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SIMLESA target and spillover countries

Acronyms

ACIAR	Australian Centre for International Agricultural Research
AGRA	Alliance for a Green Revolution for Africa
AGRIMERC	Organisation for Sustainable Development of Agriculture and Rural Markets
AIFSC	Australian International Center for Food Security
APSIM	Agricultural Production Systems Simulator
APSFarm	Agriculture Production Systems Simulation Model for the Whole Farm System
ARARI	Amhara Regional Agricultural Research Institute
ARC	Agricultural Research Council, South Africa
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASSMAG	Association of Smallholder Seed Multiplication Action Group
BARC	Bako Agricultural Research Center
BMGF	Bill & Melinda Gates Foundation
BNF	Biological nitrogen fixation
BOM	Opportunity Bank of Mozambique
CA	Conservation agriculture
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	Agricultural Research for Development, France
CORAF	Conference of the Agricultural Research Leaders in West and Central Africa
CRS	Center for Rhizobia Studies (Murdoch University)
CSIRO	Commonwealth Scientific and Industrial Research Organization
DALDO	District Agricultural and Livestock Development Officer
DEEDI	Department of Employment, Economic Development and Innovation, Queensland
DTMA	Drought Tolerant Maize for Africa Project
EGSP	Effective Grain Storage for Better Livelihood of African Farmers Project
EIAR	Ethiopian Institute of Agricultural Research
EPA	Extension planning area
FARA	Forum for Agricultural Research in Africa
HARC	Hawassa Agricultural Research Center
IAC	Chimoio Agriculture Center
IARC	International Agricultural Research Center
IAV	Crops and Veterinary Inputs
ICARDA	International Center for Agricultural Research in the Dry Areas
ICIPE	International Center of Insect Physiology and Ecology
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics

IDEAA-CA	Associação dos Produtores de Oleaginosas (Oil crops association ex-Initiative for development of Agriculture in Africa)
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Cooperation
IFPRI	International Food Policy Research Institute
IIAM	Mozambique's Agricultural Research Institute
IMAS	Improved Maize for African Soils Project
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IRRI	International Rice Research Institute
ISPM	Polytechnic Institute of Manica
KALRO	Kenya Agricultural and Livestock Research Organisation
LER	Land equivalent ratio
MARC	Melkassa Agricultural Research Center
MASA	Malawi Seed Alliance
ME&L	Monitoring Evaluation and Learning
NARES	National Agricultural Research and Extension System
NARI	National Agricultural Research Institute
NARS	National Agricultural Research Systems
NEPAD	New Partnership for Africa's Development
NGO	Nongovernmental Organization
OPV	Open pollinated variety
PARC	Pawe Agricultural Research Center
PASS	Program for Africa's Seed Systems
PVS	Participatory variety selection
QAAFI	Queensland Alliance for Agriculture and Food Innovation
SIMLESA	Sustainable Intensification of Maize and Legume Cropping Systems for Food Security in Eastern and Southern Africa Program
SPER	Provincial extension services
TLC	Total Land Care
TLII, TL-2	Tropical Legumes II Project
UCAMA	Manica Small-scale Farmers Association
WECARD	West and Central African Council for Agriculture Research Department

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1 Progress summary

This annual progress report is a synopsis of activities under the Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) program over the period July 2015 to June 2016 in the SIMLESA implementing countries – Ethiopia, Kenya, Tanzania, Malawi and Mozambique. The program, in its second year of the second phase - utilizes pathways for the intensification of maize-legume cropping systems through the promotion of resilient and adopted technologies. Funded by the Australian Centre for International Agricultural Research (ACIAR), SIMLESA was launched in March 2010 and is a multi-stakeholder collaborative research program managed by the International Maize and Wheat Improvement Center (CIMMYT) and implemented by National Agricultural Research Systems (NARS) in the core countries, with backstopping inputs from other partners. Botswana, Uganda and Rwanda are spillover countries benefitting from ongoing SIMLESA research activities, (See map on page i).

Collaborators of the program include: Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Agricultural Research Council (ARC) of South Africa, Queensland Alliance for Agriculture and Food Innovation (QAAFI), International Center for Tropical Agriculture (CIAT) and International Livestock Research Institute (ILRI).

The program aims to create more productive, resilient, profitable and sustainable maize-legume farming systems that overcome food insecurity and help reverse soil fertility decline, particularly in the context of climate risk and change. The program is helping farmers to diversify their crops, increase food production, and withstand the risks of climate variability and drought. SIMLESA is envisaged to reach 650,000 small farming households in the five countries over a 10-year period. The second phase of the program (SIMLESA II) was launched in July 2014 with modified program objectives and emphasis on scaling out evaluated technologies.

Notable activities and achievements during the reporting period

During the reporting period, SIMLESA managed to reach out a cumulative of 173,533 farmers adopting new technologies/practices against a target of 143,607 which translates to a 121% achievement. This was achieved through field days, exchange visits, innovation platforms, demonstration plots and farmer trainings.

The program has also witnessed an average yield increase of 30-60% from conservation agriculture (CA) exploratory on-farm and on-station trials which have varied results from one region to another.

Local innovation platforms, which at the time of reporting had a cumulative figure of 56, have been strengthened and are functioning in the SIMLESA countries as farmer groups, partners and other key stakeholders shared knowledge on good agricultural practices, market linkages and value chains.

A total of 14 NARS researchers and SIMLESA project managers, communications specialist and monitoring, evaluation and learning specialist, participated in an ARC-SA facilitated one-

week “Situating Gender in SIMLESA” capacity building course. A cumulative total of 65 students, 42 students pursuing Masters of Science degrees and 23 PhD students at national and Australian universities in SIMLESA partner countries, were being supported.

In October 2015, SIMLESA and ASARECA jointly coordinated a high-level ministerial policy conference in Entebbe, Uganda. The forum, whose theme was “Mobilizing policy action to scale-up best agricultural practices,” focussing on promoting sustainable intensification (SI) options generated by SIMLESA. It was attended by 50 people, including the Ministers of Agriculture of Kenya (represented by Jacinta Ngwiri), Mozambique (Feliciano Mazuze), Rwanda (Charles Murekezi), Tanzania (Hussein Mansoor), and Uganda (Ambrose Agona). Other participants included researchers from CIMMYT, NARS, ACIAR, international and regional nongovernmental organizations, farmer associations, and private companies. A final Ministerial communique calling governments to create an enabling policy environment to promote SI practices was adopted and disseminated to the SIMLESA program countries.

During the same period, a program Mid-Term Review (MTR) was one of the major activities carried out. ACIAR contracted an external review team to carry out the MTR of SIMLESA in the second year of implementing phase II of the program. The MTR was carried out in the last quarter of the year, 16 October – 3 November 2015.The MTR report generally recognized the positive elements of achievements by this complex program and made very useful suggestions on how the program could prepare for the conclusion of activities by 2018. Emphasis was on the need to avoid starting new activities whose objectives may not be met by June 2018.

The SIMLESA website was revamped and updated to reflect the breadth of program activities, in addition to producing the SIMLESA Bulletin in December 2015 and March 2016. Other multimedia publications were also developed and produced.

Details of program activities by objectives country-by country constitute the bulk of this annual progress report where monitoring and evaluation, gender integration, training, communications and documentation, are part of the report. The report goes further to articulate SIMLESA impacts, problems and opportunities. Rolling out Competitive Grants Scheme for scaling-out SIMLESA technologies under Objective 4 have been initiated. Expressions of Interest (EoI) were advertised in June in the SIMLESA partner countries as well as on the SIMLESA website.

By mid-August 2016, Ethiopia and Kenya SIMLESA teams were expected to sign collaborative agreements with selected partners and disburse the competitive grant funds.

SIMLESA objective achievements are presented below:

Objective 1: To enhance the understanding of CA-based sustainable intensification for maize-legume production systems, value chains and impact pathways.

Economic analysis of SIMLESA promoted technologies across all the five countries, Mozambique, Ethiopia, Kenya, Tanzania and Malawi continued to reveal that use of sustainable intensification practices (SIPs) improves crop production. Plans for adoption and impact assessments to refine impact pathways and facilitate learning, priority setting processes for maize-legume-forage/fodder production systems were completed where major stakeholders were consulted during planning meetings using participatory methodologies, particularly in

Ethiopia. The SIMLESA team in Kenya reviewed and synthesized literature to identify challenges and opportunities in crop/livestock interactions and shared this with stakeholders. Based on the reviews of challenges and opportunities in crop/livestock interactions, data analysis and reporting would be finalized before the end of 2016. The Kenyan team would develop a scientific paper on the subject which would then inform future work on crop/livestock interactions. In collaboration with ASARECA, SIMLESA Objective 1 held a policy dialogue in Entebbe, Uganda in October 2015. The two-day meeting was attended by 50 people from SIMLESA partner countries, donor representatives, nongovernmental organizations, private sector and farmer organizations. A ministerial communique calling governments to create an enabling policy environment to promote sustainable intensification practices was adopted and disseminated to SIMLESA program countries.

Objective 2: To test and adapt productive, CA-based intensification options for sustainable smallholder maize-legume production systems.

In the reporting period, main SIMLESA activities under Objective 2 conducted included evaluation of CA plots; performance evaluation of newly released common bean varieties in maize/common bean cropping systems; establishment of different experimental trials in both on-farm and on-station sites, best-bet technology scaling up of CA as well as testing and evaluation of options for improving farmer access to inputs.

Other activities Objective 2 conducted were on-farm exploratory trials in Kenya, and the participatory evaluation of on-farm trials in addition to carrying out adaptive on-farm experiments with CA-based intensification options. Farmer trainings were also conducted. In addition, Objective 2 held 18 field days across the five SIMLESA countries during the reporting period. In Mozambique, Objective 2 organized inputs and materials for 30 modified exploratory trials with three new varieties to test compatibility with CA for the 2015/16 agricultural season.

Objective 3: **To increase the range of maize, legume and fodder/forage varieties available to smallholders**

The main Objective 3 activities carried out during the reporting period were participatory variety selections, establishment of experimental trials (trials for maize and legume varieties) and supporting local seed companies in scaling-out new maize and legume varieties in SIMLESA areas and beyond.

SIMLESA's partnership strategy for scaling-up of certified seed production with seed companies included provision of germplasm and technical backstopping, particularly from breeding programs within and outside CIMMYT, seed road maps development for collaborating seed companies, trainings in seed business management and financial support to popularize the new varieties through demonstrations, field days, and media.

Effort has been made to improve fodder/forage availability and utilization for feeding livestock in Eastern Africa, particularly in Ethiopia, Kenya and Tanzania. There has been an introduction of new grass species in the program, such as: *brachiaria decumbens*, *brachiaria brizantha brachiaria brizantha*, *penicummmaximum*, *tripsacumandersonii* and *penisetum preprium*. ILRI is

playing a leading role in fodder production and integration within the sustainable intensification realm.

Objective 4: To support the development of local and regional innovation systems and scaling-out modalities.

Field activities carried out during the reporting period include field days, exchange visits, establishment of demonstration plots, those related to Agricultural Innovation Platforms (AIPs) in all SIMLESA countries and the involvement of other organizations to scale out SIMLESA promoted technologies. AIPs have played a central role in the dissemination of information, sharing of new knowledge, rural innovation including through training sessions, marketing and business approaches among rural farmers. The introduction of digital platforms such as SMS-based technologies were at an advanced stage. The program is working with numerous partners in scaling out best bet SIMLESA technologies. This program is being replicated in Kenya and Tanzania. Two workshops were held in these countries in late 2015, and messages were expected to be disseminated in July 2016. SIMLESA II is rolling out the Competitive Grant Scheme (CGS) to scale out and up tested/ validated technologies and practices by partners that include NGOs, extension services, private seed companies, farmers' unions and other relevant partners. Key documents for the CGS can be found at http://simlesa.cimmyt.org (Events). One of these documents is a comprehensive scaling out plan, developed as per the 2015 MTR recommendation. The first country to roll out was Ethiopia, where plans/ proposals were ready for contracting. In October 2015, a high - level policy meeting for SIMLESA was held in Entebbe in Uganda (http://simlesa.cimmyt.org/high-level-policy-conference/). The theme of that meeting was "Mobilizing policy action to scale-up best agricultural practices". ASARECA were spearheading the follow-up actioning process.

Objective 5: Capacity building to increase the efficiency of agricultural research today and in the future.

The focus of SIMLESA II is on-job training and in-house capacity building of NARS. The ARC, South Africa, conducted a gender training workshop in Pretoria during the reporting period. The overall goal of the training was to enhance the capacity of management, objective leaders, and country coordinators and gender focal persons, and to integrate and mainstream gender in the SIMLESA planning and implementation process. The objectives of the training were to: develop an improved understanding and knowledge of gender concepts for effective gender integration in SIMLESA; initiate the scope for behaviour change/innovation to determine the set of gender intervention; identify influencing factors affecting the final decision toward gender change in SIMLESA; provide participants the opportunity to acquire gender change agency skills and discuss and reach consensus on topics for strategic gender research in SIMLESA.

Various famer trainings, including establishment of experimental trials were conducted at country level. Details of community trainings are in this report.

Program Coordination and Management

Program Mid -Term Review

The Mid-Term Review was one of the major highlights during the reporting period. As mentioned earlier in this report, ACIAR contracted an external review team to carry out the MTR of SIMLESA in the second year of implementing phase II of the program. The MTR involved review of documents, field visits, stakeholder meetings, informant and farmer-focused group discussions. All major documents like program proposal, logframe, progress reports, spillover and monitoring reports, were availed to reviewers before field visits. Four countries out of the five main SIMLESA countries were visited by the MTR external reviewers. The sampled countries were Ethiopia, Malawi Tanzania and Kenya. An MTR meeting was organized with reviewers after field visits to discuss program milestones, outcomes and impacts on 30-31 October 2015 in Addis Ababa, Ethiopia. The meeting was attended by 40 participants comprising key program staff, such as objective leaders, country coordinators, MTR reviewers and program steering committee (PSC) members. Details of the MTR observations and recommendations are summarized in this report.

The MTR report generally recognized the positive elements of achievements by this complex program and made very useful suggestions on how the program could prepare for the conclusion of activities by 2018, with emphasis on the need to avoid starting up new activities whose objectives may not be met by June 2018. The MTR review team came up with 12 recommendations which were generally constructive and positive. The recommendations were incorporated in the program as part of realigning activities during the sixth Annual Review and Planning Meeting (ARPM) held in Lilongwe, Malawi, on 6 - 8 April 2016. SIMLESA Program Management Committee and Program Management Unit discussed on the series of MTR recommendations and submitted an official response to ACIAR. PMC meetings were held on 14 December 2015 (via Skype) and on the 5th of April 2016 in Lilongwe, Malawi Two PSC meetings were held during the reporting period on 30-31 October 2015 in Addis Ababa, Ethiopia and 6-8 April 2016 in Lilongwe, Malawi.

During the period under review, monitoring visits were also conducted in all the core SIMLESA countries to get a better understanding of how the countries were progressing with their program implementation plans and giving support on how they were supposed to document their activities as evidence of program progress on performance and as part of internalizing the monitoring and evaluation process as the program now had a full time ME&L Specialist as at June 2015. Before, the program depended on outsourcing from ASARECA. Countries, through their SIMLESA country focal persons were also expected to keep track and update figures in database as a way of strengthening the internalized SIMLESA ME & L system. The ME & L visits proved very beneficial in terms of improving data management at country level and provided proof for farmers' understanding of maize-legume value chains, especially in Western Kenya where a field day was attended and issues of value chains were articulated in a very impressive way. Details of the visit are articulated later in this report.

CIMMYT adopted Research Management Systems (RMS) which is a web based management tool for tracking program performance. RMS enables program team members to elaborate research program and align them to organisational strategy, define scientist work plans, monitor both financial and physical progress of program activities. SIMLESA scientists work plans and milestones are captured within the RMS. Scientists work performance are monitored throughout the implementation period using the RMS system. Monitoring of individual budgets was made

easy by the RMS system, however these activities do not include NARS activities. Therefore, RMS cannot be fully utilized in monitoring SIMLESA activities since NARS activities are not integrated within the system. RMS is ideal for higher level management for instance in monitoring of individual scientists work performance and resources utilization. To compliment it, the Monitoring, Evaluation and Learning Unit has devised and excel sheet to follow NARS activities based on their submitted work plans and resources to keep track of performance and resource utilisation.

Policy Dialogue

A high-level policy forum was held on 27-28 October 2015 in Entebbe, Uganda. Fifty participants drawn from Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, and Uganda, attended the forum. The participants represented policy makers, scientists, farmers, private sector and development partners. The main theme of the policy forum was 'Mobilizing Policy Action to Scale-up Best Agricultural Practices'. Official opening consisted of statements in support of the theme by five representatives of the Ministers for Agriculture in Kenya, Mozambique, Rwanda, Tanzania and Uganda. The keynote presentation by a renowned Zimbabwean academic, Professor Mandivamba Rukuni, addressed the question: "Does agricultural policy matter in agricultural transformation?" Details of the policy forum are contained in ASARECA report and the communications section.

The main activity in 2016 has been the follow-up on countries to implement the actions in the communiqué. SIMLESA implementing countries are preparing meetings with the top ministry of agriculture organs to sensitize them on the aspirations of SIMLESA and how the actions from the communiqué can be mainstreamed in the planning cycles. The meetings will be followed by meetings with ministry technocrats to prioritize action points and sequence them in the annual and medium- term plans.

2 Achievements against program activities and outputs/milestones

This is the SIMLESA 2015/2016 annual report of activities conducted from July 2015 to June 2016 in Eastern and Southern Africa under Phase II of the program. This report presents program achievements objective by objective, from 1 to 5, before presenting country specific achievements as well as overall challenges and opportunities.

Notable achievements at objective level observed during this reporting period include, but are not limited to: the SIMLESA Mid-Term Review, high-level policy forum, the sixth annual review and planning meeting, and the Competitive Grants Scheme rolling out. The following are the achievements against program activities and outputs / milestones:

Objective 1: **To enhance the understanding of CA-based intensification options for maize-legume production systems, value chains and impact pathways.**

As evidenced by the work done in Ethiopia, Kenya, Tanzania and Malawi, economic analysis of SIMLESA promoted technologies across all the five countries continued to reveal that use of sustainable intensification practices (SIPs) improves labour productivity. Plans for adoption and impact assessments to refine impact pathways and facilitate learning, priority setting processes for maize-legume-forage/fodder production systems were completed where major stakeholders were consulted during the planning meetings using participatory methodologies, particularly in Ethiopia. SIMLESA-Kenya reviewed and synthesized literature to identify challenges and opportunities in crop/livestock interactions and shared with stakeholders.

