonally across the country from the southwest to the northeast (Fig. 2). Subsistence agriculture, defined to include crops, livestock and fisheries, is by far the district's most important economic activity, employing about 90 percent of the population [13, 14]. The Lira district is largely crop-oriented and is located in a higher potential production zone in northern Uganda [14]. This district has a continental climate modified by large swamp areas in the south. Once again, the dominant economic activity in Lira is agriculture, including crops, livestock and fisheries. Two subcounties in each district were purposively selected to represent areas of low and high production potential in order to provide contrasting testing sites (Fig. 2).

Partners

NARO — the country's main agricultural research agency under the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) — took the lead in implementing the project's activities in partnership with the local governments of Lira and Nakasongola. Other major partners were Uganda's Task Force on Conservation Agriculture under MAAIF, which provided technical support and contributed to the development of the field guide for establishing and managing conservation agriculture demonstrations, and the Africa Conservation Agriculture Tillage network, which trained members of the technical service units and coordinated the process of procuring conservation agriculture equipment.

Figure 2. SIMLESA-Uganda project sites: Lira and Nakasongola districts and the cattle corridor



national agricultural laboratories

Source: SIMLESA-Uganda.

Geographic Information Systems Laboratory, NARL – Kawanda.

KEY FINDINGS

This section summarizes SIMLESA-Uganda's key cross-cutting research findings in the context of the following questions:

How can CASI increase the farm-level food security, crop yields and incomes of smallholder farmers?

In what ways do CASI approaches contribute to increasing the resilience of farming systems, protecting the natural resource base and mitigating the risks associated with climate change?

What key factors in terms of government policies, agricultural programs, rural institutions or market arrangements would enable the diffusion of CASI methods among farmers?

Does CASI contribute to a balanced approach to agricultural progress for both men and women, and how might resource-poor farmers — in particular — benefit from these technologies?

What market enhancements, including seed systems and value chains, are needed to encourage the adoption of CASI practices?

The project's findings were complex. The new approach works by integrating multiple technologies with synergistic effects over different time horizons. In addition, CASI was purposively implemented across a range of agroecologies, which makes it challenging to directly compare results from one region to another. Nevertheless, the key findings that emerged are described below.

Smallholder Farmers' Food Security, Productivity, and Incomes Levels

At the inception of the project, a baseline survey [14] established that the average maize and bean grain yields on smallholder (less than one hectare) farms were less than 30 percent of their potential. Poor soil conditions (meaning low soil fertility, compacted soils and moisture stress), poor quality seed, and low nutrient and water-use efficiency are also major contributing factors to low yields. The main challenges for both maize and beans in the preproduction phase were late farming operations due to equipment and cash shortages, poor quality seed and an inadequate supply of agro-inputs. In the production phase, the challenges were weed infestation, crop damage by pests and diseases, and declining soil fertility.

Maize-bean intercropping using optimum intercropping patterns was tested and observed to improve the efficient use of land and labor. The raising of cereals and legumes in rotational or intercropping sequences improves soil nutrient health and provides extra nutrient-rich residues that are incorporated into the soil, thereby improving the efficiency and ability to produce under varying weather patterns. This helps farmers adapt to the impacts of climate change and, hence, improves household food and nutrition security [15].

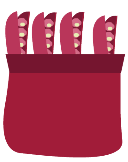
In another important activity, the project team evaluated and selected pigeon pea varieties in order to identify farmer-preferred varieties. The team acquired five elite lines of pigeon peas (Cajanus cajan) from ICRISAT and evaluated them for performance and yield. Assessed as cover crops, the varieties yielded significantly more above-ground dry biomass than a baseline comparison with natural fallow. Pigeon peas provide multipurpose benefits, such as improving the quality and productivity of the soil; suppressing weeds when used as a cover crop; and providing nutrient-rich pigeon pea grain, which directly benefits the farmer. Being multipurpose, the adoption rate of pigeon peas is expected to be higher than traditional cover crops, such as mucuna and lablab.

Strategies to Improve Resilience, Reduce Risks and Protect Natural Resources

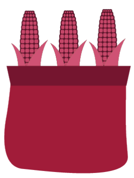
SIMLESA-Uganda introduced CASI technologies in the form of permanent planting basins and rip lines, which enable crop mixing and rotation, precision management of nutrients, rainwater capture, and soil-moisture conservation. These technologies, combined with improved seed and fertilizer, and proper seeding rates, increased maize and bean grain yields to the expected levels for both crops. Bean grain yields rose from an average of 460 kg/ha using conventional production methods, to an average of 655 kg/ha, using CASI technologies (Fig. 3). This represents a 42 percent increase but is still well below potential levels of about 2,000 kg/ha. Similarly, maize grain yields rose on average from 2,000 kg/ha using conventional methods to 3,575 kg/ha using CASI approaches (Fig. 4). Despite being a 78 percent increase, this is also well below potential levels for hybrid maize of 5,000 to 8,000 kg/ha [10].