Other activities done under Objective 1, more specifically in Tanzania, include analysis of opportunities and constraints for output market and agribusiness development (agribusiness survey), gross margin analysis of SIMLESA technologies and gender analysis of maize-legume value chain. Overall, above 90% of the agro-dealers trade in seeds and fertilizers. Results also indicate that about 93% and 91% of agro-dealers were dealing in pesticides and herbicides, respectively. Less than one quarter of the agro-dealers are trading in agricultural equipment and machinery. Gross margin analysis for improved agricultural technologies in SIMLESA program areas aimed at analyzing economic benefits of conservation agriculture against current agronomic practices (CAP) using cost-benefit analysis approach.

The Tanzania team would be developing a scientific paper on these two detailed studies conducted in Northern and Eastern Tanzania.

Based on the reviews of challenges and opportunities in crop/livestock interactions, data analysis and reporting would be finalized in 2016.The Kenyan team would also develop a scientific paper on the subject which would then inform future programming on crop/livestock interactions.

The program also continued to draw key empirical lessons at Objective 1 level, among them:

- Unobserved gender-based differences accounting for poor food security outcomes for female-headed households in Kenya, perhaps due to unreported nor documented social exclusion and discrimination.
- Adopting individual practice benefit farmers but suites of technologies contributed to high income in Ethiopia and Malawi and reduced external input use (chemical fertilizer and pesticides) without undermining yield
- Adoption of improved varieties improves food security of food insecure households in Tanzania
- For conservation agriculture to succeed, alternative feed sources are needed in Tanzania and Kenya since crop residue is a valuable source of livestock feed.
- Adoption of SIPs is highly conditioned by markets, social groups, extension and education.

In terms of risk reduction, farmers in SIMLESA communities particularly in Malawi reiterated that with a minimum of 20mm rainfall they were able to achieve more than 75% germination for their maize crop in CA plots compared to less than 40% germination in the conventional plots. Second, a combination of drought-tolerant maize varieties and CA technology reduced the downside risk of total crop failure by more than 50% for the adopters in the drier southern Malawi

The table below gives a summary of status of milestones according to the logframe and agreed workplans under Objective 1 (To enhance the understanding of CA-based intensification options for maize-legume production systems, value chains and impact pathways).

The achievements of milestones toward Objective 1 are summarized in Table 1.1 below.

Table 1.1 **Objective 1 Summary of milestones according to the logframe and program work plan**

No.	Activity	Outputs/Milestones	Completion date	Status of achievement	Comments
1.1.1	Create a continuously updated database of productive and risk reduction CA-based intensification options based on: i) review of the literature and other projects; ii) stocktaking of SIMLESA I experiences, including surveys and empirical evidence from on-station and on-farm experimentation, and; iii) on-going SIMLESA activities.	Dynamic web-based databases of CA-based intensification options (agronomic practices, varieties, crop choices/diversification, fodder/forage) were established.	2014-2018, updated annually	Work is still in progress to populate a web based database for CA based intensification options although 508 research villages/communities were characterized in 2010 for demonstrating and evaluating technologies during SIMLESA 1 and 2 In 2014, 6 CIMMYT Policy Briefs summarizing the empirical work in SIMLESA In Kenya 246 publications were acquired from various sources: Journals 178; Books 23; Conference Papers 17; Brochures 13; Reports 8; Conference Proceedings 5 and	Policy Briefs hard copies and PDFs have been shared extensively in SIMLESA and Adoption Pathways meetings

				Manuals 2.	
1.1.2	A meta-analysis of CA-based intensification options focusing on productivity, yield stability/risk, profitability, sustainability and adaptability.	- One peer reviewed synthesis of performance of CA-based intensification options - Implications of CA-based intensification options on crop failure analysed and documented	2014, updated 2016	Ongoing even though 8 technical briefs were produced by all the country teams and were being earmarked for dissemination on SIMLESA website.	Important to note is that the meta-analysis considered issues of gender and the potential risks and benefits of SI interventions
1.1.3	Evaluation of crop-livestock interactions, feed demand and supply options in six farming systems, through quantitative and participatory data collection and use of analytical tools. (Ethiopia, Kenya, Tanzania)	Synthesis of feed demand, and feed intervention options	2014, updated 2015	This activity is behind schedule although a work plan was developed in consultation with key stakeholders in Ethiopia, Kenya and Tanzania in 2014. Data has been collected for the target countries, but evaluations and analyses have yet to be completed, This activity has been sub-contracted to ILRI which has done two pronged FEAST assessment in Tanzania	The MTR observed that this activity is far from being achieved with the delivery dependent upon a comprehensive redesign of the livestock component of SIMLESA 11. ILIRI has developed a logframe focusing on evaluation of year round feed availability and utilization and prioritization of alternative approaches.
1.2.1	Analyses of agricultural input accessibility (fertilizers, herbicides, pesticides) in enhancing CA-based intensification options, including agribusiness opportunities and constraints.	Agricultural input supply options, constraints and (agribusiness) development opportunities identified	June 2015	Although a workplan was developed by Socioeconomics team in 2014, agribusiness opportunities and constraints have not been fully explored so this activity is behind schedule	The MTR noted that this activity could be sped up if considered in parallel with AIP activities under Objective 4
	Initiate a set of on-farm evaluations of feed and forage based technologies and combinations.	Fodder interventions with different forage types have been implemented in Hawassa Zuria woreda, and data collected on the survival and performance of planted forages	August until now	This activity is still ongoing and is on schedule	Seedling of two fodder legumes (Leaucaena, and Sesbania) and root splits of a grass species (Desho grass) were introduced into different planting niches. Survival of the fodder trees was affected by the El Nino and was limited

					to about 30%, whereas the Desho grass established more than 95% performed very well. Farmers started to get feed biomass from the planted forage.
1.2.2	Update the analysis of opportunities and constraints for output market and agribusiness development	Report on (gender specific) output markets constraints and (agribusiness) development opportunities for maize, legumes and fodder	June 2015	Completed Value chains were analysed in 2014 in Kenya and Ethiopia. The key findings from this work were completed in May 2015	The results focussed on the need to formalise as much as possible the maize and legume value chains within economic realities of Ethiopia and Kenya.
1.2.3	Determine local, national and regional institutional/agribusiness constraints (incl. policy) in the delivery and uptake of CA-based intensification options (by different farm types and farming systems)	Documentation of institutional/-agribusiness constraints to the delivery and uptake of CA-based intensification options	June 2015	This activity has been completed. A policy brief from Objective 1 was among the six policy briefs presented at a regional high level policy forum on 27-28 October 2015 in Uganda where key policy action points for SI were signed by five ministerial representatives from Kenya, Mozambique, Rwanda, Tanzania and Uganda. Databases of productive and risk reducing CA-based intensification options have been updated	Country specific follow-up planned for each country
1.2.4	Testing of alternative value chain interventions for developing competitive and efficient market system	Alternative input and output delivery options identified and report produced and shared with program members and other stakeholders	October 2015	This activity is behind schedule though on going.	Work to identify and test alternative value chain interventions is still in progress. Two issues identified and discussed with Mozambique and Malawi country teams.
1.3.1	Assess farmers' attitude toward risk and perception of risk sources and risk management strategies under	Survey instruments to collect data on risk perception and risk management strategies	December 2015	This activity has been done using the PRA approach and the report is being	The issue of PRA instead of the survey approach was informed by the

	different farm household types, resource condition (e.g. farm size) and agro-ecology	and carry out risk experiment survey to elicit risk attitude Country synthesis report on farmers risk attitude and perception of risk sources and risk management strategies under different risk attitude behaviour produced and shared with stakeholders		finalised.	resource availability.
1.3.2	Estimate cost of risk and its impact on welfare and the contribution of variability (variance) and downside risk to cost of risk under different CA-based SI technologies adoption and agro-ecology	Two papers documenting risk implications of CA-based SI investment options and contribution of downside risk and variance produced and discussed with stakeholders	Feb 2016 June 2017	Ongoing and on schedule	
1.3.3	Quantify productivity and risk trade-offs farmers face under different risk attitude, exposure and sensitivity regimes including CA-based SI technologies adoption	Productivity and risk trade-offs farmers face under different risk attitude classes and CA-based SI technologies adoption estimated	Oct 2017	Ongoing and on schedule	
1.3.4	Estimate the relationship between farmers' perception of risk sources and attitude toward risk against farm and farmer socio-economic characteristics and the cost of risk and risk attitude on technology adoption	Work on factors influencing risk perception and attitude to risk and associated costs	July 2015	Done but needs to finalised	Preliminary work on factors influencing risk perceptions and attitude have been done. More analysis needs to be done against socio-economic characteristics. This activity to be combined with activity 1.3.2
1.3.5	Exploration and refining of opportunities for investment in maize, legume and forage value chains through a better understanding of climate and market risks i) Two participatory modeling workshops at SIMLESA sites identifying opportunities for the on farm demonstration of profitable and risk reducing CA-based intensification opportunities, ii) Risk analysis and investment options discussed at farmer group and public-	Risk implications of CA-based investment options quantified and discussed with stakeholders	2014-2018, updated annually	Ongoing on schedule	Economic and trend analysis of all promoted technologies done annually as per schedule

	private partnership meetings.				
1.5.2	Adoption and impact assessments to refine impact pathways and facilitate learning, priority setting processes for 15 maize-legume-forage/fodder production systems. In partnership with the Adoption Pathways Project.	Report on annual Early Adoption monitoring survey Documented best-fit adoption and impact pathways	2015-2018, updated annually	Ongoing on schedule	Some adoption monitoring surveys were completed in 2013 while another round was done in 2016; analysis and report writing is in progress

The specific country and partner achievements of outputs and milestones toward Objective 1 are indicated below:

1.1 Ethiopia

Most of the SIMLESA research activities planned for the reporting period, July 2015 to June 2016 were implemented as per plan except few activities which were delayed due to external factors like seasonal climatic variations. SIMLESA activities were monitored in the field by country SIMLESA program coordination team and CIMMYT staff in the project implementing centers.

Participatory evaluation of alternative farm enterprise options for increasing productivity and reducing food insecurity was done in the last half of 2015. A cost-benefit analysis (CBA) was conducted. Data collection tools were developed and enumerators were trained and pre-testing of tools was done during the reporting period. CBA data were being collected for analysis, particularly in assessing different and combination of farm enterprise options.

Analysis of agricultural input accessibility (fertilizers, herbicides, pesticides) in enhancing CA-based intensification options, including agribusiness opportunities and constraints is in progress. Analysis of data were completed and the document was under review during the reporting period.

Adoption and impact assessments were carried out in all implementing centers. This was carried out in Bako, Hawassa, Melkassa Agricultural Research Center (MARC), Southern Agricultural Research Institute (SARI), Amhara Agricultural Research Institute (ARARI) and Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI), and Pawe Agricultural Research Center. Melkassa ARC and Pawe ARC have already collected data from 614 households (301 from Central Rift Valley, 200 from Southern Region and 113 from Pawe). The data were entered, cleaned and ready for analysis at MARC and data entry was underway at SARI and Pawe. In other centers, a field survey was extended due to competing time constraints particularly with the planting activities. The field survey is expected to be completed in these areas in September 2016.

1.2 Kenya

The Kenya-SIMLESA team reviewed and synthesized literature to identify challenges and opportunities in crop/livestock interactions and shared with stakeholders. Based on the reviews of challenges and opportunities in crop/-livestock interactions, data analysis and reporting would be finalized in 2016 to inform future programming. A list of niches for the various fodder crops was provided based on the discussions with BecA-ILRI Hub scientists. The SIMLESA-Kenya team would develop a scientific paper on the subject.

The team also evaluated crop/livestock interactions feed demand and supply options in two farming systems through participatory data collection and use of analytical tools. Past studies on fodder/forages, with particular focus by ICRAF agroforestry project were analyzed and discussions with stakeholders particularly in the state department of livestock were done. One working paper on analysis of the maize and legume value chains and market analysis for Kenya was developed so was the information on productive and risk reducing CA options. These were identified, synthesized and a report consolidated for use by the subject matter stakeholders.

Assessment of adoption and impact to refine impact pathways and facilitate learning, priority setting processes for maize-legume-forage/fodder production systems was carried out in November and December 2015. A monitoring adoption study on SIMLESA technologies using *snowball* sampling method was undertaken in project sites. Ten enumerators were trained and involved in data collection processes. Twenty-two host farmers and 78 members of local innovation platforms - LIPs (first generation farmers) were interviewed and provided names of others who were also introduced to SIMLESA technologies. A total of 2,000 second and third generation partners involving farmers and members of IPs were met.

Four functional farm typologies (two in Eastern and two in Western Kenya) were refined and documented through focus group discussions and further analysis of SIMLESA baseline data.

Adoption of CA components were documented and factors influencing sustainable intensification identified in collaboration with the Adoption Pathways Project.

1.3 Tanzania

Generally, economic incentives play an important role in the adoption of SIMLESA technologies and beyond. Gross margin analysis for improved agricultural technologies in SIMLESA program areas aimed at analyzing economic benefit of conservation agriculture against current agronomic practices - using cost-benefit analysis approach were done during the period under review. The project conducted a gross margin analysis in October 2015 after harvesting maize and cowpeas/beans in Mvomero, Kilosa and Karatu districts (See Table 1.2 below for the details of the results).

The project developed a socioeconomic data record sheet which was used by farmers and extension officers to collect input-output costs from management technologies (maize-legume intercropping + zero tillage + herbicide +fertilizer (CA), maize-legume intercropping + fertilizer - Current Agronomic Practices (CAP). Focus group discussions were done with both SIMLESA host and non-host farmers to verify the input-output costs.

Table 1.2 presents the details of gross margin analysis of CA as compared to CAP for maize and pigeonpea in Kilosa and Mvomero, and maize and beans in Karatu in the 2015 crop season. Results show that the CA technology was found to be more beneficial compared to CAP because of reduced cost on land preparation and weeding and increase in yield. Gross margin under CA was 29%, 16% and 22% more compared to CAP in Mvomero, Kilosa and Karatu districts, respectively.

Table 1.2: Cost - Benefit Analysis of SIMLESA technologies in 2015 crop season

	Mvomero		**Kilosa**		**Karatu**	
	CA	CAP	CA	CAP	CA	CAP
Maize Yields (Kg/ha)	2,500.0	2,450.0	1,960.0	1,940.0	3,597.0	3,327.0
Price (TShs/Kg)	500.0	500.0	625.0	625.0	500.0	500.0
Cowpea/Bean Yields[1] (Kg/ha)	322.5	265.5	650.0	645.0	530.0	501.0
Price (TShs/Kg)	2,000.0	2,000.0	1,250.0	1,250.0	2,000.0	2,000.0
Gross Revenue (Maize)	1,250,000.0	1,225,000.0	1,225,000.0	1,212,500.0	1,798,500.0	1,663,500.0
Gross Revenue (Cowpea/Bean)[1]	645,000.0	531,000.0	812,500.0	806,250.0	1,060,000.0	1,002,000.0
Total Gross Revenue (TR)	1,895,000.0	1,756,000.0	2,037,500.0	2,018,750.0	2,858,500.0	2,665,500.0
Cost of Inputs (A)	454,500.0	417,000.0	502,500.0	465,000.0	637,675.0	592,900.0
Cost of Labour (B)	428,625.0	623,275.0	375,000.0	573,800.0	401,250.0	658,288.0
Total Cost (TC) A + B	883,125.0	1,040,275.0	877,500.0	1,038,800.0	1,038,925.0	1,251,188.0
Gross margin (TR - TC) Tshs/ha	1,011,875.0	715,725.0	1,160,000.0	979,950.0	1,819,575.0	1,414,312.0
B-C ratio	1.1	0.7	1.3	0.9	1.8	1.1

Note: CA=Conservation Agriculture; CAP=Currently Agronomic Practices

[1]Cowpea in Mvomero and Kilosa districts; Bean in Karatu District

The analysis of opportunities and constraints for output market and agribusiness development was also updated where it was observed that agro-dealers were mainly involved in seed and pesticides with less concentration on fertilizers and sprayers. It was also observed that agro-dealers lacked business skills because of lack of experience.

Gender analysis of maize-legume value chain showed that family labour remains the major source of labour in maize-legume systems in Tanzania with women being the major contributors while land ownership was dominated by men except for female-headed households.

1.4 Malawi

In Malawi, the following activities were done:

- Adoption monitoring survey was undertaken to estimate the number of farmers who had heard of and adopted SIMLESA activities since 2010.
- Agro-dealers value chain survey
- Assessment of risk perception participatory rural appraisal

- Published policy briefs on review of input and output value chain analysis studies in Malawi

Data was collected from all six SIMLESA districts involving 1,151 farmers, where 656 were female respondents and 495 were male respondents. The average age of the respondents was 46 years with 15 years as minimum age. Data is still being processed to assess adoption levels and to further publish the results.

The short - to medium - term benefits of the activities to the community are:

In the short-term, data collected will help understand the number of farmers who are aware of technologies, source of information and level of use to inform the program on where to improve in dissemination of technologies. On value addition, data collected helps in knowing and mapping the input suppliers to understand how they are helping in disseminating SIMLESA technologies. In the long run, the survey will draw adoption recommendations which can better inform other projects promoting conservation agriculture in Malawi. Furthermore, the study will inform policy markers regarding CA for integration of positive benefits into the Malawian production and marketing policies.

The survey results will be benchmarked against previous adoption monitoring information. For example, 2013/14 survey information showed that farmers were aware of the technologies but on average 63 % had tried them either as SIMLESA host farmer or follower of host farmers. Of those that tried, 78 % out- scaled and were practicing the technologies on a larger scale, signifying adoption. The results also showed that most farmers preferred and adopted zero or minimum tillage under sole maize production followed by zero/minimum tillage in maize – legume rotation. As a result, farmers registered an average yield change of 67 % from using zero/minimum tillage. However, in the lowlands, zero/minimum tillage + basins + legumes-maize intercrop was the least preferred technology because it was labour intensive.

The SIMLESA ME& L Specialist conducted a one-day workshop on data collection, analysis and storage in December 2015, attended by country objective leaders and ME&L focal person. The main aim of the workshop was to strengthen the SIMLESA ME&L monitoring system. The team developed user-friendly data collection tools linked to program milestones, logframe and indicators. This would enhance quality in SIMLESA data management.

The team produced a policy brief, “Review of Input and Output Value Chain Analysis Studies in Malawi.” A poster entitled “Review of Maize Seed and Grain Value Chain Studies in Malawi”, was also produced.

1.5 Mozambique

From July 2015 to June 2016, the SIMLESA-Mozambique Objective 1 team conducted the following activities: visited different typology farmers, interviewed agro-dealers, produced a draft paper on gender and information acquisition, and held focus groups discussions. This resulted in the production of farmer case studies.

The three farmers already identified in the typologies analysis were visited by QAAFI and IIAM researchers in Sussundenga District. The objective of the visit was to discuss and identify the best interventions for the different farmers' typologies. During the visits, the best interventions for increasing productivity and reduce risk were discussed, followed by selection of plots for the trials. Observations were:

1.5.1 "Hanging in-Food Insecure" Farmer

The main causes for low yields last season and the household's food insecurity were poor rains and weeds pressure. The family had labour shortage for agriculture as the children were attending school. The selected treatments for this household included maize, cowpea, and sesame. Improved agronomy planted in four plots (5 rows x 10m) and lime would be applied to half of each plot. An area of high and uniform blady grass infestation was chosen for the trial.

1.5.2 "Hanging in - Food Secure" Farmer

The farmer had interest in getting more cattle through government and use them for draught power. The other interest was on new hybrid maize, more sesame, and vegetables. The selected treatments included four split plots for improved maize, cowpea, and sesame agronomy. All plots were split with manure application (30 litres per row – each row 10m, 5 rows per plot). Manure split was marked out and began spreading manure (two to six weeks before planting), 3 x 10 litre bucket were applied along the soil surface of each maize row. Each plot was five rows wide (0.9m wide rows) by 10m long (20m for lime plot).

1.5.3 Stepping out – Businessman

This farmer would plant his sole maize trials with his preferred management. Relay crop treatments (e.g. split-plots) on his maize trial after flowering would be used.

Interviews with agro-dealers in Sussundenga and Angonia districts were also held. The objective was to test the survey questionnaire developed for the value chain study which aimed at mapping the main herbicide supply chains and their location, and to understand if herbicide intensive CA is feasible given the supply chain patterns. Four agro-dealers (two in each district) were interviewed in Sussundenga and Angonia districts.

The results indicate that all the agro-dealer shops were owned by men. The agro-dealers in Angonia were members of the agro-dealers association in the district. Agro-dealers in both districts trade a variety of products including seeds, fertilizers, pesticides, herbicides, farming tools, and food items. They diversify their products to satisfy the different needs for agricultural inputs.

1.5.4 Gender Issues

A draft paper on gender, social networks and information acquisition in Mozambique was produced. The objective of the study was to examine gender and access to information on SIMLESA promoted agricultural technologies and used data from the adoption pathways survey conducted in Central Mozambique. The results showed that both men and women farmers have higher needs for extension training and information about new legume varieties (88%), new maize varieties (80%), crop rotation (76%), intercropping (76%), and minimum tillage (74%). In

addition, access to the training and information is relatively low. The study showed that 33% of farmers received extension training and information on new improved maize, and only 26% received information on minimum tillage.The study also showed differences between men and women in terms of information needs and access to information on the different technologies. Men are more likely to receive extension training and information compared to women.

Public extension services (55%), research (19%), other farmers (9%), NGOs (4%), agro-dealers, and spouses are the main sources of technological information. Results show that gender affects access to extension training and information.

1.5.5 Focus group discussion on AIP benefits

The objective of the focus group discussion was to discuss and document the benefits of the agricultural innovation platforms. The main benefits discussed include: crop related, economic, social, ecological, and infrastructural. The participants of the focus groups were farmers from Munhinga in Sussundenga District and Boavista in Macate District that are part of SIMLESA IPs in Mozambique. Six focus groups - two in Sussundenga and four in Macate were conducted with men and women separately. In total 41 farmers participated in the focus groups. In Sussundenga, participating farmers were SIMLESA demonstration plots hosting farmers and those farmers that adopted the SIMLESA technologies in the village while in Boavista, participants were farmers from a farmer association called “Associação agro-pecuária Zano Ra Mambo”. IP key informants were also contacted to understand the history and objectives of the IP.

Development and distribution of agronomic brochures were done during the reporting period. For example, brochures on agronomic recommendations and characteristics of three maize varieties (ZM 523, ZM 309, and Pristine) promoted under SIMLESA in Mozambique, were produced and distributed.

1.6 QAAFI

In Mozambique, QAAFI team developed an agronomic case study. The case study farmers identified in Mozambique were visited to discuss and agree on trial treatments. The trials were then planted at two farms in collaboration with QAAFI and IIAM. The objective of these trials was to support farmers experimenting with low -cost (labour and cash inputs) weed management options for different household types in Sussundenga. The questions were (i) whether relaying cowpea into maize crop would provide good weed control, and (ii) whether the relay cowpea should be planted at the first or second weeding event. Maize seeds distributed to all farmers: Only one trial had been sown to date due to the late start to the season. One on-station replicated trial was established at ISPM to evaluate weed suppression by relay crops against farmers’ practice and chemical fallow.

Three journal publications were published, a journal article and a book chapter were submitted for publication, and a book chapter was published in the third quarter of 2015.

Objective 2: To test and adapt productive, CA-based intensification options for sustainable smallholder maize-legume production systems

In the reporting period, main SIMLESA activities under Objective 2 conducted included evaluation of CA plots; performance evaluation of newly released legume varieties in maize/legume cropping systems; establishment of different experimental trials in both on-farm and on-station sites, best-bet technology scaling- up of CA as well as testing and evaluation of options for improving farmer access to inputs (seeds, fertilizer, knowledge, finance) for technology adoption.

Other activities conducted by Objective 2 included on-farm exploratory trials in Tanzania and Kenya, and the participatory evaluation of on-farm trials in addition to carrying out adaptive on-farm experiments with CA-based intensification options.

Farmer trainings were also conducted during the period under review. Objective 2 also held field days. In Mozambique, Objective 2 organized inputs and materials for 30 modified exploratory trials with three new varieties to test compatibility with CA for the 2015/16 season. The new varieties are two hybrids (Pristine and Molocue) and one OPV (ZM309). QAAFI facilitated the production of a first draft soil sampling manual. The manual outlines soil sampling protocols, analysis, and application to field-based research activities. The achievements of milestones toward Objective 2 are summarized in table 2.1 below**.**

Table 2.1: Objective 2 summary of milestones according to the logframe and agreed work plan:

No.	Activity	Outputs/milestones	Completion date	Status of achievement	Comments
2.1.1	Annual on-farm exploratory trials to verify co-identified promising CA-based intensification options in terms of productivity, yield stability/risk, profitability and sustainability (excl. variety evaluation. see 2.1.2) - at least three sites per SIMLESA country testing at least three refined options every year	Verified CA-based intensification options under smallholder farmer conditions.	2014-2018, findings reported annually	Ongoing on schedule	Finding to be reported annually from 2014-2018
2.1.2	Annual on-farm participatory evaluation trials of released improved maize, legume and forage/fodder varieties under CA practices to identify most suitable varieties with male and female farmers – with at least three sites per SIMLESA country testing at least three refined	Improved maize, legume and forage/fodder varieties suitable for CA-based practices identified.	2014-2018, findings reported annually	Ongoing on schedule. Forage studies established in Ethiopia and Tanzania based on partner demands	CA-based improved variety component trials have been conducted in each of the participating countries, and the results reported. Varieties were introduced and

	options every year				combined with 2.1.1 in some countries and implemented in collaboration with objective 3
2.1.3	Annual adaptive on-farm experiments with CA-based intensification options to: (1) Smart-sequence options and; (2) Integrate options at farm-level. This is done for different farm types in different agro-ecological conditions – with at least two farm types for five main farming systems in ESA, and at least one refined set per SIMLESA country every year	Verified strategies to smart-sequence and integrate CA-based intensification options for different farm types and agro-ecologies	2014-2018, findings reported annually	Ongoing on schedule	Country work plans were developed. Farm type studies initiated in Mozambique and Ethiopia in 2014 based on identified typologies and priorities
2.2.1	Annual continuation of on-station long-term trials under conditions representative of the agro-ecologies to monitor the medium to long-term productivity, yield stability/risk and soil health dynamics of CA based intensification practices, including effects on disease, pest and weed dynamics.	Precise data on the effects of CA-based intensification practices focusing on crop productivity, water and soil health dynamics.	2014-2018, repeated annually	Ongoing on schedule	Long term trials have been continued as planned. In Malawi, Kenya and Mozambique the on station trials were modified to include potential CA-ready varieties while smaller basins were also incorporated as split plots
2.2.2	Annual on-station evaluation of maize/legume varieties for CA-based intensification (released varieties only)	Suitable varieties for CA-based systems identified	2014-2018, repeated annually	Ongoing on schedule	Suitable varieties of maize and legumes have been identified for CA-based systems
2.3.1	Fine-tuning the implications of the tested options through analysis of trade-offs and synergies at intra-household, farm scale (in terms of resource allocations and seasonality) and village scale.	Detailed adoption constraints of CA-based intensification options at intra-household, farm and village scale	Dec 2014 and annually thereafter	Ongoing on schedule	Ongoing though some adoption constraints have been identified
2.3.2	Aligning and refining on-farm experimentation and soil health dynamics research to recommendation domains	Updated recommendation domains	2014-2018, refined annually	Ongoing on schedule	Recommendations have been updated and will continue to be refined
2.3.3	Development of an interdisciplinary monitoring protocol for on-farm experiments of CA-based intensification options focusing on productivity,	An interdisciplinary monitoring protocol for on-farm experiments of CA-based intensification	Dec.2014, refined 2016	Completed	Protocols are being developed reviewed in SIMLESA countries

	stability/risk, profitability and sustainability, and including some farm and household indicators	options that can be used beyond the project's lifespan.			

2.1 Ethiopia

Major activities carried out in Ethiopia under Objective 2 are summarized below:

- Evaluation of long- term on-station exploratory trials
- Performance evaluation of newly released common bean varieties in maize/common bean cropping systems
- Assessment of different fertilizer and bio-fertilizer schemes for soybean
- Evaluation of maize/pigeon pea intercropping under conservation agriculture
- Establishment of different experimental trials in both on-farm and on-station sites

2.1.1 Evaluation of long - term on-station exploratory trials

The results of these experimental trials clearly show that conservation agriculture give higher yield than conventional practice. However, it was observed that intercropping under conventional practice produces higher yields than sole planting. The evaluations were mainly based on numerous exploratory trials.

2.1.2 Exploratory Treatments

Protocol – 1a Treatments for on-farm exploratory trials in Bako Area

1. *Conventional practices: sole maize*. Traditional land preparation and maize management but with the same varieties and recommended fertilizer rate (100kg/ha NPS at planting and 150 kg/ha Urea) has been applied. Residues of last year were removed.
2. *Conservation Agriculture: sole maize*. No tillage, no burning. Residue retained (mulch) but with the same varieties and recommended fertilizer rate (100kg/ha NPS at planting and 150 kg/ha Urea).
3. *Conservation Agriculture: Maize-soybean intercropping.* No tillage, no burning. Residue (mulch) retained. Recommended fertilizer rate of maize (100kg/ha NPS at planting and 150 kg/ha Urea) has been applied. Soybean was seeded simultaneously with maize in the middle of two maize rows
4. *Conservation Agriculture: maize - soybean rotation.* No tillage, no burning. Residue retained (mulch). Maize has been planted this year (2015) and will be followed by soybean next year. Recommended fertilizer rate (100kg/ha NPS at planting and 150 kg/ha Urea) has been applied.
5. *Conservation Agriculture: legume - maize rotation.* No tillage, no burning. Residue retained (mulch). Soybean has been planted in 2015 and will be followed by maize next year in. Recommended fertilizer rate (100kg/ha DAP) has been applied.
6. *Conservation Agriculture: sole soybean*. No tillage, no burning. Last year residue retained (mulch) but with the same varieties and recommended fertilizer rate (100 kg/ha DAP) of legume has been applied at planting.

BARC: Bako Agricultural Research Center had been advised to focus only on maize- soybean cropping systems as maize haricot bean cropping system trials are under way at ARARI**.** In this first year (2015/2016) of the newly established long-term on-station experiment, comparable yields of maize were obtained under both minimum tillage and conventional practice tillage practices across intercropping, sole cropping and rotation cropping systems. The highest soybean yield was obtained from plots intercropped under CA compared to their conventional practice (CP) counterparts. Comparative yields were obtained from both tillage practices from sole soybeans planted for rotation and permanent plot. Even though financial analysis (e.g. partial budget) is required, the highest land equivalent ratio (LER) was obtained from producing maize-soybean intercropping under CA. The experiment for 2016 was planted.

HARC: As a continuation of the previous season, 11 maize-bean cropping systems were tested under CA and conventional practice at Hawassa Agricultural Research experimental station with three replications. Other than yield and agronomic parameters, resource use efficiency and soil–water and nutrient dynamics of the systems will be evaluated. Soil moisture content measurements are monitored using water probes (once in a month) and during crop planting and harvesting of component crops following the methods of gravanometric to see the long-term benefits of the systems. The experiment had already been established on station. The associated soil sample were collected during planting with spacing of 75 cm by 30 cm between

rows and plants respectively for maize crop and 40 cm by 10 cm between rows and plants for common beans. The list of treatments established at HARC are summarized below.

Treatment of Long- Term Exploratory Trial at HARC

Continuous maize with repeated tillage (CN), Rotation Maize with repeated tillage (CN), Rotation Beans with repeated tillage (CN), Maize bean inter cropping with repeated tillage (CN), Continuous beans with repeated tillage (CN), Continuous maize with minimum tillage (CA), Rotation Maize with minimum tillage (CA), Rotation Beans with minimum tillage (CA), Maize bean inter cropping with minimum tillage (CA), Continuous beans with minimum tillage (CA) and basin planting with minimum tillage (CA).

***MARC*:** The results of the experiment established in 2015 at MARC was poor due to the adverse effects of drought. The trials were seriously affected at vegetative stage. For 2016, the experiments were established and were in good condition.

***PARC*:** Evaluation of *striga* controlling efficiency of cropping system and organic and inorganic fertilizer application on maize under conservation agriculture: From last year's experiment, there was no significant difference among treatments due to high *striga* incidence. As a result, the treatments were revised and repeated in 2016.

2.1.3 Performance evaluation of newly released common bean varieties in maize/common bean cropping systems

Land Equivalent Ratio (LER)

LER was significantly higher ($P<0.05$) due to intercropping of shone variety with either Remeda, Wajo or H. Dume varieties compared to other maize and common bean variety combinations. Conversely, LER was lowest due to mono-cropping of either common bean or maize as a sole crop. However, growing either maize crop with any of the aforementioned varieties of common bean has produced more than 50% advantage of land use in the study areas. This depicts that cropping systems productivity is enhanced due to growing more than one crop in a given land in a year instead of growing each crop at a time.

Table 2.2: Mean of growth and yield components of maize and common bean grown under CA

No.	Treatments	**Common bean**				**Maize**		**LER**
		Grain Y (kg/m2)	TSW (G)	HI	Biomass Y (kg/m2)	Grain Y (kg/m2)	HI	
1	Sole Remeda	0.302	335	0.41				1

2	Sole Wajo	0.093	354.8	0.67				1
3	Sole H.dume	0.172	320	0.34				1
4	Sole BH-540				0.73	0.42	0.575	1
5	Sole Limu				1.13	0.52	0.424	1
6	Sole shone				1	0.42	0.427	1
7	BH540-Remeda	0.138	324.5	0.52	0.67	0.37	0.545	1.55
8	BH540-Wajo	0.139	338.9	0.38	0.83	0.31	0.374	1.42
9	BH540-H.dume	0.06	254.5	0.26	0.79	0.3	0.378	1
10	Limu-Remeda	0.09	319.7	0.41	0.89	0.36	0.424	1.27
11	Limu-Wajo	0.125	415.9	0.48	1.35	0.39	0.305	1.52
12	Limu-H.dume	0.09	232.4	0.51	0.81	0.28	0.358	1.43
13	Shone-Remeda	0.175	34.8	0.46	1	0.42	0.427	1.85
14	Shone-Wajo	0.192	327.5	0.36	1.01	0.37	0.392	1.83
15	Shone-H.dume	0.19	227.7	0.43	1.18	0.64	0.548	1.86
	LSD (%)	**0.0604****	**16.484***	**NS**	**0.1126***	**0.035****	**18.4***	**0.09***
	CV (%)	**22.9**	**3.25**	**13.1**	**15.6**	**18.3**	**14.2**	**14.2**

2.1.4 Biomass and grain yield in Halaba soybean

Evaluation of different fertilizer and bio-fertilizer schemes for soybean indicated that Hambi 3513 and Hambi 3520 produced significantly ($P<0.05$) higher grain and biomass yield compared to no fertilizer amendment applications. The fact that significantly lower ($p<0.05$) grain yield and biomass was obtained from plots where little or no fertilizer was applied manifest the reality that application of organic or inorganic soil amendments is critical for soybean production in Halaba. The fact that Hambi 3513 and Hambi 3520 produced statistically superior biomass and grain yield would indicate the existence of alternative soil amendment options for soybean producers in Halaba area.

2.1.5 Evaluation of different fertilizer and bio-fertilizer schemes for common bean

Common bean biomass measured from plots where Hambi 3562 were applied was greatest compared to either Hambi 3570 or recommended NP fertilizer regimes. Least biomass yield means were measured from plots where neither artificial nor organic fertilizer amendments were

made. Grain yield of common bean followed similar pattern. From this preliminary study, it could be noted that cost effective common bean production could be possible through use of bio-fertilizer Hambi 3562.

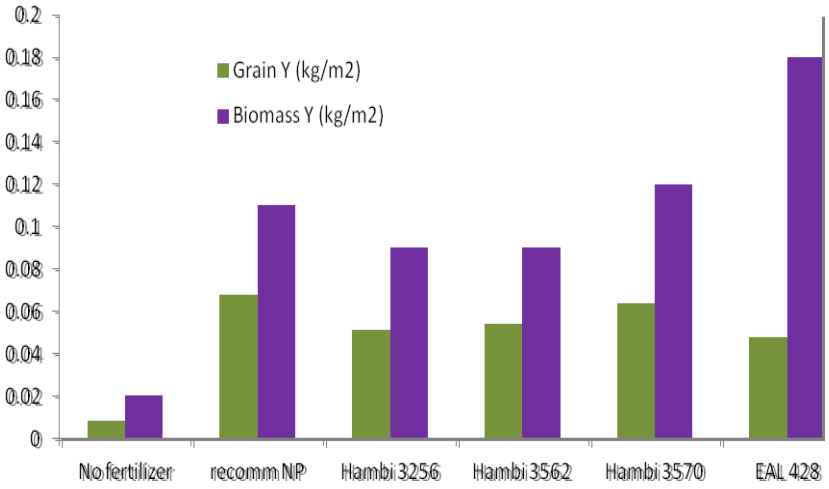

Figure 2.1: Effects of Rhizobial fertilizers on grain yield and biomass of common bean in Boricha

2.1.6 Evaluation of maize/pigeonpea intercropping under conservation agriculture

Maize from conventional tillage has suffered a lot due to extended drought of 2015 whereas superior growth performance was observed from plots of maize /pigeon pea intercropping. Field data was collected and compilation is underway.

2.1.7 Dynamics of macrofauna under conservation agriculture farming system

This research was conducted with the objective of comparing dynamics of macrofauna under conservation and conventional agriculture in maize/bean cropping system and determining the impact of soil macrofauna on maize/bean productivity.