The rip line technology, especially for medium- to large-scale farmers, is considered to provide the greatest impact because it aids farmers in timely planting; lowers production costs; increases production area; and makes biophysical improvements by breaking the hardpan (the impervious layer in or below the soil) and improving water capture and storage, which supports climate change adaptation.

Increase in yield under CASI



42% for bean grain



78% for maize grain

Figure 3. The impact of different tillage practices on bean grain yields, with and without fertilizer

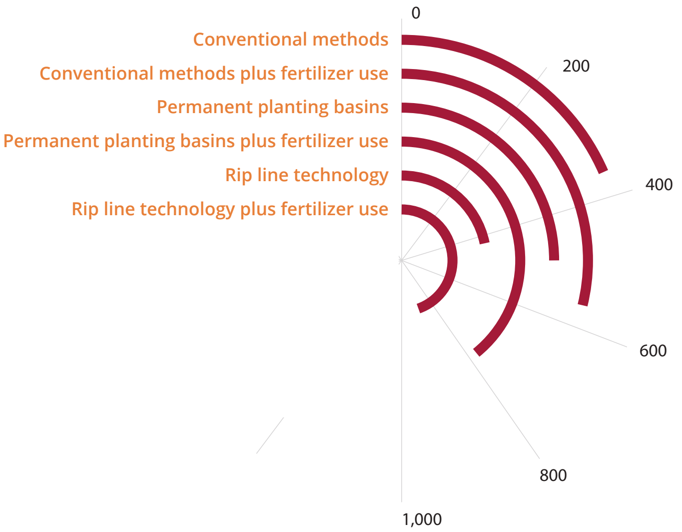
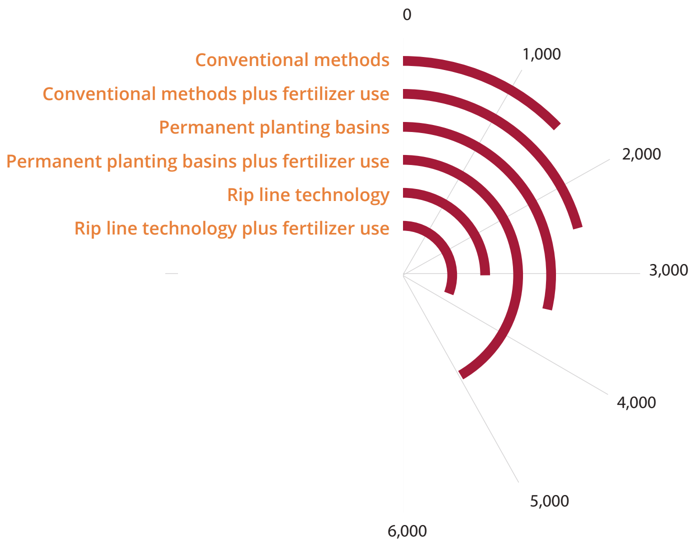


Figure 4. The impact of different tillage practices on maize grain yields, with and without fertilizer



Source: SIMLESA-Uganda.

Gender and Equity

The primary obstacle to timely planting is the need for labor to prepare the land, which greatly limits production area because most farmers use a hand hoe as opposed to mechanization. In choosing between the two newly introduced technologies, many farmers opt for oxen-drawn rippers as opposed to permanent planting basins because the rippers increase production area with less labor. In addition, by reducing drudgery and increasing farm profitability, the rip line technology has attracted the younger generation into farming. In addition, the reduced requirement for labor has given women more time to attend to other family responsibilities and personal needs, while also providing them with opportunities to engage in vertical diversification, such as rearing poultry.

Study findings indicated that entrepreneurs, specifically agro-input dealers and produce traders, sought additional income beyond what they were earning from either farming or employment. Findings also showed differences in the skillsets of male and female entrepreneurs. Almost all of the women had higher managerial ability, competence and risk-taking capacity. The men were more highly skilled in aspects such as leading, planning, evaluating and controlling the business. Male entrepreneurs also faced more competition in their businesses compared with their female counterparts. This could be attributed to the fact that (1) most of the male entrepreneurs were located in the most competitive areas in the district, and (2) the majority of female respondents had worked or were still working in the public sector and managed to develop strong customer relations skills. The level of activity in women's businesses was more limited, largely due to limited access to finance to expand the business and other support services. In short, businesses owned by women face many more constraints and receive far fewer services and less support than those owned by men.

Supporting Mechanisms and Partnerships

The main challenges for farmers in the postharvest phase for both maize and beans are poor storage and exploitative markets [14]. These challenges are intertwined because when farmers lack appropriate grain storage, they are forced to sell their produce when the supply is still very high and, hence, are exploited by opportunistic traders.

ACHIEVEMENTS

Farmer Reach and Adoption

Between 2012 and 2018, SIMLESA-Uganda supported 16 farmer groups (four in each participating subcounty) totaling about 320 farmers, of whom 40 percent were female. In turn, each farmer represented a household of five members, on average. The districts' local government extension system was engaged to offer technical support to the project's beneficiaries on a more regular basis. Through popular demand, the districts supported their extension staff in establishing demonstrations of the CASI technologies in areas outside the project sites.

With the farmer as a constant at all the levels of the value chains, SIMLESA-Uganda identified key participants and drivers as being integral to the success of CASI at each level. The project team determined the AIP approach to be the most effective for up- and outscaling methodologies. As a result, the Kalongo Maize-Bean Agribusiness AIP was established to create a network of farmers, mechanization service providers, agro-input dealers, traders, agro-processors, credit institutions, extension agents and researchers.

Improved Varieties Released

SIMLESA-Uganda provided three drought-tolerant, early maturing and high-yielding maize varieties (Longe 10-H, PH-5052 and UH-5053) and two bean varieties (NABE-14 and NABE-15).

Capacity Strengthening

SIMLESA-Uganda primarily targeted young scientists (six women and three men) who were trained in the use of CASI methodologies. The training also served to increase the community of practice at NARO, thereby facilitating dissemination of the new methodologies across the country.

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OPPORTUNITIES FOR INTEGRATING THE NEW APPROACHES INTO MAIZE FARMING SYSTEMS

Packages for Farmers

Recommendations for farmers vary depending on the agroecological context and available resources. Technologies form “a basket” from which farmers can choose depending on their socioeconomic and biophysical environment. Prescriptions can be fully adopted or farmers can select the combinations they deem most suitable to their circumstances. In addition, the use of good agricultural practices is key to success. SIMLESA-Uganda identified the following as key factors supporting the adoption of the new technologies by farmers:

1. **Modifying soil conditions.** SIMLESA-Uganda introduced rip lines and permanent planting basins to break the soil hard pan, thereby helping to increase resilience to climate change and variability, and both crop and land productivity.

2. **Saving labor.** Increased use of herbicides for land preparation drastically reduces the time and cost of operations, allowing farmers to carry out timely planting, thereby increasing resilience to climate change.

3. **Reducing manual labor.** Being mechanized, rip line technology allows farmers to prepare and plant land in half the time required using conventional means, thereby increasing timeliness and farm profitability, and significantly reducing the labor burden associated with farming.

4. **Improving grain quality.** SIMLESA-promoted drought-tolerant maize and bean seeds have been in high demand because, in combination with CASI technologies, they yield high-quality (heavy and well-developed) grain that commands premium prices.

5. **Reducing the risk of total crop failure.** CASI technologies (comprising permanent planting basins, rip lines, intercropping and improved seed) reduce the risk of total crop failure, maximize land use, and increase food security and farm profits.

Based on these findings, a number of packages of packages are proposed for the agroecological contexts in which SIMLESA-Uganda operated (Tab. 1).