The treatment that had a large number of macrofauna were those that implemented conservation agriculture, those plots where maize is grown with common bean (T2) when compared to other conservation agriculture and conventional agriculture cropping practices This might be attributed to the extent of multiple cropping and residue retention in CA plots compared to plots under conventional agriculture. The magnificent effect of these soil organisms is beneficial for growing crops in these plots mainly because of their effect in decomposing the crop residue, improving the rhizosphere and subsequently enhancing soil biological activity.

2.1.8 Weed density under CA in Boricha and Loka Abaya

Digitaria abyssinicum was the most abundantly occurring grass weed species under sole maize and sole common bean cropped system (CA) while the other weed species were suppressed with different intercropping systems. *Commelina* species had a great influence as it is growing

with creeping nature even at early crop growing stages and hinders crop harvest. *Agreratum conyzoids and Galinsoga perviflora* have caused troublesome effects in these production areas under CA. Conservation agriculture production systems are necessary to preserve agricultural productivity and meet future global food demands. To implement these systems, adequate weed control is crucial for their success. Herbicide use has been a valuable asset when adopting conservation practices. Further development and testing of alternative weed management practices that can be utilized along with herbicide applications must be pursued for conservation practices to remain successful.

Table 2.3: Mean Abundance of major weed species across varying treatments in Boricha

No.	Treatments	Digitaria abyssinicum	Galinsoga perviflora	Ageratum conyzoids	*Giuzotia scabra*	Commelina spp,	Medicago polymorpha
1	Maize -common bean intercropping under CT	11	4.25	2.75	1.5	1	1.25
2	Maize -common bean intercropping under CT	10.25	3.25	2.5	0	0.5	0.25
3	Maize –cow pea intercropping under CT	2.75	3.25	4	1	1.25	0.5
4	Sole maize under CT	16	1.25	5.75	1	1	0
5	Sole common bean under CT	20.5	4	0	0.75	2	0
6	Maize common bean rotation plot	8.75	2	11	0.75	1.75	0

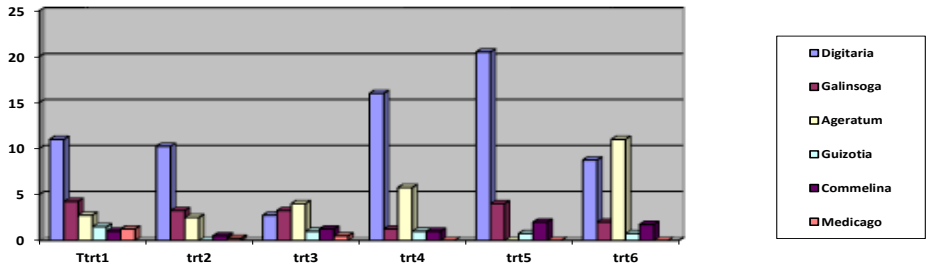

Figure 2.2: The graph shows abundance of different weed species with their respective treatments under CA at Boricha

2.1.9 Testing and evaluation of options for improving farmer access to inputs (seeds, fertilizer, knowledge, finance) for technology adoption

- Community and institution-based seed multiplication scheme was prioritized and were able to deliver maize and legumes (soybean and haricot bean) seeds for farmers in the locality. Under these schemes maize (BH540), soybean (Belesa-95) and Haricot bean (Nasir) were multiplied.
- Forty participating farmers and eight development agents were trained on the basics of seed production technology in Pawe, Mandura, Dibate and Bullen districts. Foundation seed were distributed for farmers.

2.1.10 Permanent on-station long-term trials

This activity was conducted under conditions representative of the agroecologies to monitor the medium to long-term productivity, yield stability/risk and soil health dynamics of CA- based intensification practices, including effects on disease, pest and weed dynamics. Accordingly, a replicated CA experiment was conducted for the third season at Fafen sub-station by modifying, with a previous treatment modification. Experimental plots were harvested and data entry and analysis was underway.

2.1.11 Annual on-station evaluation of maize/legume varieties for CA-based intensification

One new replicated maize adaptation trial was planted at Fafen on-station. It included six released varieties. One new haricot bean adaptation trial plantation at on-station was also planted on-station at Fafen. This included eight released varieties. Data were collected and data entry is under way.

Soil samples from all the permanent plots were collected at planting and flowering stages and was ready for soil analysis. The sites geo-reference data were collected. All trials at Jabitenane, South Achefer and Adet districts were planted on time since this part of the country experienced good rains. The experiments were well managed and their data, including agronomic, labour cost, weeding time and input cost, were collected and recorded.

2.1.12 Long- term on-farm/ Farmer Training Center (FTC) exploratory trials

Five long-term on farm/FTC exploratory trials were established to see the long-term impact of CA for maize soybean cropping system. Based on comments from the SIMLESA Phase II country planning meeting, the maize haricot bean cropping systems were dropped and soybean maize treatments were maintained and put on FTCs than keeping them on farmers' fields as residue retention had been difficult to maintain. Experimental crops were being harvested. Data entry and compilation for analysis was underway.

2.1.13 Best-bet technology scaling up of CA

Thirty-eight best bet CA technologies for scaling out farmers were conducted in four districts of Wayu-Tuka and Gobu-Sayyo in East Wollega; Illu-Galan and Bako Tibe in West Shewa. The participants were involved in maize-legume intercropping and legume maize rotation under CA

on a quarter of land. The activities were conducted smoothly except unexpected rains during the maturity stage. The crops were harvested during the reporting period. Trashing and yield data collection were underway. During this reporting period, a number of farmers participated in field days and exchange visits organized by the project to facilitate CA adoption among the respective communities of CA scaling out activities. On the field days organized in Bako-Tibe, Ilu-Gelan and Gobu-sayo, 421 (47 female) stakeholders including 385 farmers, participated.

The CA trials at Bako Agricultural Research Center were modified during the September 2014 SIMLESA II inception workshop in Hawassa. The modification was meant to focus only on maize soybean cropping systems as maize haricot bean cropping system trials were promoted by ARARI Research Center. The center was also advised to increase trial plot sizes from 25 m^2 to 100m^2 and change trial location to appropriate area that could accommodate these large plots. Based on these comments, the on-station mother trial has been changed to the recommended cropping systems, larger plots and suitable location. On the treatment protocol, all experimental crops were harvested. Data entry and compilation for analysis were underway. The results would be presented after analyzing the data.

Eleven treatments comprised of both sole and multiple maize-bean cropping systems were under conventional and five conservation agriculture practices were conducted at Hawassa experimental field in 2015. The varieties used were BH-543 (maize) and Hawassa-Dume (common bean). The treatments arranged in RCBD with three replications of 5 m by 4.8. m. The conventional plots were cultivated three times. Plots for CA trials were treated with pre-planting herbicide (glyphosates) to eradicate weed. Soil samples at three depths were taken before planting and at the time of harvesting. All relevant agronomic and phonologic data were collected throughout the cropping season, including yield and yield components. Management practices such as weeding time and frequency and fertilizer applications rate and time and man days, moisture content and soil related data were recorded throughout the season. The highest maize grain yield was recorded from CA maize basin planting treatment followed by CA maize after bean rotation - the yield is 2.98 t/ha and 2.81 t/ha respectively. Continuous maize under conservation practice and maize after bean rotation showed good yield as compared with the other treatments.

Generally, this farming season was bad due to erratic rainfall in these areas. However, the conservation tillage practices showed better resistance to low moisture stress condition as seen from the grain yield analysis results than conventional tillage system. Treatments on conservation tillage practices showed reasonable yield increment as seen in conventional tillage practice. Though considerable grain yield of maize was reduced by intercrops, it was compensated by intercrop with common bean yield

2.1.14 Comparison of conservation- based maize-bean cropping systems and conventional farmers practice

During the reporting period, four conservation agriculture-based maize-legume and farmer practices under conventional tillage systems were conducted in three districts in the southern region of Ethiopia. The trials were replicated on five farmers' fields in each district. The maize variety used was BH-543 and common bean variety was the plot size of the trial- 100 m^2 with

row spacing of 75 cm for maize and 40cm for common beans. Maize and beans were planted simultaneously for intercropping. Pre-planting herbicides were applied to clear weeds. More than one third of maize stalk were left on the plot as a package of the CA technology for the last four years.

Soil samples were taken at time of planting and harvesting for the two component crops. Relevant agronomic traits were collected for each component crop. Results show that intercropping give higher yield than sole cropping. The differential response between the locations was due to the late rainfall onset and uneven distribution at the time of planting.

2.1.15 Exploring Herbivory opportunity to achieve nutrient recycling, soil improvement and weed control in CA-based crop-livestock farming system

This activity was intended to be executed in two phases (Phase I: CA maize intercropped/relayed with forage species in the main rain season and Phase II: grazing versus residue retention level in the off-season. Accordingly, the first phase of the activity was executed at Melkassa and Arsi Negele Research centers. The first phase of the activity was carried out as planned at both locations by planting maize variety Melkassa-4 on plot area of 11m x 7m, plant spacing of 75 cm and 25 cm between rows and plants in a row. In between maize rows pigeon pea and Brachiaria grass were sown at plant to plant spacing of 120 cm in May 2015 at Arsi Negele and in June at Melkassa. At Arsi Negele the seedlings were damaged by rodents / rats. The pigeonpea and *Brachiaria* grass again failed due to dry spells and the team did planting for the third time with little success in *Brachiaria* establishment. On the other hand, both the three crops in the intercrop established well at Melkassa. It was partly funded from government activity which was not lasting and the experiment was interrupted and not carried out to its second phase mainly because of limited funding.

2.1.16 Dynamics of macrofauna under conservation and conventional agriculture in maize /legume cropping system

This research was conducted with the objectives of comparing dynamics of macrofauna under conservation and conventional agriculture in maize/bean cropping system and determining the impact of soil macrofauna on maize/bean productivity.

The treatment that had large number of macrofauna were those that were implemented under CA with maize and common bean as compared to other CA and conventional practice) practices. This might be attributed to the extent of multiple cropping and residue retention in CA plots compared to plots of conventional practice. The effect of these soil organisms is beneficial for growing crops in these plots mainly because of their effect in decomposing the crop residue, improving the rhizosphere and subsequently enhancing soil biological activity.

Table 2.4: Mean values of Macrofauna between treatments

Macrofauna	***Treatments***						***CV***
	T1	***T2***	***T3***	***T4***	***T5***	***T6***	
Termite	0.67a	10.6a	2.8a	0a	7.9a	1.4a	93.7
Ants	12.9b	18.2b	42.8b	24.2b	10.8b	11.4b	19.9

Millipedes	0.23b	1.3a	0.1b	0b	0b	0.3	129.9
Centipede	0.9a	3a	1.3a	1a	0.7a	1.7a	84.5
Others	2.4a	4a	4a	3.3a	1.4a	4.3a	29.2

Where : T1= Conventional agriculture maize with common bean T2= under conservation agriculture maize with common bean T3= under conservation agriculture maize with cow pea T4= under conservation agriculture sole maize T5= under conservation agriculture sole common bean T6= under conservation agriculture rotation maize with common bean OTHERS= beetles, spiders, scorpions , white grub and crickets

2.2 Kenya

2.2.1 On-farm exploratory trials

Twenty four on-farm exploratory trials which were first established in close collaboration with the existing IPs in Kenya, continued. Twelve trials established during the long rains of 2015 were harvested in the months of August and September in Siaya and Bungoma sites. Yield data obtained from the trials were submitted to CIMMYT-SIMLESA in Nairobi for further analysis. The same 12 trial farms were planted during the short rains in September and October. The 24 exploratory trials were being managed in close collaboration between SIMLESA and KALRO scientists and the four innovation platforms with each IP hosting six such trials.

In Embu and Kakamega, there were reductions in number of trials. The number of exploratory trial farms was reduced in 2015 from 24 to 12 in line with the reduced project budget and prioritization of activities. However, more than 800 adopters/ out-scaling demos were established. On-farm trials were harvested by partners in September 2015. Data collected included soil characterization, crop growth (physiological) and yield parameters. Operationalization of the trials was under the project scientists and two MSc. students from Nairobi and Kenyatta universities. The students were conducting studies in economics of maize and legumes production under CVT and CA farming practices in Eastern Kenya.

2.2.2 Participatory evaluation of on-farm trials

Three participatory evaluation trials, in two agroecological zones in Eastern Kenya and two trials in two agro ecological zones in Western Kenya were being evaluated with 11 pre/new released maize varieties, 18 legumes (10 bean varieties, three cowpea varieties, three groundnut varieties and two pigeon pea varieties), and five leguminous fodders and three grass fodders.

Improved maize varieties tested were KM 1201, KM 1101 and KSTP 94 all under conservation agriculture. Planting of the same trials for the second season was finalized in August and September in Siaya and Bungoma respectively.

In Eastern Kenya, four farmer groups - cum IPs were testing and scaling out the SIMLESA I selected crop varieties under CA in two agroecological zones. In Western Kenya, use of agricultural lime to ameliorate soil acidity with follow up phosphate application in both legumes and cereals in soils with pH less than 5 was carried out.

The long-term on station trial started under SIMLESA I continued in Phase II with new emphasis being laid on measurements on changes in soil biological chemical and physical properties attributed to the effect on CA. This is done in collaboration with CIAT. Three MSc students in Eastern and three in Western Kenya were attached to this project's activities

2.2.3 Adaptive on-farm experiments with CA-based intensification options

One trial to evaluate the effect of lime application on the performance of beans was planted in Siaya during the short rains of 2015. Two on-station trials were started at KALRO Alupe and Kibos centers by CIMMYT- SIMLESA agronomists in collaboration with KALRO agronomists in Western Kenya during the second season of 2015. The objective of the experiment was to test and make available to farmers, targeted and sustainable *Striga* and maize lethal necrosis (MLN) control strategies and their combinations for improved maize crop productivity under CA options.

Specifically the aims of the experiment were:

a) To decimate the seed bank of *Striga* in the soil and reducing infestation with MLN.
b) Bringing the technologies to the farmers - facilitating access to, and delivery of Imazapyr Resistant (IR) or StrigAway and MLN tolerant maize seeds.

The experimental treatments were:

i) Conventional tillage (CT): maize with residue removal, manual seeding and fertilization in the tilled seedbed after ploughing. Plots are subdivided into split plots with continuous maize, maize/legume intercropping, and fertilizer plots
ii) No-till direct seeding (NT): maize with residue retention, seeding and fertilization is carried out with the dibble stick. Plots are subdivided into split plots with continuous maize, maize/legume intercropping, and fertilizer plots.

The on-station experiment was replicated at six on farm trials, three in Siaya and three in Busia counties. The on-farm design was however simplified with farmers testing the three varieties intercropped under CT and NT with a uniform N rate of 30 kg N ha^{-1}. To give a total of six plots per farm (2 tillage × 3 varieties × 1 intercrop × 1 fertilizer treatment).

2.2.4 Assessment of on-station long-term trials

The long-term on station trials started in 2010 at KALRO Kakamega was harvested in September 2015 and the yield data obtained was tabulated and submitted to CIMMYT-SIMLESA in Nairobi for further analysis. Planting of the trials for the short rains of 2015 was finalized in October and maize crop was at near tasselling stage while beans were ripening at the time of reporting. Soil samples were taken from all the plots just before harvesting for

biological analysis at CIMMYT-SIMLESA in Nairobi, to evaluate the effect of the applied treatments on the below ground soil microfauna.

In collaboration with CIAT and CIMMYT scientists, soil samples were analyzed from the students' and existing SIMLESA trials to access the effect of CA on buildup of soil microbes (e.g. bacteria, fungi and nematodes). A draft paper targeting an international refereed journal has already been prepared.

On development of an interdisciplinary monitoring protocol, stakeholders for this development for on-farm experiments of CA-based intensification options have been sensitized in three counties in Eastern Kenya so that the protocol would be developed in collaboration with CIMMYT.

2.3 Tanzania

During the period under review, the established long-term on-station trials at Ilonga and SARI, and nutrient response trial at Mandela Community was harvested and data processing and analysis were also done. The overall objective being to test and adapt productive, CA-based intensification options for sustainable smallholder maize-legume production systems. On-farm trials were conducted at Rhotia and Changarawe communities in Karatu District on five farmers' fields in each community. In Eastern Zone, on-farm trials were established in Kilosa and Mvomero districts in Muungano and Tangeni communities, where nine farmers in each community were involved. Soil analysis in collaboration with CIAT, was on-going and data analysis for both on-station and on-farm was undertaken.

Table 2.5 Long term trial treatments at SARI 2015 cropping season

CA + 0 kg N ha
CA + 40 kg N ha
CA + 60 kg N ha
CA + 100 kg N ha
CAP + 0 kg N ha
CAP + 40 kg N ha
CAP + 60 kg N ha
CAP + 100 kg N ha

Soil samples were collected for analysis prior to trial establishment to determine soil condition at planting. Soil analysis was done using standard analysis methods at Selian Agricultural Research Institute laboratory. The analysis was done to determine soil pH, organic carbon, and total nitrogen, available phosphorous and exchangeable potassium. Statistical analysis was done using Excel and GenStat packages

2.3.1 Results and discussion

The study area soils are characterized by neutral soil reaction with pH and medium soil organic matter (<2.5%). Available phosphorous ranges between 15-23 mg kg^{-1}. Total soil nitrogen ranged from 0.15 to 0.28.

Application of fertilizer had significant effect ($p<0.05$) on maize grain yields. The highest yield was obtained when 100 kg N ha^{-1} was applied on a CA based plot. It was interesting to note that there was no significantly difference on grain yield when 40 kg N ha^{-1} was applied on CA-based system and when 100 kg ha^{-1} was applied on CAP. The use of FYM significantly increased maize grain yield on CA based system as compared to CAP.

The study led to the conclusion and confirmation that a poorly distributed and low rainfall during the cropping season greatly affects performance of crop. Lack of rain during the short rains had significantly affected the soil moisture balance hence relatively low grain yield was realized. The effect of fertilizer application was enhanced by CA resulting to higher grain yields. CA plot attracted a large number of a wide range of soil fauna. This has resulted frequent insect infestation on CA plot. The opposite trend was observed on the CAP plots.

In the Eastern Zone, the development of pigeonpea ratooning regime for the maize-pigeon pea intercropping system under conservation agriculture at Ilonga-Morogoro was done during the period under review. The main objective of the study being to develop and recommend to farmers, the best pigeon pea-ratoon regime in the maize and pigeon pea intercropping system. This led to the conclusion that prolonged dry spell coupled with termite destruction on crop residues together with insect damage on ratoon pigeon pea plants affects the performance of crops in both CA and CAP which confounded the results. The trial need to be repeated again before conclusive remarks can be made.

2.3.2 The Urea Trial in Mandela Village, Mvomero

Urea trial was revised to include P fertilizer as blanket recommendation (40 kg P/ha) in an effort to find out the non-responsiveness of Nitrogen fertilizer. In addition it was proposed to include CA plots (practice) instead of the only CAP used in the back years. The trial was conducted on two sandy and clay soil plots both of which received similar treatments. There was poor crop establishment in the sandy plot due to vermin (rats) despite the gap filing/replanting. The observation was that during the first year of adopting CA-based system, the most visible benefit is associated with economic advantage of the system particularly low operation cost and relatively higher yields. The long-term benefit of any CA-based system would involve gradual build-up of soil organic matter and associated soil physical conditions.