Table 1. Summary of CASI options for two of Uganda's agroecological zones

	Low-potential areas		High-potential areas	
Type of agricultural practice	Low-input	High-input	Low-input	High-input
Conservation Agriculture				
Reduced tillage	Permanent planting basins	Rip line technology, either with oxen or two-wheel tractors	Permanent planting basins	Rip line technology, either with oxen or two-wheel tractors
Crop diversity	Intercropping/ rotations	Intercropping/ rotations	Intercropping/ rotations	Intercropping/ rotations
Mulching	Crop residues	Crop residues	Crop residues	Crop residues
Sustainable Intensification				
Plant density	Appropriate seeding rates	Appropriate seeding rates	Appropriate seeding rates	Appropriate seeding rates
Planting date	Prepare land during the dry season and plant at onset of rains	Prepare land during dry season and plant at onset of rains		
Shallow weeding	Encouraged	Encouraged	Encouraged	Encouraged
Fertilizer	DAP, urea and organic manure	DAP, urea and organic manure	DAP, urea and organic manure	DAP, urea and organic manure
Herbicide for weed control	Glyphosate and 2,4-D	Glyphosate and 2,4-D	Glyphosate and 2,4-D	Glyphosate and 2,4-D
Improved varieties				
Maize	Water-efficient hybrid maize (Longe 10-H, PH-5052, and UH-5053)	Water-efficient hybrid maize (Longe 10-H, PH-5052, and UH-5053)	Water-efficient hybrid maize (Longe 10-H, PH-5052, and UH-5053)	Water-efficient hybrid maize (Longe 10-H, PH-5052, and UH-5053)
Legumes	Drought-tolerant, early maturing and high-yielding bean varieties (NABE-14 and NABE-15)	Drought-tolerant, early maturing and high-yielding bean varieties (NABE-14 and NABE-15)	Drought-tolerant, early maturing and high-yielding bean varieties (NABE-14 and NABE-15)	Drought-tolerant, early maturing and high-yielding bean varieties (NABE-14 and NABE-15)
Forage	Chloris gayana (Rhodes grass), Centrosema (butterfly pea), Calliandra	Chloris gayana (Rhodes grass), Centrosema (butterfly pea), Calliandra	Chloris gayana (Rhodes grass), Centrosema (butterfly pea), Calliandra	Chloris gayana (Rhodes grass), Centrosema (butterfly pea), Calliandra

Source: SIMLESA-Uganda.

Low-Potential Areas based on the Nakasongola District

Areas requiring low resource investment. This land is less productive and drier compared with other parts of the country. Labor is also scarce due to urbanization, leaving most of the farm-related workload to women. In addition, farming activities are less commercially oriented, so the focus is more on household food consumption and nutrition security. Key options highlighted for this group are described below:

1. Permanent planting basins are recommended over rip line technology because they involve a lower investment but would still help to increase resilience to climate change.

2. Intercropping maize and beans would reduce the risk of total crop failure and enhance household food and nutrition security.

Areas requiring high resource investment. This land is relatively wetter and more productive than elsewhere in the country. The farmers are commercially oriented so, provided resources are available, animal traction is a viable choice. Key options highlighted for this group include the following:

1. Rip line technology combined with improved seed and fertilizer would serve to increase resilience to climate change, increase production, save labor, and reduce the drudgery of manual labor.

2. Where animal traction is not a viable option, two-wheel tractors should be promoted.

High-Potential Areas Based on the Lira District

Areas requiring low resource investment. These farmers have less land, and labor is also scarce due to urbanization. Despite the commercial orientation, the key option indicated for this group — based on limited land area — is the adoption of permanent planting basins.

Areas requiring high resource investment. These commercially oriented, yet resource-constrained farmers have large tracts of relatively more productive land. Animal traction is a viable practice, enabling the use of ripper technology. Key options highlighted for this group include the following:

1. Rip line technology combined with improved seed and fertilizer is suitable.

2. Where animal traction is not viable, two-wheel tractors should be promoted.

Factors Preventing Widespread Adoption of CASI Technologies

Farmers face several constraints to adopting the new approaches, as described below.

Lack of inputs and implements. Adopting CASI methodologies requires some capital investment, which could be an impediment.

Lack of affordable credit financing. With affordable credit, farmers can have timely access to agricultural inputs, such as improved seed, herbicide and fertilizer.

Inadequate extension services. The ratio of field extension workers to farmers in Uganda is estimated to be 1 : 5,000, yet CASI methodologies require regular farmer–extension worker engagement.

In addition to these constraints, in the broader context, appropriate policies, programs and other interventions are instrumental in creating the environment and structures to enable farmers to adopt new approaches in the long term and become integrated into value chains. This involves both discrete and collaborative efforts by government, private enterprise and civil society organizations. The following interventions or enhancements are recommended to support the adoption of the new technologies by farmers.

Policies and Programs

Policies. CASI methodologies should be further incorporated into Uganda's Agriculture Sector Strategic Plan to signal its integration within the government's development agenda to development partners. Sustainable land-management interventions at the catchment level should be promoted, including soil and water conservation measures, agroforestry and woodlots for climate change mitigation.

Training and Capacity Strengthening

Extension. The government, MAAIF, and local actors should recruit and train field extension workers to build the community of CASI practice in Uganda based on SIMLESA-Uganda's initiatives.

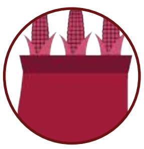
Education. Higher agricultural education curriculums should be reviewed to include CASI principles and practice.