In collaboration with Objective 4, the project conducted three field days. The following short and medium-term benefits accrued from on-farm trials:

- Farmers realized increased from 2.5 to 4 tons/ha maize and from 1.5 to 3 tons/ha legumes yields through drought tolerant crops from practicing conservation agriculture to other farming practices.
- By adopting conservation agriculture, smallholder farmers benefited from reduced cost of production
- Labour saving: Farmers have saved by 50% on time for other economic activities through adopting zero tillage.
- Management of crop residues remains the major challenge once the crop is harvested. Provisional solution is compromised with farmers to utilize the softer part of the plant for feeding animals and the remaining hard part as material for soil cover.

Synergies with other projects like FACASI, have been established.

2.4 Malawi

During the period under review, SIMLESA-Malawi Objective 2 had the following planned activities:

- Hold review and planning meeting for Objective 2 assessing the 2014/15 cropping season and planning for 2015/16 cropping season
- Data entry and processing from the on-farm exploratory and on-station trials for the 2014/15 cropping season
- Develop protocols for the implementation of on-farm exploratory trials and on-station CA-based trials at Chitala Research Station in Salima District
- Procure inputs and distribute to SIMLESA sites where on-farm exploratory trials and on-station CA based trials are being implemented
- Plan for measurement of particulate organic matter and general soil sampling and time to pond in SIMLESA on-farm exploratory trials
- Train SIMLESA core farmers and data collectors on implementation/management of CA-based trials and data collection
- Hold farmer feedback meetings on on-farm exploratory trials

The on-farm exploratory trials were implemented in six districts spread between two major agro ecologies where maize is the major crop; the low altitude covering Salima, Ntcheu and Balaka districts and the mid-altitude covering Mchinji, Kasungu and Lilongwe districts. In these six districts, all exploratory conservation agriculture trials were managed by trained extension agents and closely supervised by Objective 2 team leaders. The project established 36 exploratory trials but six in Balaka were abandoned due to poor data collection by extension workers. The project established four on-station trials at Chitala Research Station. Also, the

project conducted three supervisory visits to exploratory and on-farm trials and regional backstopping.

The research scientists strive to validate “best-bet” options for the management of maize-legume systems under CA conditions in the aforementioned districts through participatory research-led farmer managed trials. This is in addition to on-station CA trials implemented at Chitala Research Station in Salima District. The results were shared with other objectives in the program for local scaling out.

Objective 2 held a review and planning meeting on 20-22 August, 2015 at CIMMYT- Harare, where a number of issues were discussed. The meeting reviewed the implementation progress of the 2014/15 cropping season which marked the first year of SIMLESA II. During the review, participants observed that the modifications made on both on-farm exploratory trials and on-station trials were promising and ought to be continued. These modifications were made based on SIMLESA I activities implemented on the same sites. The Objective also added some trials and additional data to be collected from the trials to answer some questions emanating from SIMLESA I.

The meeting assessed the status of data collection on the on-farm exploratory trials for the 2014/15 cropping season and registered success in five SIMLESA districts with the exception of Balaka where maize varieties were not planted as per protocol instructions. The team decided to work on data from the rest of the districts for data entry and processing. The data was entered and partly analysed. Challenges were observed in Balaka District that needed to be followed up and resolved regarding implementation, management and monitoring of the exploratory trials. Ntcheu District required more effort to assist the data collector and extension agents who were new to the implementation of SIMLESA activities as a result of staff turn-over and retirements.

With on-station trials, it was pleasing to note that implementation during the 2014/15 cropping season surpassed expectations. However, data handling became a challenge and needed particular attention and assistance from the Objective 2 team leaders.

Exploratory trials had 36 host farmers for the exploratory trials of which each host farmer is expected to have minimum of 10 follower farmers (360 participants).

The farmers who practiced SIMLESA promoted technologies including CA, experienced yield increase and the farmers’ crops were resilient to dry spells.

The cropping season during the review period encountered a lot of rainfall variability with more rains than expected in particular months and persistent dry spells during certain periods. This affected a number of trials on some sites.

Pigeonpea seed was distributed for production by SIMLESA core farmers in Salima, Ntcheu and Kasungu districts with the view of buying out after produce. Extra seed of different varieties

were also distributed in the same areas for mounting demonstrations so that farmers could choose the variety of their choice for production in subsequent years.

Table 2.6: Purchases of inputs and their distribution

Description	On-station	On-farm
Maize seed	120 kg	360 kg
Legume seed	50 kg	330 kg
Inoculant (soybean)	-	1 kg
Herbicides	40 litres	54 litres
Fertilizer	25 bags	60 bags

The review meeting also observed that there was lack of documentation of SIMLESA activities. It was resolved that working with the communications specialist, SIMLESA-Malawi should produce more articles, photographs, and stories. A total of six CA trial protocols and data collection sheets were developed; two for on-farm trials and three for on-station trials at Chitala Research Station. Chitala CA long-term trial protocol and data collection sheets were developed.

The project trained researchers and technicians from Chitedze and Chitala research stations on rapid soil sampling and analysis on 16 November 2015.

The project also purchased and distributed farming inputs to sites in Balaka, Ntcheu, Lilongwe, Mchinji, Salima and Kasungu districts as well as Chitala Research Station.

2.5 Mozambique

SIMLESA Phase I has provided lessons for sustainable intensification using integrated approaches not applied before in Mozambique. The conflicting information provided to extension officers, NGOs and then to farmers, lacked science. For example, sole components of CA were negatively implemented without proper soil and crop management and as a result adoption was almost zero. During SIMLESA I and continuing in SIMLESA II, best fit approaches were developed, researchers, extensionists and farmers were trained and a range of activities undertaken.

2.5.1 Approaches for SIMLESA II

Some of the ground work activities were modified and great emphasis was given to outscaling the best known technologies selected by stakeholders during phase I. Moreover, instead of Mother and Baby trials (MBT) and Participatory Variety Selection (PVS), the Exploratory Trials (ET) were modified to include new and improved maize and legume varieties. This practice is sound because:

- Tests variety compatibility to CA,
- Allows farmers to select varieties based on different criteria
- It is cost effective and integrates different disciplines and objectives

Outscaling activities using IP members gained more emphasis and involved four districts namely, Nhamatanda (ADEM), Macate (ADEM, UCAMA, and IDEAA-CA), Gondola (ADEM) and Angonia (TLC). Table 2.6 presents the summary of farmers that are directly involved on scaling out demonstrations.

Soil moisture results from Angonia suggested the possibility of intensified cropping by relay cropping with legumes to utilize the extra moisture in CA. A new trial for testing crops that can be grown with the residual moisture as well as for soil cover purposes on environments prone to termite and competition for firewood and fodder was designed and implemented in Angonia and ISPM (on-station trial).

Table 2.7: Layout for Relay-crop trial. Season 2015/16

Treat	Planting at onset of season	Interseeded
1	Maize and pigeon peas (*Cajanus cajan*, [ICEAP 00040])	Dolichos (Lablab purpureus L.)
2	Common bean	Cowpea
3	Maizeand soybean (var TGX198762f)	Crotolaria (*Crotolaria juncea L.*)
4	Maize and soybean (var TGX198762f)	Desmodium intortum cv. Greenleaf
5	Sole maize	---

Study results from SIMLESA I suggested the need for developing improved CA techniques capable of handling waterlogged conditions in very wet environments.

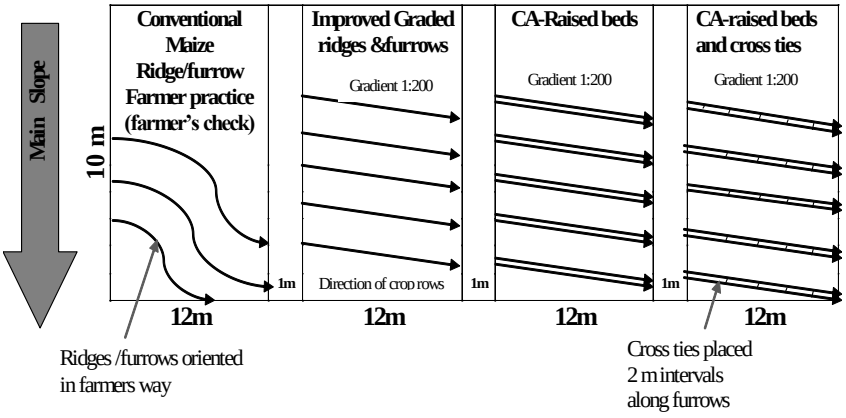

Figure 2.3: Raised bed lay-out trials, 2015

During the review period Objective 2 organized inputs and materials for 30 modified exploratory trials with three new varieties to test compatibility with CA for the season 2015/16. The new varieties are two hybrids (Pristine and Molocue) and one OPV (ZM309). The varieties conformed to the requirements of farmers such as yield, resistance to diseases, lodging and general productivity. On-station trials were harvested and data analysed.

2.5.2 On-station and on-farm trials

- Continued the big long-term trials but with the same new maize varieties as applied on – farm in the exploratory trials entirely managed by local SIMLESA personnel. These were harvested and data were analyzed
- Thirty farmers ran on-farm and exploratory trials and each trial covered 1,200 farmers
- Established trial and harvested and analysed to assess the effect of varying plant densities on soil N mineralization, maize nitrogen uptake, radiation use efficiency and yield under different weed management and N input scenarios (PhD work from Caspar).

2.6 QAAFI

Activities carried out during the reporting period are summarized below:

A crop-rainfall data base was developed for Southern Africa and hard copies of long-term research station climate data were distributed. QAAFI developed an image analysis tool for estimating kernel number of entire cobs. QAAFI established two sentinel nitrogen by residue trials established to validate nitrogen management tools. Ex-ante modelling the effects of CA on N-dynamics was completed and a draft publication is being produced. First draft of SIMLESA's soil manual outlining soil sampling protocols, analysis, and application to field-based research activities has been produced. The soils samples were sent for analysis from Southern African SIMLESA's long-term trials:

- SOC fractions
- Rapid nitrate tests
- Spectral analysis calibration
- A journal article is being produced and will be circulated during the next six months. QAAFI established low population OPV and hybrid trials at ISPM, Mozambique.

Objective 3: To increase the range of maize, legume and fodder/forage varieties available to smallholders

Main Objective 3 activities carried out during the reporting period were participatory variety selections, establishment of experimental trials (trials for maize and legume varieties) and supporting local seed companies in scaling-out new maize and legume varieties in SIMLESA areas and beyond.

SIMLESA's partnership strategy for scaling-up of certified seed production with seed companies included the provision of germplasm and technical backstopping particularly form breeding programs within and outside CIMMYT, development of seed road map for collaborating seed companies, trainings in seed business management and financial support to popularize the new varieties through demonstrations, field days, and media

A total of 26 seed roadmaps were developed; whereas 33 best-bet varieties were identified. More than 42 seed companies were involved in scaling-up identified products. Most of the companies are small to medium enterprises. Significant progress has been made in developing and registering of improved drought-tolerant maize and legume varieties, which are being promoted by both governmental and private institutions in respective countries.

Effort has been made to improve fodder/forage availability and utilization for feeding livestock in Eastern Africa, particularly in Kenya, Tanzania and Ethiopia. There has been an introduction of new grass species in the program, such as: (i) *Brachiaria decumbens* cv Basilisk, (ii) *Brachiaria brizantha* cv. Toredo (iii) *Brachiaria brizantha* cv. Piata. In Ethiopia eight fodder species were evaluated on station (Ilonga and SARI): These were *Penicummmaximum*, *tripsacumandersonii*, *Penisetum preprium*, ILRI 16837, KK2, ILRI 16803, ILRI 14984, ILRI 16835, KAKAMEGA, *Leucaena pallid* 14203, *Leucaena diversfolia* K780K, *Sesbania sesbana* and *Vigna unguiculata*. Harvesting of breeder seed for the newly released and selected best bet varieties of maize and legume - approximately 24 kg of breeder seed for hybrids H308 and H208 were produced. ILRI is taking a leading role in forage multiplication and integration in Eastern Africa.

SIMLESA-Mozambique, in collaboration with seed companies produced basic and certified seed. Nzara ya Pera (SP-1 hybrid, ZM523); Dengo Comercial (Gogoma and ZM523); WORUWERA (Molocue). Seeds from beans, soybeans, cowpea and pigeon pea were produced in collaboration with IIAM's Stations and, ICRISAT Mozambique /Malawi and local seed producers

SIMLESA-Kenya seed company partners produced maize and legume seeds for wider distribution. Freshco Seed Company distributed 1,500 kg of KDV6 maize variety seed to farmers on credit. Farmer groups in the various IPs informally produce and distribute OPV (maize), bean and cowpea purchased from seed companies (Frescho and Migotyo Plantation) to other members of the communities.

Malawi is working with a number of partners in production of drought tolerant maize and legume varieties for example, ICRISAT, IITA and NGO partners. Hybrid maize MH30 was selected for planting under pit planting by Kachere Farmers Group in Lilongwe District. CADECOM was out scaling soybean seed multiplication, while Natural Resources College (agriculture college

training students in agriculture and natural resources management) tested different maize varieties under conservation agriculture (CA) and conventional practice imparting knowledge about CA and varieties to students and other relevant stakeholders.

In attempting to sustain seed production system in Africa, SIMLESA is working with different partners in five main countries.

Table 3.1: SIMLESA Maize seed production partners

Ethiopia	Kenya	Tanzania	Malawi	Mozambique
Ethiopian Seed Enterprise	Western seed co.	ASA	Seed CO (Mw) Ltd	Dengo Commercial
South Seed Enterprise	Kenya seed co.	Demeter Agriculture Ltd		Nzara Yapera
Amhara Seed Enterprise	Bubayi Products	Tan Seed International	Funwe Farms Ltd	Woruwera
Oromia Seed Enterprise	Min of Agriculture	SATEC	CPM Agri-Enterprise Ltd	Phoenix
Pioneer	Sustainable Farming Development Initiative		Seed Tech Ltd	Klein
Meki- Batu Union	Resource Project Kenya		Panthochi	PANNAR
Alemayehu Farm	Seed Growers Association		Peacock Investments Ltd	Bonimar
Gadisa Gobena	KARLO SEED Unit		Multi Seed Company	Olinda
Anno Agro-Industry	FRESHO		Mkomera Seeds	
Ethio Veg Frue	Migotyo		Prime Seeds	

Table 3.2: Objective 3 Summary of milestones according to the logframe and agreed work plan:

	Output	Milestone	Date due	Status of achievement	Status/ Comments
3.1.1	Prioritize available stress tolerant maize varieties for SIMLESA sites annually	Per farming system, revisit 2-3 newly released hybrids and OPVs with potential suitability for the targeted farming system	Dec.2014 and annually until project end	Ongoing, on schedule	Prioritisation of varieties has been completed for all participating countries and will be reviewed annually
3.1.2	Potential legume species and varieties for the target environment in the program countries analysed with TL II partners annually.	Per farming system, 1-2 potential legume species and 2 varieties each for the target communities identified.	Dec.2014 and annually until project end	Ongoing, on schedule	Plans with relevant key stakeholders were developed in 2014
3.1.3	Identify and refine best bet forage/fodder species and varieties suitable for target AEZs for use in maize-legume-forage production systems	Per farming system in eastern Africa, 2-3 forage/fodder spp. identified and acquired from available sources	Dec.2014 and annually until project end	Ongoing, behind schedule	ILRI developed a plan for best bet forage/fodder species for target zones. They agreed to use SIMLESA 1 funds balance
3.1.4	Increase farmer access to promising but underinvested material (improved maize, grain legume and forage/fodder species and varieties), through seed increase at relevant stage of seed production pipeline.	Seed for promising but underinvested maize, grain legume and forage varieties increased annually to meet country demands.	Annual (June 2014-June 2017)	Ongoing on schedule	Progressing according to plan noting the MTR comment which encourages focus on pulses and forage
3.1.5	Identify, tackle and refine seed availability bottlenecks of improved maize,	Farmer (m/f) access to improved maize, legume and forage/fodder varieties	2014-2017	Ongoing, on schedule	Plans with relevant key stakeholders were developed in 2014, sub-grants and seed road maps are being developed to address lack of

	legume forage/fodder varieties (from sister projects such as DTMA and TL-II), including seed systems and agribusiness support and improved seed distribution road maps in each of the five countries.				breeder and foundation seed for legumes.

3.1 Ethiopia

3.1.1 Compatibility of intercropping of soy bean maize intercropping

The compatibility of six soybean varieties for intercropping with BH-540 maize variety was underway for the second season in two locations, Pawe and Dibate. Data is being collected at field level. The results will be communicated as soon as data analysis is completed.

3.1.2 Participatory Variety Selection of Maize and Soybean varieties

On-farm and on-station plots with different maize and soybean varieties were evaluated at early and maturity stage by 18 male and 18 female farmers as well as interdisciplinary agriculture experts and researchers. Both the yield data and perception ratings were collected. Data entry and data analysis were in progress. Thirteen soybean variety breeder seed were multiplied. The maintenance of 20 soybean varieties was on-going to keep the seed for the next generation for seed multipliers and farmers.

Participatory maize variety selection was conducted. Different maize varieties were evaluated and best materials were selected by farmers and researchers depending on their field performance and other agronomic traits. In the reporting period, eight maize varieties were planted with two replications on two farmers' field (Hawassa zuria district) and one at Hawassa on- station including standard checks BH-546 and BH-547. Field data were collected, data entry and compilation were under way.

The newly released maize varieties demonstration was also implemented in three districts (Hawassa zuria, East Badawacho and Meskan). Three recently released maize hybrids (BH-546, BH-547, and MH-140) compared against BH-540. The demonstrations were conducted on a minimum of 100m^2 plot on 17 farmers' fields planting at the spacing of 75 cm and 30 cm between rows and plants in a row respectively. The farmers assessed the varieties on diseases resistance, ear size, kernel size, texture, color and yield. The farmers criteria is expected to meet that of researchers. Data entry and compilation were under way.

Bako National Maize Research Center (BNMRC) is responsible for the production and supply of the parents of newly released hybrids (breeder and pre-basic seed). Accordingly breeder and per-basic seed production of newly released varieties were supported by SIMLESA and are presented in Table 3.3 below:

Table 3.3: Breeder/pre-basic and certified seed produced during the main season of 2015

No	Variety	Parental line	Seed class	Area	Amount produced(T)	Remarks
1	BH547	BH547	Certified	1.9	2.9	Harvest 2015 on Centre
2	BH547	BLL003	Pre-basic	0.8	2.0	“”
3		BH546	Certified	1.25	5.0	“”
4	BH546	BKL001	Pre-basic	1.2	2.2	“”
5	BH661	142-1-e	Breeder	0.3	0.4	“”
6	BH661 & BH546	CML395	Pre-basic	0.17	1.0	Synergy with DTMASS and AGRA (ready for harvest)
7	BH661 & BH546	CML395	Pre-basic	0.20	10	“”
8	BH661 & BH546	CML202	Pre-basic	0.43	15	“”
9	Gibe3	Gibe3 (OPV)	breeder	0.12	5	“”

Table 3.4: Legume varieties and their number planted for maintenance

Breeder seed/Varieties	No. of varieties maintained	Area (ha)
Soybean	9	1.5
Haricot bean	8	1

A maize-legume multiple cropping system trial was conducted at Hawassa experimental station to assess and identify alternative maize-legume-based multiple cropping systems. Six treatments comprised of maize-legume multiple cropping systems including control plot were used in this study (sole maize under conventional practice, sole maize under CA, relay cropping (M+B) +B under CA, double cropping maize then bean under CA, double cropping bean then Maize under CA, and relay cropping forage crop then M+ B under CA. To conduct this experiment, a hybrid maize MH-130, a common bean Hawassa Dume and a forage crop (cowpea) were used. The treatments were arranged in randomized complete block design with three replications. Data on yield and agronomic parameters, resource use, soil and rainfall pattern were collected. The result shows that there is no significant difference between the treatments for grain yield. Generally, the grain yield result was lower for all treatments tested because rainfall shortage, better yield was obtained from sole maize under CA and conventional practice 1.46 t/ha and 1.45 t/ha respectively. The second round planning was not effected due to serious moisture shortage during the reporting period.

3.1.3 Forage seed multiplication for demonstrations

Cowpea seed was multiplied on 44m by14m plot to enhance farmer access to promising but underinvested material (improved maize, grain legume and forage/fodder species and varieties), through seed increase at relevant stage of seed production pipeline. The purpose of the activity

is to enhance pastoral and agropastoralists access to promising but underinvested material (grain legume and forage/fodder species and varieties).Two forage types (cowpea and lablab) were planted on 0.5 ha at Fafen on-station.

Forage crop variety selection was implemented in Hawassa zuria, East badawacho and Meskan districts. Four different forage species sasbania, cowpea, lablab and cp12713 were evaluated, farmers showed their preference to Lablab.

The activity was aimed at integrating forage cultivation with main food crops grown in the study area as backyard forage on lands close to homesteads, on contour lands as hedges rows in farm niches where it would not compete with food crop and intercropping with food crops. A perennial forage grass known as *Brachiaria Mulato* II was planted on 71 farmers' field as back yard, and a forage legume known as *Dolichos lablab* on 13 farmers' field as intercrop with maize. The field establishment was not also good due to the prolonged dry spell.

In 2016, three annual forage species (cow pea, lablab and pigeon pea) were planted at three SIMLESA program area farmers' field to evaluate and select good forage crop in HARC. In addition, Hawassa Maize Research Center planned with ILRI group on forage seed multiplication, scaling and feeder construction this year, the community-based forage seed production planned to be implementation at Meskan and East Badawacho districts and the scaling planned for Hawassa Zuria district.

3.1.4 Increasing the range of maize (and legume) varieties for smallholders

Breeder, pre-basic and certified seeds of the release, candidates, and promising hybrids were planted. These were all harvested. Threshing, weighing and data recording are underway. For recently released, candidate and promising varieties, demonstration plots were selected and planted on farmers' fields. Eighty-eight farmers from the four districts selected for CA scaling up were supplied with soybean and haricot bean for demonstrations. These farmers planted different legume varieties under CA and are supposed to use these plots for maize rotation in the next cropping season. These were all harvested. Threshing, weighing and data recording were also underway.

3.1.5 Basic seed multiplication of early maturing and drought tolerant hybrids

Basic seed of hybrid maize released for drought prone areas were produced at Arbaminch, Wondogenet and Koka (Ethio-vegfru) areas on research stations and a private investor's farm. Ethio Vegfru provided high level of management where fertilizer is continuously applied through irrigation water of a sophisticated irrigation system. The company produced high seed yield (6.5 t/ha) of MH140 yielding to 10.7 tons of this hybrid seed. All produced parental line of MH140 (male parent), CZL0814 was allocatted to Ethio-Vege company to produce certified seed of MH140 and they produced the certified seed on 15 ha of land and maintained the remaining seed of CZl0814 on 1/4ha of land. The seeds produced were distributed to farmers and producers in SIMLESA areas.

Table 3.5: Maize seed production plan for SIMLESA activity at MARC, 2016

Hybrid Name	Parental lines/single cross	Seed class	Amount produced(kg)
MH130	CML445	pre-basic	100
MH138Q		Pre-basic	100
	CML159	-	100
MH140		pre-basic	100
	CML444		100
	CML457		100

Table 3.6: Lowland pulse seed production plan for SIMLESA activity at MARC, 2016

Common bean variety	Area allocated	Seed yield expected	Other major collaborator involved in lowland legume seed production
1. SER-119	0.50	10	Haile Wako, ESE (Ethiopian Seed Enterprise-ESE), Lume Adama farmers' Cooperative Union
2. SER-125	0.25	5	
3. Awash-2	1.0	20	
4. Nasir	1.0	20	

3.2 Kenya

A total of 11 varieties of the newly released and pre-released improved maize were acquired, prioritized and planted as stress tolerant under CA tillage practice (zero tillage) for the second season (SR 2015) for testing for their environmental adaptability and farmers' acceptance. The varieties are P2859W (Pioneer Seed Company), KH500-39E (KALRO-Embu), Emb225 (KALRO-Embu), Embu 226 (KALRO-Embu), PHB 30G19 (Pioneer Seed Company), KDV 6 (KALRO-Katumani), DK 8033 (Monsanto) and H529 (Kenya Seed Company). The varieties were planted in a randomized complete block design in three replication sites. The trials are jointly managed by researchers and farmer groups in the sites. All maize varieties were planted under zero tillage and intercropped with an early to medium maturity KAT-x69 common bean varieties. This was the bean variety used. Through a participatory variety selection (PVS) approach, the maize and bean crop's growth parameters were monitored.

Eighteen potential legumes (10 bean varieties and three cowpeas varieties, three groundnuts varieties and two pigeon pea varieties) were subjected to participatory variety selection. The varieties are KK15 (KALRO-Kakamega), Chelalang (Egerton University), Ciankuis (Egerton University), Tasha (Egerton University), KATRAM-01 (KALRO-Kakamega), KKRI05/Red 13, KKRI105/cal14B (KALRO-Kakamega), KKRI105/cal130 (KALRO-Kakamega), KAT-x69 (KALRO-Katumani) and Embean-14 (Mwende) (KALRO-Embu). Three varieties of cowpeas (K-80, M66 and KVU-27-1, all from KALRO-Katumani). The bean varieties were intercropped with newly released KH500-39E (KALRO-Embu) maize variety while the cowpeas were intercropped with maize variety KVD 6 under zero tillage (a CA practice).

Effort has been made to improve fodder/forage availability and utilization for feeding livestock in Eastern Kenya. Thus, there has been an introduction of new grass species as follows: (i) *Brachiaria decumbens* cv Basilisk, (ii) *Brachiaria brizantha* cv. Toredo (iii) *Brachiaria brizantha* cv. Piata. The grass seed were provided by Biosciences Eastern and Central Africa-International Livestock Research Institute (BecA-ILRI Hub) scientists after visiting the Eastern Kenya SIMLESA project seeking for collabotation. The grass seeds of the three species were provided to Geeto and Kathuri farmer groups to plant for observation within their mega demonstration hubs. In addition, every individual farmer (26 from Geeto and 28 from Kathuri) was provided with at least one grass varieties for further observation on their farms. The three grass varieties were planted on-station at KALRO-Embu for demonstration and researcher detailed observation purposes. Fodder sorghum (E6518) and legume Vetch obtained from KALRO-Ojorolok were also introduced to Geeto and Kathuri farmer groups and planted within their mega demo plots in October 2015. The legume Vetch is good as livestock feed and a green manure/cover crop for soil fertility improvement. *Calliandra Calothyrsus, Molus alba* (mulberry) and *Leucaena trichandra* shrubs were further introduced to Geeto, Mariani and Kyeni sites as fodder or trees to stabilize terraces.

Working with farmer groups in Kyeni, Mariani, Mweru, Nkogwe and Mworoga IPs, over 2,000 kg of bean seed were produced and shared among farmers and the neighbouring institutions. The seeds were informally produced by the groups with backstopping from researchers and extension providers. In addition, the groups in four sites (Mariani, Nkogwe, Mworoga and

Kimangaru) in drier zones managed to distribute 2000kg of bean seed, over 650kg of KDV 6 seed (an OPV maize variety) and 156kg seed of M66 cowpea variety that were harvested in August-September 2015 after having been planted in LR 2015 (April rains). The Mworoga group distributed 610kg of Kendi pigeon pea seeds to over 600 farmers from Kimangaru (Itabua) site. The farmers shared 600kg, while 10kg seeds were used in the mega demonstration hub.

Two hundred kilograms of unshelled nucleus seed of groundnuts was produced while 1500kg of KDV 6 maize seed was distributed by FreshCo Seed Company to farmers on credit.

Ninety five farmers and 17 small-scale seed producers were interviewed, focused group discussions held and informal interviews conducted to identify bottlenecks to the availability of improved legumes and varieties in Western Kenya.

3.3 Tanzania

To increase the range of maize, legume and fodder varieties for smallholders through accelerated breeding, regional testing and release, the following specific activities were conducted under seed systems:

- Identification, increasing and maintenance of suitable pasture (forages/fodder) species for carrying out participatory varietal selection and demonstrations in the next farming season.
- Eight fodder species were evaluated on station (Ilonga and SARI): These were *Penicummmaximum*, *tripsacumandersonii*, *Penisetum preprium*, ILRI 16837, KK2, ILRI 16803, ILRI 14984, ILRI 16835, KAKAMEGA, *Leucaena pallid* 14203, *Leucaena diversfolia* K780K, *Sesbania sesbana* and *Vigna unguiculata*. Harvesting of breeder seed for the newly released and selected best bet varieties of maize and legume - approximately 24 kg of breeder seed for hybrids H308 and H208 were produced. For legume, 100kg and 50kg for Ilonga 14-M1 and Kiboko varieties were produced, respectively.

Fifty legume varieties of breeder's seeds of varieties Kiboko, Karatu, Ilonga 14-M1 and Ilonga 14-M2 and Tumia each were advanced for certified seeds production by the seed agency, ASA.

During the period under review, work was also done to generate and increase the range of maize, legume and fodder/forage varieties to smallholders through collaboration with other key actors.

3.3.1 On-station breeder seed multiplication of maize, legume and forage species

Four different parental lines constituting hybrids SELIAN H308 and SELIAN H208 were planted at SARI and ARI Ilonga in 2015 for increasing the seed. Pollination was done manually using pollination bags to minimize level of contamination and ensuring of maximum generation of clean seed. The lines used were CML 390, CML 197, KSO3-B15-118, and KSO3-B15-125. At the same time six different female single cross hybrids were generated using the pollination bags, of which in turn can be crossed to another parent to obtain a three way cross hybrid. Selfing and generation of single crosses were done at both sites. For legume, the planted varieties of pigeon pea were Kiboko (ICEAP 00053), Karatu (ICEAP 00932) Ilonga 14 -MI (ICEAP 00554)] and were planted to increase the seed. For pasture species, twelve (12) fodder/forage species were planted at both sites Ilonga and Selian research institutes. Some of

these include: (1) ILRI 16837, (2) KK2 (3) Guatemela (*Tripsacumandersonii*), (4) ILRI 16803 (5) ILRI 14984 (6) P. Maximum (7) Kakamega (8) ILRI 16835 (9) *Leucaena pallida* 14203 (10) *Leucaena diversfolia* K780K (11) *Sesbania sesbana* (*Sesbaniaglandflora*) (12) Cowpea *(Vignaunguiculata*).

Three SIMLESA seed partner companies were directly involved in seed production as shown in Table 3.7 below:

Table 3.7: Seed Systems Partners in Tanzania

Name	Role
ASA	Production of foundation seed and certification mainly OPV's of both legumes and maize.
SATEC	Production of maize hybrids
TAN SEED INTERNATIONAL	Production of maize hybrids

3.4 Malawi

In Malawi under Objective 3, a number of meetings were held on potential drought-tolerant maize and legume varieties with seed companies, ICRISAT, IITA and NGO partners. Hybrid maize MH30 was selected for planting under pit planting by Kachere Farmers Group in Lilongwe District. CADECOM was out scaling soybean seed multiplication, while Natural Resources College tested different maize varieties under CA and conventional practice imparting knowledge about CA and varieties to students and other relevant stakeholders. The achievements during the review period are summarized below:

- Multiplication of breeder seed for groundnuts and pigeonpeas (4 hectares – groundnut, 1 hectare pigeon peas). Groundnut had just been harvested, while pigeonpea is still in the field
- Established three maize regional trials in Chitedze (2) and Chitala (1) to evaluate some CA ready varieties
- Facilitated partners, such as seed companies to access improved seed
- Conducted six demonstrations on the new groundnut varieties
- Conducted one field day in March 2016.
- Ten groundnut genotypes were being evaluated

Seven groundnut varieties released in 2014 were being promoted through on-farm demonstrations (in 2015/16 season there were 12 demonstration fields established).

The approximate number of farmers benefiting from new maize, legume or forage by gender are: 65% maize farmers and 40% of legume farmers). Up to 70% legume farmers were women. Maize as a staple food was grown by both genders.

SIMLESA-Malawi facilitated partners such as seed companies to access improved seed (For maize - Funwe for MH 26, Peacock MH 30, Mosanto DKC 8053, for pigeon pea was Exagris,).The companies were involved in seed multiplication.

On capacity building, staff members were encouraged to strengthen on-the job training. It was mentioned that long - term studies support, for example competitive grants for MSc and PhD studies were open for Malawians in Australia and South Africa

3.5 Mozambique

Plant population / density regional maize trial to evaluate different maize population responses of drought-tolerant maize under conservation agriculture were planted at Sussundenga Research Station under conventional tillage. The trial was planted in January 2016 during a very short rainfall period and harvested in the last week of May 2016. The performance of the varieties on field were good despite the severe drought which occurred during that season. Preliminary data analysis would be done at country level and final analysis at CIMMYT-Zimbabwe, together with data from other sites in Eastern and Southern Africa.

The preliminary data analysis from the maize population trial found a highly significant difference between treatment under high density and low density. The variety SC727 showed good performance across density 1, 3 and 4 followed by variety CML444/C that showed across density 1, 2 and 3. In terms of yield performance across the different population densities, SC727 had highest yield followed by CML444/C and the lowest variety was CZH1258 that did not show significant difference with PAN 53.

Two value for cultivation and use (VCU) and one advanced national trials were conducted at Sussundenga Research Station in Manica Province, and One VCU and one advanced at Ntengo Umodzi in Angónia District, in Tete Province. The VCU trial included 30 proposed varieties and 28 varieties in advanced trials. The VCU trials were planted under fertilizer and without fertilizer application in Sussundenga and under rainfall conditions at Ntengo Umodzi. In Sussundenga, the VCU trial were harvested on 18th May and advanced trial were harvested in the same week. The one at Ntengo Umodzi was harvested during the first week of June.

Monitoring and evaluation of the trials were conducted once in Gorongosa and Manica districts in the 2015/16 agricultural season. This activity was led by a multidisciplinary team, including a socioeconomist, agronomist and breeder. In both districts, farmers were setting demonstration plots with different technologies, particularly the use of improved maize varieties, legumes, crop rotation, intercropping, herbicides, minimum tillage, and residues on their plots promoted by the project and other outscaling partners.

The objective of the visit were to carry out data collection from exploratory trials, evaluate the process of establishment of the trials and discuss with the farmers and extension staff the challenges and constrains. Five trials were visited in each district and one meeting with

farmers in Gorongosa where the results obtained from the field visit. All trials were well established but the drought contributed to poor germination in some fields and bad performance of Molocue in most of the trials.

Legume seed of IT 16 was multiplied in Nhacoongo Agronomic post in Inhambane Province and in Argentina field (IDEEA) in Manica Province.

Table 3.8: Crops and areas planted in the 2015/16 agricultural season by four seed companies

Seed company	Crop and Area planted (ha)	Seed category
Nzara ya Pera	ZM 309 = 7 ha ZM 523 = 5 ha ZM 523 = 1.5 ha SP-1 = (failed due to drought) Pigeon pea = 1.5 ha	Certified seed Certified seed Basic seed Certified seed Certified seed
Dengo Comercial	ZM 309 = (information not available yet) ZM 523 = (information not available yet)	Certified seed Certified seed
Oruwera	Molocue Female = 2ha Male = 1ha	Certified seed
K2	Prestine 601 (information not available)	Certified seed

3.5.1 Summary of Mozambique Objective 3 activities

There were 24 PVS maize trials conducted (six in each location - Gorongosa, Manica, Macate and Angonia) as well as 24 PVS trial of food legumes conducted (six in each location- Gorongosa, Manica, Macate and Angonia). The program identified and evaluated 30 new maize varieties (VCU trial). In addition, the program endorsed four new maize varieties - two hybrids and two OPV through PVS procedures. Three new legume varieties were identified and evaluated (1 cowpea, 1 soybean and 1 pigeon pea). The program conducted 30 maize-legume inter-cropping trials. To strengthen the seed industry, SIMLESA is working with five seed companies (Nzara-yapera, Dengo, Pannar, Oruwera and K2)

Objective 4: To support the development of local and regional innovation systems and scaling-out modalities

During the reporting period, the following activities were carried out under Objective 4:

- Strengthening Agricultural IPs
- Field days
- Farmer trainings – mainly organized through AIPs, including on marketing/ business
- Exchange visits
- Establishment of demonstration plots, including forage species demos

- Scaling out initiatives involving partners to conduct demos of SIMLESA best bet technologies
- Planning meetings
- Development of SIMLESA's SMS delivery system
- The launching of the Competitive Grants Scheme

All the above were done in attempting to effectively scale SIMLESA technologies to as many farmers and other actors as possible since the program is working with many partners.

Table 4.1: The table below shows approaches used for scaling out (in all countries)

Approaches	Mechanisms	Practice, Technology	Objectives				Key Partners, Linkages
			1	2	3	4	
Agriculture Innovation Platforms	Capacity building	Inputs, marketing	X			X	ASARECA, NARS, CG
	Business approaches, value chains	Insurance, credit, gender	x			X	Private, farmers, (CBOs, cooperatives)
		Value additions				X	Private
Extension	Field days	CA, seed		X	x	X	MoA, NGO, NARS
Participatory	Demonstrations trials	(Gender)		X	x	X	NARS, CG
	Trials			X	x	X	NARS, CG
Public Private Partnership	Bulking, promotions	Seed			x	X	Seed companies
	ICT-sms, video	*Many				X	QAAFI, private
	Packaging	Seed, info		x	X	X	Private, NGO
	Print (e.g. brochure)	Seed, info		x	X	X	Private, NGO
Policy	Round table	CA, seed	X		X	X	MoA, NARS, CG
	High level policy conference	Policy briefs (all options, approaches)	X	X	X	X	ASARECA, NARS, Ministries
	Briefs	AIP, CA, Seed	X			X	CG

*****Competitive Grant Scheme

During the reporting period, the following key activities were carried out under program Objective 4.