Markets and Value Chains

Input markets. Together with MAAIF, the Uganda National Bureau of Standards should improve the standards for agro-inputs, regulate trade in agro-inputs, and regularly update the list of agro-input imports to be gazetted. Input credit systems from large agro-input companies to local dealers should be introduced. The private sector, especially agro-input dealers, need to develop attractive business models targeting smallholders, such as small packs of seed and quantities of fertilizer, along with an input distribution network. Microfinance institutions also need to develop financial packages to support such efforts.

Seed systems. NARO has a strong maize and legume improvement system in place, but the seed distribution system is under the private sector and is neither well-regulated nor well-coordinated. The government (ministry) needs to coordinate and regulate the sector.

Mechanization and equipment. Small tractors should be introduced for farm operations along the commodity value chain; examples include pedestal sprayers, direct seeders, small-scale irrigation and tractors for shelling and milling.



Output markets. Postharvest challenges facing smallholder farmers include poor storage and opportunistic markets. Strategies geared toward promoting grain storage cribs, bulk marketing and capacity building in commodity value chains should be explored.

Multisectoral and Social Innovations

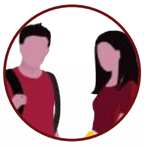
Agricultural innovation platforms. AIPs have proved to be a far superior approach because of their multistakeholder method of operation. Both AIPs and technical service units need to be developed with technical and financial support as an integrated means of effectively disseminating information on CASI.

Civil society and nongovernmental organizations. As part of the AIP strategy, grassroots NGOs should be trained to increase the community of practice in CASI and be equipped to play a leading role in up- and outscaling.

Farmer and social groups. Again, in concert with the development of AIPs, linkages and networks between individual farmers, farmer groups and cooperatives/associations — as major producers of raw materials — need to be encouraged and supported.

Gender, Youth and Equity

Gender issues. Future research projects promoting the adoption and dissemination of CASI technologies within the development agenda should target women. In particular, they should facilitate skills development by women. Given the constraints on women's time, information on rip line technology (which reduces the time commitment and drudgery of farm activities) and improved seed and use of fertilizer (which enhance intensification) should target women.



Youth. Promoting the use of information and communication technologies, especially among the country's youth, would be beneficial. This could involve organizing youth groups into technical service units to facilitate the development of their skills and take advantage in their renewed interest in engaging in agriculture due to these emerging technologies. In addition to creating youth employment, attracting young people back into agriculture will support scaling efforts.

Successes to Date

1

MAAIF already has a Conservation Agriculture Task Force in place, and it advocates the advancement of the Conservation Agriculture agenda.

2

CASI is one of the activities in Uganda's agriculture sector strategic plan.

3

With support from the Common Market for Eastern and Southern Africa, MAAIF developed the Climate-Smart Agriculture program, now in the process of being implemented.

A SUSTAINABLE FUTURE FOR FARMING AND FOOD SYSTEMS

Scaling the New Approaches

AIPs, such as the aforementioned Kalongo Maize-Bean Agribusiness AIP, bring together farmers, mechanization service providers, agro-input dealers, traders, agroprocessors, credit institutions, extension agents, and researchers. The Lira and Nakasongola districts comprise 17 subcounties, but only 4 of these participated in SIMLESA-Uganda; hence, upscaling is needed within the four subcounties to target more farmer groups, and outscaling is need in the remaining subcounties.

"Unless CASI is successfully scaled, land degradation will occur at a wider scale, and food and nutrition insecurity and rural poverty will rise."

WHAT IS AT STAKE?

CASI technologies have demonstrated high farm productivity and profitability, climate change resilience, and reduced land degradation. As a result, they are in high demand. Nevertheless, scaling CASI technologies to other farmer groups and subcounties presents a bottleneck in that it requires technical and financial support. Unless CASI is successfully scaled, land degradation will occur at a wider scale, and food and nutrition insecurity and rural poverty will rise.

CONCLUSION

SIMLESA-Uganda introduced several CASI technologies, including permanent planting basins, rip lines, and improved seed and fertilizer use, the combination of which has helped farmers bridge the yield gap and reduce labor and other costs. This directly addresses household food and nutrition insecurity and rural poverty. SIMLESA-Uganda established optimum maize-bean intercropping patterns that improve land- and labor-use efficiency and potentially improve soil quality. This makes farms suitable for production even under varied rainfall conditions, leading to improved household food and nutrition security. CASI technologies — and the rip line technology in particular — reduce the time and drudgery associated with farm activities, increase production and productivity, and make farming more profitable. Widespread adoption and integration of these technologies into maize farming systems will contribute substantially toward greater productivity and resilience in the face of climate change in Uganda.

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