Table 4.2: below summarizes program achievements under Objective 4, outlining the relevant outputs and milestones during this reporting period.

No.	Activity	Outputs/milestones	Completion date	Status of achievement	Comments
4.4.1	Formulation and advocacy of policy options to address institutional constraints for CA-based intensification options	Policy brief(s) and other advocacy materials on institutional constraints for CA based intensification. Policy workshops	March 2016 June 2015; Dec 2016	Ongoing on schedule	Seven policy briefs have already been produced and circulated. These cover a wide range of themes relating to sustainable intensification and the work conducted in SIMLESA. Three high level round table policy meetings were been held in Botswana, Rwanda and Uganda. These round tables focussed on institutionalisation of AIP-based approaches, and integration of new CA-based technologies in extension programs.
4.4.2	Evaluation of different organizational models (incl. IPs) for scaling out CA-based intensification options in terms of reach, farmer use and sustainability	Institutional/organizational models (incl. policy options) for scaling out of CA-based intensification options identified and evaluated on potential.	Dec. 2016	Ongoing on schedule	Organisational models for scaling out are being developed in consultation with the program partners. An integrated framework, developed based on country planning meetings is guiding the scaling work in SIMLESA II. The 5 key approaches are: Agricultural Innovation Platforms; Extension (public, private, business-led); Participatory techniques (including use of demonstrations and trials, field days, exchange visits); Public Private Partnerships (business models, such as service provision, use of ICT); and through Policy (as mentioned in 4.1.1)
4.4.3	Cross-participation in annual research workshops between program members and other programs (other Australian food security initiatives) and effective working relations will be strengthened with six other related projects	Shared understanding of regional research challenges and products; sharing of innovative agronomy, breeding and socio-economic research methods and maize legume system products	Cross-participation in all years	Ongoing, on schedule	Excellent communication within SIMLESA is being fostered through regular meetings and workshops, including the annual meeting for all project participants. Full advantage is often taken during other events like the Beating Famine Conference in Malawi and the DTMAS Project meeting in Ethiopia which happened during the reporting period.
4.4.4	Annual exchange visits of farmers (m/f) and extension agents	Farmer-to-farmer networking and knowledge exchange	2014-2018, annual activity	Ongoing, on schedule	Annual exchange visits have been organised in all countries. Vital lessons include the need to

	between different sites to discuss experiences with CA-based intensification practices	facilitated. At least one farmer study visit will take place in each country per year (gender sensitive selection of participants)			strengthen collaboration with other projects in sustaining this approach. In Tanzania Annual exchange visits have been taking place every year including during farmer's field days and other events.

Below are specific details on achievements of the outputs and milestones toward Objective 4 by country:

4.1 Ethiopia

SIMLESA team in Ethiopia scaled out SI technologies in different forms, for example field days, farmer training, competitive grant scheme and exchange visits and establishment of demonstration plots. Local field days were organized on maize-soybean intercropping and CA technologies in Pawe District which involved 145 male and 32 female participants. Another local field day was organized for Pawe, Mandura, Dibate, Dangur districts of Metekel zone and Jawi district of Awi zone involving 414 male and 27 female participants.

Key SIMLESA stakeholders participated in locally organized field days in different districts as shown in Table 4.3

Table 4.3: List of field day participants

Districts	**Farmers**		**Extension Officers**		**DAs**		**Total**	
	Men	Women	Men	Women	Men	Women	Men	Women
Bako_Tibbe	140	21	4	0	11	1	155	25
Ilu_GAlan	110	15	4	0	13	2	127	17
Gobbu_Sayyo	91	7	4	0	9	0	104	7
Total	341	43	12	0	33	3	386	49
Grand Total				**435**				

A large number of farmers took part in the SIMLESA promoted technologies including maize and legume varieties, intercropping and conservation agriculture practices (including minimum tillage) during the reporting period.

Table 4.4: Number of farmers who participated in scaling up on CA and related technologies by Zone and district

Zone	District	Type of technology	Variety/ Practice	Participant farmers
Metekel	Pawe	Soybean	Belesa-95	774
		Maize	BH-540	64
		CA	Zero tillage	17
			Intercropping	37
	Mandura	Soybean	Belesa-95	58
		Haricot bean	Nasir	60
		CA	Maize soy bean Intercropping	7
	Dangur	Soybean	Belesa-95	767
		Maize	BH-540	724
	Dibate	Soybean	Belesa-95	74
		Haricot bean	Nasir	653
	Bullen	Soybean	Belesa-95	63
		Haricot bean	Nasir	385
Awi	Guangua	Soybean	Belesa-95	13
		Haricot bean	Nasir	41
		CA	Maize soy bean Intercropping	32
	Jawi	Soybean	Belesa-95	111
Total				**3880**

Note: In addition, bio fertilizer for soybean(MAR1495) and haricot bean (Legume fix) were distributed to farmers under soybean and haricot bean scaling up in Jawe, Mandura, Pawe, Dangur, Guba and Dibate districts in collaboration with N2Africa and ComproII projects.

In attempting to reach more farmers through demonstration plots, three forage species (sweet lupine, cow pea and lab-lab) were established, intercropped with maize. The demonstration plot covers about 40 hectares of farmers' fields involving 160 farmers. Farmer trainings were organized by lead farmers and local agricultural development agents**.**

Table 4.5: Forage type and number of famers in forage involved

Type of forage	Place	Area (ha)	Number of farmers		
			Male	Female	Total
Sweet lupine	South achefer	21.5	83	3	86
Cow pea	Jabi tehnan	10	40	-	40
Lab	Jabitehnan	8.5	34	-	34
Total		**40**	**157**	**3**	**160**

The popularization of CA technologies promoted under SIMLESA program in Ethiopia was conducted in Hawassa Zuria, Mesakan, and East Badewacho handled by Hawassa Maize Research centers of Wondo Genet Agricultural Research Centre. Sixty-seven famers were involved and implemented the demonstrations. Agronomic and farmers' assessments were under collection.

4.1.1Scaling out in Ethiopia

Completive Grant Scheme (CGS) Expression of Interest to scale-out CA based intensification options

To promote CA-based technologies, seven zones were brought on board to present their expression of interest (EoI) for technology scaling up. The zones are attached with SIMLESA program implementing centers. Researchers in these centers assisted the zones prepare their EoIs. The EoI of all the seven zones are summarized in the Table below and details are attached as Annexes.

Table 4.6: List of zones which expressed their interests in SIMLESA technology scaling up

Regional sate	Name of Zone	Number of districts to start with, 2016	Affiliated centers
Oromia	1. East Shewa	2	MARC
	2. West Arsi	2	MARC
	3. West Shewa	1	BARC
	4. East Wollega	1	BARC
SNNPR	5. Sidama	1	SARI
	6. Hadiya	1	HARC
Amhara	7. West Gojam	1	ARARI

In HARC, during 2015/16 cropping season, a total of 90 farmers were selected from the three districts of the southern region for technology scaling out activity (Table 4.6). In each district,

farmers were selected from different farming communities to reach as many farmers as possible. Technologies planned to scale out were: CA with intercropping, recently released maize and common beans varieties.

Table 17: Number of farmers scaling out SIMLESA technology

Locations	***No. of villages***	***No of farmers***
Hawassa Zuria,	5	30
East Badawacho	3	30
Meskan	4	30
Total	***12***	***90***

Improved varieties of maize and common seed were dispatched to farmers packed in 2 kg bags each. The bean varieties distributed were Hawassa Dume and Ibado while the maize varieties were BH-546, BH-547 and MH-140. The summary is presented in Table 4.7 below.

Table 4.8: Number of farmers got Maize and common bean improved seed 2016

Crop	**No of farmers by district**			
	Hawassa Zuria	**East Badawacho**	**Meskan**	**Total**
1.Common Bean				
Hawassa Dume+ Ibado	35	35	33	103
2. New Maize Varieties seed	0	0	0	0
BH-546+BH547	10	10	8	28
MH-140	0	0	8	8
Total	**45**	**45**	**49**	**139**

4.1.2 Training Activities in association with IP meeting

IP meeting was organized at the three districts to discuss how it was possible to move further for more aggressive CA and other associated technologies scaling out and up. During the meeting the long - term CA experiment result was presented to the participants. For the IP meeting organized at Meskan and East Badawacho, an NGO called SOS Sahil was engaged because it is working on CA technologies scaling in the two districts.

Table 4.9: Number of partners who participated in training and district level innovation platform meeting, 2016

	Hawassa Zuria/Dorebafeno		East Badawacho District		Meskan District	
Participants	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
District Administrator	-	-	1	-	-	-
District Agriculture office head	1		1		-	
District Agriculture Extension Head	1		1		1	1
District Agronomist	1		1		1	
District Natural resource protection Extension	1		1		1	
District Extension Communication	1		1		-	
Development agents	5		8		10	
Kebele agriculture office head			2		3	
Kebele chair man			3		-	
Farmers	4	1	10		7	
SOS Sahel agronomist expert	1		-		1	
Trainers/Researchers	3		2		4	
Others/ support	3		2		4	
Total	***22***		***33***		***33***	

The following on-farm demonstration and pre-scaling up activities were under way in Eastern Ethiopia in pastoral and agro-pastoral regions of Ethiopia:

1. Twenty agro-pastorals (16 male and 4 female in ‘intercropping of maize and haricot bean’ under CA condition;
2. Twenty agro-pastorals (18 male and 2 female) in maize (MH-130 variety);
3. Fifteen agro-pastorals (12 male and 3 female) for haricot bean (Nasir and Awash-1 verities) and;
4. Ten agro-pastorals (7 male and 3 female) for forage (cow pea) participated in pre-scaling up activities in Jijiga and Gursum districts.

4.1.3 Demonstration of improved maize varieties in the Central Rift Valley of Ethiopia

The demonstration of improved maize varieties were conducted in 60 sites. Two were conducted on FTCs. The number of farmers involved was 58 (eight female). Both conventional tillage and minimum tillage (eight farmers) were practiced. The average land holding size is 2.33 ha consisting seven households and less than a pair of oxen. The varieties used are MHQ138, MH140, Melkassa-2 and MH130. The average yield in tons per hectare of MHQ-138 was 3.08 (n=36), MH140 was 4.97 (n=36), Melkassa-2 was 3.02 ton (n=9). The yield of MH130 was particularly low 1.07 (n=25). This happened since the variety was planted in drier areas such as Zway Dugda and Mieso where there were rain deficits.

Maize common bean rotation demonstration plots were also established in the Central Rift Valley of Ethiopia. This activity was conducted in seven districts (ATJK, Adama, Boset, Mieso, Shalla, Siraro and Zway Dugda) in the Central Rift Valley of Ethiopia. Thirty farmers (seven female) participated. Both minimum tillage and conventional tillage were practiced where the majority (23 out 30) of farmers planted using minimum tillage. The maize varieties planted were MHQ-138, MH-140 and MH-130. The common bean was planted three weeks later after maize. However, the beans were not established and produced lower yield due extended drought and erratic rainfall at planting. The average maize yield per hectare were MHQ-138 was 2.97 t/ha (n=13), MH-140 was 6.85 t/ha (n=2) and MH-130 was 0.75 t/ha (n=15). The lower yield per hectare for MH-130 was attributed to lower moisture since it was planted in drier areas such as Mieso and Zway Dugda districts.

4.2 Kenya

Seven mega-demo sites that were established in seven sites during SIMLESA I in Kakamega (3) and Embu (4) were planted for two seasons. The sites are in Kyeni (Kathuri), Mariani, Mweru (Geeto) and Nkogwe locations in Embu, Tharaka/Nithi, and Meru counties, respectively. In Kakamega, three mega demonstration farms established in Siaya and Bungoma counties were maintained to act as learning sites for farmers and other stakeholders on improved crop production and CA. The main aim of the demo sites is to scale out the SIMLESA program and partners' technologies within and beyond the initial program sites. Strengthening of the demonstration sites continued during the reporting period.

The following activities were implemented:

i. Acquired inputs and planted maize, legumes and fodder crop demonstrations under CA farming practices at the start of the short rain season in 2015. The program held six planning meetings (one per site and two more within Kimangaru/Itabua new sites);
ii. Conducted six training meetings in the region on group dynamics, postharvest handling of maize/legumes and production of fodder crops;
iii. Co-opted more members into joining the LIPs. A total of 11 field days were held during the reporting period and were attended by 1,956 farmers (1234 females and 722 males). One of the field days organized by the Boro Agricultural Innovation Platform held on 22 July 2015 was attended by the SIMLESA Program Coordinator, Mulugetta Mekuria, SIMLESA ME & L Specialist, Communication Specialist and SIMLESA Objective 4 leader hosted by an enterprising female farmer, Angela Odero.

Figure 4.1: Mrs Angela Odero showing her maize intercropped with beans during a field day in Boro, Western Kenya. Photo: Johnson Siamachira/CIMMYT.

In Kakamega, four innovation platforms remained active in Western Kenya. These were Bungoma South Farmers' Innovation Platform – SIMLESA (BUSOFIPs), Bumula Innovation Platform (BIF) all in Bungoma County, Karemo Innovation Platform (KIT) and Boro Agricultural Platform (BAIP) in Siaya County. Each IP (with an average membership of 20) held monthly meetings mainly to review progress in the implementation of their agreed actions, plan the holding of field days, and provide fora for members training.

In Embu, 22 IPs members and eight Kimangaru/Itabua ACC&S FAs were trained. Definition/implementation procedures and benefits of the CA packages were among the topics discussed. Thirty six SIMLESA IP members participated in end of LR 2015 and start of SR 2015 seasons information sharing or/and planning held in different sites.

No new IPs were formed during the review period. However partnerships were formed with other institutions implementing similar activities focusing on sustainable intensification practices in Western Kenya. The institutions include CIAT, County Departments of Agriculture, GIZ and other NGOs. A training on business approaches to scaling and sustainability (systems intensification) under the formed partnership was planned for the next reporting period. The training will focus on:

a. Understanding scaling up – Power Point presentations and discussion on different ways of scaling up
b. Evaluating technologies for scaling up – assessing the SIMLESA technologies and developing a strategy for their scaling up
c. Scaling-up through service providers – assessing the supply/ demand of service providers
d. Scaling-up through partnerships with the private sector – finding the appropriate level – local/ meso/ national – for partnership development; negotiations/ deal making
e. Analyzing the business models – analysis, critical success factors, upgrading

4.3 Tanzania

Scaling out initiatives during the period under review were:-

- Involving partners to conduct demonstrations of SIMLESA best bet technologies in communities: Partners involved were government extension unit (DAICO), NGOs (RECODA and WADEC). In Eastern Zone, three communities namely Taabu Hotel and Ibuti for Gairo District and Muungano and Muenda for Kilosa District were involved in scaling-out of the selected best technologies (Improved maize and pigeonpeas intercropping under no till practice and proper crop husbandry). In Northern Zone, three communities were involved namely Bashay, Qaru and Ayalalio. A total of 30 demonstration plots were established in Northern Zone and 32 in Eastern Zone.
- Development of publications: SIMLESA produced leaflets and posters. These were distributed to farmers and other stakeholders. Translations into local languages were underway at the time of reporting to ensure use by more farmers.
- Farmers were informed about the inclusion of fodder/forages in Phase II to reduce competition of crop residues with livestock. Farmers who were hosting SIMLESA trials were asked to spread the project technologies through various means, including farmer to farmer exchange visits.
- Fifteen members of the local innovation platform from Karatu and Mbulu and 15 from Gairo Mvomero and Kilosa districts were facilitated by the project to visit demonstration plots during agricultural shows at Nanenane grounds in Arusha and Morogoro respectively.

Through innovation platforms and other partners, large 25m x 25m size demonstration plots were established in various communities. A total of 19 communities were reached. Field days were conducted in these communities where 778 people participated (54% males and 46% females). The program facilitated a farmer exchange visit where 77 were male and 43 were female farmers. Demonstration plots were established at Nane National Agricultural Show grounds in both zones where 1500 participants signed in the register kept at the plots premises. Out of these participants 800 were male and 700 female.

Table 4.10: Number of people who benefited from various scaling out activities in Eastern and Northern Zones of Tanzania in 2015

Activity	Men	Women	Total
National Agricultural Show	37	16	53**
Field Days	420	358	778
Exchange Visits	77	43	120

** Farmers who were assisted by the SIMLESA program to attend the National Agricultural Show

4.4 Malawi

Malawi strengthened innovation platforms, organized farmer meetings, trainings and established demonstration plots. A total of six AIP meetings were conducted specifically by group members of innovation platforms. Gender mainstreaming in all aspects of SIMLESA is one of the main activities carried out during the reporting period. Objective 4 team also participated in the MTR field visit where the ACIAR review team visited some of the AIPs.

SIMLESA-Malawi strengthened scaling out and identification of best-fit technologies to communities by linking them up with other partners with comparative advantage. The team also explored high value markets for products and promotion for value addition to create sustainable demand. The strategy is to engage and align with current policy frameworks to enhance synergy and quantifying contribution of CA-based technologies. The detailed activities are below:

- Partnered with NGOs (CADECOM, NASFAM), seed companies (PANNAR), agro-dealers (Agri-Trading Company) and government projects e.g. Sustainable Agricultural Productivity Program (SAPP), and Malawi Red Basin Project
- Used extension methods such as demonstrations, farmer field schools, farm business schools, exchange visits and field days
- Involved local leaders in promoting SI technology adoption
- Worked with six AIPs through meetings and field days
- Linked farmers to input and output markets: 551 farmers – 331 males and 220 females. These people purchased 3MT fertilizers and 1MT maize hybrid seed at a total cost of MK2.3 million (US$3 484)

4.5 Mozambique

Land preparation was done well on time in five SIMLESA community sites despite the delay of 2015/16 rain season. In each community, there are five research committee members and more than 2,000 farmers hosting exploratory and out scaling trials. All other members of the community (around 50-100 people) were involved.

The Objective 4 also worked in close collaboration with four partners from local innovation platforms and those still active in Angonia, Gondola, Manica, Macate and Nhamatanda and working in two new communities in Manica were successfully engaged and inputs delivered for out-scaling activities.

In the 2015/16 agricultural season, the number of participating farmers hosting demonstration plots have increased significantly and 30 new farmers joined the project in Macate District.

The number of out scaling trials and the coverage of farmers was increased in the 2015/16 agricultural season as part of engagement efforts as follows:

Table 4.11: Scaling out farmers

Organization	Community	No of farmers	Farmers achieved
ISPM	Mathsinho	12	218
TLC	Angonia	42	1050
IDEEA	Macate	10	259
ADEM	Nhamatanda	18	3250
UCAMA	Macate	24	600
Total		**106**	**5381**

SIMLESA partners organized three field days in the respective communities during the review period to assess the performance of trials, evaluate them and discuss on further improvements.

The program held a feedback workshop with farmers and partners in Macate District in October 2015. This was a joint effort by the University of Queensland (UQ), Instituto de Investigação Agraria de Moçambique (IIAM), the Manica Department of Agriculture, and local farmer organizations (UCAMA and UDAC). The workshop was held to provide feedback to farmers from two years of research which focused on identifying simple options for sustainable intensification of maize production within the district. Thirty-one farmers attended, representing a number of smaller farmer associations in their communities.

4.6 QAAFI

Knowledge sharing of relevant program innovations

In Mozambique, QAAFI assisted SIMLESA team in developing SMS-based tools for site-specific decision support to deliver simple heuristics for crop management and other information at key times during the year to registered mobile users (service includes information from global seasonal climate forecasts, and in-crop nitrogen management tools).

SIMLESA's SMS delivery system has been developed and is functional across all SIMLESA countries. The new SMS system was released early during 2016 – with two patches being made during the first half of the year based on partners' feedback. Since its release, NARES have received constant support from the QAAFI's team in Africa, and a training manual has been developed and circulated. It is important to note that some countries are more advanced than others in its usage though. Mozambique leads in its usage and client numbers, followed by Kenya and Malawi. Tanzania and Ethiopia are yet to populate their contact databases. SMS updates are summarized below, (see QAAFI report attached).

- SIMLESA's SMS delivery system is now live and operational
- Meetings with NARS have taken place to develop their calendar of SMS messages.

- Testing of the system and sending of preliminary SMS messages to regions.
- Administrator and Operator access and familiarization in all SIMLESA countries.
- Message content development training specific to SIMLESA
- Ongoing collection of details for farmers and extension officers across the regions.
- Ongoing input of farmer “Subscribers” details to SMS database.

It can be expected that usage will depend across the different countries given the availability of other – more established - SMS delivery systems of information. This is the case of Kenya where multiple suppliers of information use similar technology.

It has been proposed to the project leader that the institutionalization of the tool needs to be discussed with the NARES so that ownership and continuity of the system is assured beyond the life of the project. Discussions are proposed to take place at the next PMC meeting.

The SIMLESA scaling partners appear the best equipped to develop and manage ICT content. Several scaling partners are interested in using the SMS system and will populate the SIMLESA-SMS database with 10 to 50, 0000 farmers per country.

QAAFI shared a summary of level of investment, expected outcomes, SIMLESA related activities and outputs for period 2015-2018. See Annex 2.

Objective 5: Capacity building to increase the efficiency of agricultural research today and in the future modalities

Main stakeholders of SIMLESA, NARS and farmers were empowered in various forms from the inception of the program through short trainings, educational support, participating at international conferences, on-job training, farming equipment support, field days, exchange visits and hosting demonstration sites. During the reporting period, three students out of 65 SIMLESA supported NARS personnel graduated (Two PhD from Tanzania and Kenya; one MSc in Rwanda). Two more MSc candidates from Mozambique who were studying with the University of Free State in South Africa submitted drafts of their thesis and were expected to graduate in 2016. Recent graduates are working at national research centers. Most of the students are completing their studies by end of 2016 and are expected to add great value to human capital at country level in their specific countries.

In SIMLESA Phase II, there is a shift in terms of moving from long-term academic support, like PhD and MSc assistance, to on-the job training and capacity building at the work place. In line with this, ARC was identified based on its comparative advantages to support SIMLESA capacity building activities. The process follows this sequence: NARS as a group identify gaps where they need to improve with the assistance of ARC and CIMMYT, Then ARC will conduct capacity building trainings in-country.

Table 5.1: Enumerates relevant outputs and milestones during this reporting period:

No.	Activity	Outputs/milestones	Completion date	Status of achievement	Comments
5.1.1	Technical training on (1) CA –based Intensification on smallholder agriculture ; (2) farm and household typologies and system analysis (incl risk profile and interdisciplinary farming systems analysis ; (3) recommendation domains (including GIS skills); (4) biomass management incl fodder /forages in CA –based intensification ; (5) soil quality in CA-based intensification ; (6) value chain analysis ; (7) adoption , risk and impact pathways; and (8) emerging topics . Supported by on site/on job training	Socio-economic, agronomic research skills of program partners in the national and regional programs enhanced -Systems agronomy research skills of program partners in the national and regional programs enhanced -Interdisciplinary research	June 2015, follow-up June 2017	Ongoing	At the time of reporting, SIMLESA had supported 65 students (42 MSc level and 23 PhDs). Technical training was also provided in socio economic research and in systems agronomy. SIMLESA II is now focusing more on in-house training/capacity building
5.1.2	Free on-line training courses on: Experimental design, basic statistics and use of R (free statistics software) Soil and weather monitoring	Experimental design and basic statistics using R free course available on line Soil and weather monitoring free course available on line	July 2015 and follow up support to June 2018	Ongoing	Training module for an online statistical course has been developed Online Training Module
5.2.1	Trainings on gender mainstreaming, supported by on site/on the job training	Trained relevant NARS and extension staff	2015-2016	Completed	ARC South Africa conducted Gender training in August 2015 SIMLESA is promoting the role of women in the implementation and decision-making structures of SIMLESA.
5.3.1	Seed producers training courses	In-country and regional training course involving at least 10 seed company/producer participants	Dec 2015, repeated every 2 years per country	Planned and behind schedule	In country and regional training is planned for seed systems, facilitated through Objective 3.

5.4.1	Management training for NARs staff in SIMLESA (incl. 'soft-skills', leadership and team building, M&E, administration and prioritization).	Trained managers from NARS	Dec 2015	Completed	
5.5.1	Annual extension capacity building based on country-specific training needs and short courses	Identified training needs, and provided relevant training	2015-2018	Ongoing behind schedule	Country-specific training needs have been identified and short courses are being planned. Trainings are being carried out in-country by local staff and ARC South Africa.

Below are the specific details on achievements of the outputs and milestones towards Objective 5 during the period under review.

The major activity with the capacity building component in Phase II are as follows:

1. Capacity building focused on outcomes-based training (with tangible outcomes); for example, on Gender Leadership Training, SIMLESA made sure that gender-based activities were incorporated into the work plans of the countries/ objectives and also how to report on these activities.
2. The two MSc and one PhD student finished their experiments and analysis of results in South Africa and have since submitted their theses. The PhD student graduated in April/ May 2015

The ARC together with the University of KwaZulu-Natal mentored Mekonnen Simme (former SIMLESA-Ethiopia Country Coordinator) on his PhD studies.

QAAFI Online Training Module

During the review period, the School of Agriculture and Food Sciences developed a distance training module for an online statistical course for supporting capacity building under SIMLESA II. The online course has been given a short name - Bespoke eStyle Statistical Training (BeST), and is supported under a capacity building objective (5.12) the SIMLESA phase II project.

This project aims to support two international farming systems projects within the SIMLESA Phase II. It provides an online course in statistics for applied agriculture research design, analysis and reporting of results. The units will be modular, visual and interactive to assist in the understanding of biometry and study design concepts. It will take a scientist-centric approach with inputs from a wide range of research and monitoring scientists in the African and Asian projects.

5.1 ARC Human Capital Development update

In the period July 2015-June 2016, the capacity building component of SIMLESA Phase II, managed by the Agricultural Research Council (ARC) has focused on gender leadership and planning as well as post graduate studies. In 2016/17 financial year, a reshuffling of programs was conducted to prioritize activities such as development of conservation agriculture videos and field guide. The reason for re-prioritization is two-fold: to develop cost-effective information products considering the limited funding allocated to the program and second, to disseminate the information products to a wider audience through a variety of platforms such as YouTube, mobile applications and other communication channels accessible to farmers and advisors.

5.2 Capacity Building Program

A gender training workshop was organized and held in Pretoria, South Africa from August 23-28 August, 2015. The overall goal of the training workshop was to enhance the capacity of management, objective leaders, and country coordinators and gender focal persons to integrate and mainstream gender in the SIMLESA planning and implementation process. The objectives of the training workshop were to: develop an improved understanding and knowledge of gender concepts for effective gender integration in SIMLESA; initiate the scope for behaviour change/innovation to determine the set of gender intervention; identify influencing factors affecting the final decision toward gender change in SIMLESA; provide participants the opportunity to acquire gender change agency skills; discuss and reach consensus on topics for strategic gender research in SIMLESA.

In addition, the SIMLESA lo frame was re-visited to discuss gender entry points, indicators, and ME&L plans so that action plans for immediate application of gender integration in SIMLESA would be produced. The workshop also provided tools to facilitate networking among members of the SIMLESA team.

5.3 Gender Leadership and Planning

A five-day training workshop on gender integrated planning was conducted at ARC Central Office in Hatfield, Pretoria (South Africa) on 14-18 March 2016. The purpose of the training was to develop an improved understanding among participating staff of the use of gender analysis concepts to build effective planning processes and integrate gender into these. The workshop content was based on four modules for gender-integrated planning - situation analysis, followed by setting objectives, developing activities and inputs, and indicators for monitoring and evaluation. The workshop used three project proposals as case studies to evaluate if any of the steps introduced had been referred to.

The training program was attended by SIMLESA Gender Focal Points from all five countries ; Communications Specialist; Objective Leaders and four ARC Training Coordinators.

While most participants found the contents useful to their work, the more ‘field-based’ participants were under the impression that the workshop would expose them to field methods and tools for gender analysis, community participation, among others. Developing skills for field-

based methods and tools requires separate treatment and cannot be combined with more upstream, gender-integrated planning skills.

5.4 Information Products on Conservation Agriculture

Two information products, namely CA video and CA Field Guide have been commissioned to the ARC specialist to manage their production. Costing for the production of these has been conducted to ensure maximum benefit at the least price. In the meantime, the ARC is in the process of developing a Mobile Application for Agricultural 'how to" Information Hub, whereby all production, processing, marketing and early warning information will be available, among others. The mobile application will be accessible to SIMLESA advisors and farmers, as well as their intended audience in Southern Africa. The two information products to be developed for SIMLESA will feature strongly in the mobile application tool being developed.

A three-day workshop is planned in August 2016 to discuss the prosed plan by the ARC with SIMLESA colleagues and agree on the focus and content so that a final product is presented by end of year, December 2016.

5.5 Human Capital Development

i. **Two MSc candidates** (Mozambique) Gabriel Bragga and Custodia Jorge registered with the University of Free State. The two students submitted their first drafts of their thesis for review; however, due to poor presentation associated with English Language challenges, the drafts were returned for further refinement. This required the students re-register with the university. Bragga resubmitted his thesis for review on 28th June 2016.

ii. **One PhD Student** (Ethiopia), Mekonnen Simme is registered with the University of KwaZulu-Natal, since May 2015. Simme has finished his course work and literature review and is currently working to finalize his project proposal for approval by the end of September 2016.

The economic downturn and the lack of sufficient funding has a negative impact on the capacity building efforts of the SIMLESA program. The ARC's decision to incorporate some SIMLESA activities to its core programs helps to alleviate some of the financial pressure and to make sure that both SIMLESA and ARC participate in the training programs and the products developed benefit both South Africa and SIMLESA countries.

5.6 Progress on QAAFI's PhD students

Abeya Tefera (Ethiopia): Abeya has competed his PhD studies and has published one article in a high impact journal i.e. Field Crops Research, and has been invited to be senior author in the publishing of a book chapter. The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://dl.dropboxusercontent.com/u/20788757/TRANSFERS/Abeya%20et%20al.pdf

Nascimento Nathumbo (Mozambique): Nascimento has returned to Mozambique to his position in Chimoio and is expected to submit the answers to the reviewers of his PhD thesis soon.

Solomon Jemal (Ethiopia): Solomon had his mid-term review in July 2016.

Yohannis Tesema (Ethiopia): has completed his PhD studies and published his studies in a high impact journal. The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://www.dropbox.com/s/97pyu4mdz5754oz/Bioeconomic%20paper.pdf?dl=0

Caspar Roxburgh (Australia): Caspar has completed his experimental work and is on track to completing his final thesis review this month. Caspar has published an article for publication in a high impact journal (Agricultural Systems). The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://www.dropbox.com/s/9ukvsn6vubgj4de/Caspar.pdf?dl=0

Table 5.2: Kenya Support

Activity description	Achieved	Way forward
PhD training on agronomy (Land Resource Management)	The student (Alfred Micheni) finalized, defended and graduated in July 2015 with a PhD in Agricultural Conservation Systems.	• Develop and submit to conferences or refereed journals papers from the key areas addressed by the study
Participate in the program planning meetings	Four partners participated in country program 2015 SIMLESA Mid-Term Review Meeting	• Where possible include the reviewers' suggestion in future project implementation agenda.
Manage the program funds (Centre OH)	Administered the program funds according to the GoK and donor requirements	• Continue administering the program funds as stipulated by the donor and the GoK.
Coordinate the program site activities	Coordinated both technical and financial program's activities in Eastern Kenya. Also coordinated utilization of the program's physical resources.	• Continue coordinating the program funds, resources, data, personnel, etc.

In Kakamega, 46 (21 males and 25 females) were trained on CA technologies in October 2015 in Bungoma County. Twenty five farmers (10 males, 15 females) were trained on soil fertility and conservation agriculture and crop agronomy by Boro Innovation Platform. Training was done on postharvest and value addition of groundnuts, soy and pigeon peas. The training involved the application storage bead technology for legume seed processing and storage. Participants were 81 (53 men and 28 women) and comprised of department of agriculture extension staff and farmers. **NB:** Storage beads is a new technology made from a unique substance which is able to keep the seeds dry and hence influence the longevity of seed

causing the seeds to germinate over a longer period than in the conventional methods of storage.

In Tanzania, various trainings were conducted as follows: Technology dissemination method through mobile phone short-message service (SMS). Beneficiaries were from different stakeholders, including innovation platforms, researchers, extension, smallholder farmers, NGOs and private seed companies. The total number of farmers who benefited from this training were 60 (30 females and 30 males). Two participants (one male and one female) were trained on gender mainstreaming in Pretoria, South Africa. In addition, two participants attended a high-level policy forum in Entebbe, Uganda on October 27-28. Sixteen people (13 males and three females) attended a business modelling training course. Capacity building to the innovation platform was also conducted where 34 people participated (25 males and nine females).

3 Impacts

3.1 Scientific impacts

SIMLESA program has consistently maintained its focus on generating scientific impacts through partnership and collaborative research in the target countries in line with the program design. This is also in line with the acknowledgement that the functionality and effectiveness of the program depends on the capacity of partners including those strategic players who can translate research results into meaningful deliverables on the ground, particularly ***the desire to turn research into impact***. This resonates with the CIMMYT50 years (1966-2016) celebration theme. Through the use of long-term trials, SIMLESA managed to scale up termite manifestation in CA plots as well as weed control.

The trials were designed to use evidence-based data that is collected using scientifically proven methods, analyzed, reported and published for wider use. The exploratory trials, although traditionally designed for simple demonstration proved very easily understandable by small-scale farmers while at the same time providing data that have been statistically analyzed and producing very credible results which could be replicated for wider use to achieve more benefits. Partners' capacity has been strengthened through the collaborative research partnership with CIMMYT, QAAFI, CIAT and ILRI (particularly with the new focus on crop livestock integration) enabling them to share research methods, tools and their applications.

During the period under review, the program has continued to keep track of adoption pathways as a way of monitoring the efficiency of its scaling out strategies and impact pathways as a vehicle for assessing viable options for transforming the lives of the smallholder farmers through the 2015/16 Adoption Monitoring Survey. The results are still to be analysed and shared to inform the current Sustainable Intensification (SI) adoption rates. There are a number of success stories which have been documented during the period under review as evidence of SIMLESA demonstrating impact on the communities through improved food security, (Most Significant Change (MSC) story below).

SIMLESA: Enhancing integration, innovation and impact

Considered a flagship program, SIMLESA technologies are being adopted by other governments, non-governmental organizations and donors, as a framework for sustainable intensification. The program has significantly contributed to the generation and adoption of user-preferred maize and legume varieties, and has provided information and knowledge that improve system productivity and profitability of target farming systems.

Program activities also led to the identification of maize varieties compatible with intercropping systems, water conservation and labour savings from conservation agriculture technologies, while superior maize and legume yields from rotations in conservation agriculture were realized in all five SIMLESA countries in Eastern and Southern Africa. The positive impacts of conservation agriculture based sustainable intensification practices on risk, incomes and the environment were also analysed and disseminated, while innovation platforms contributed to scaling-out best bet technologies. Since its establishment in 2010, SIMLESA had by December 2015, worked with 173,733 farming households adopting sustainable intensification practices against a target of 143,607 - accounting for a 121 % achievement.

Farmers desperately need these new practices to face the challenges coming their way, according to SIMLESA partner, Total Land Care (TLC). TLC Zonal Manager and Land-Use Specialist, John Chisui said, "Climate change has played a role (in farmers' acceptance)," he explains. "People can see that under conservation agriculture, the crop do much better, compared to conventional agriculture."

Housed in the Ministry of Agriculture and supported by the Food and Agriculture Organization of the United Nations (FAO), Malawi's National Conservation Agriculture Task Force now aligns extension efforts, research, and messaging for conservation agriculture. Because the practices are complex and knowledge intensive, it is crucial to coordinate extension.

SIMLESA is working with World Bank funded projects, government projects as well as other bilateral development donors. The national farmers' association, NASFAM, is using SIMLESA scaling out approaches to reach out farmers beyond SIMLESA operational areas and spread out the community benefits.

Matthias Mkangeni, a smallholder maize farmer in Chinguluwe Extension Planning Area in Salima District in Malawi, was used to the traditional way of farming that his family has practiced for generations. It requires clearing a plot of land and burning all the remaining plant residue on top of the soil to get a clean seed bed for crops. However, as demand for land increases, this can fuel deforestation and deplete nutrients in the soil if land is not given enough time to regenerate.

Through TLC, SIMLESA-Malawi has been working with farmers like Mkangeni to adapt sustainable intensification practices like conservation agriculture to his circumstances. He is adopting the technologies as a follower farmer, learning from SIMLESA lead farmers, and other farmers in his area. In addition to TLC, other organizations who have taken up SIMLESA-supported technologies in the area include the Malawi Lake Basin Project. In the remote areas of rural Malawi, where Mkangeni's farm is located, conservation agriculture-based farming systems have significant benefits during dry spells in a region where farmers have no access to irrigation and purely depend on rainfall for their harvest. In the 2015/2016 cropping season, Mkangeni harvested his best maize yield of 25 bags of 50 kg maize in the last four years thanks to

employing sustainable intensification practice – intercropping maize and cowpeas. His previous yields averaged 10 bags per season. Other farmers 'crops were reduced to near ashes by the drought which ravaged Southern Africa in the 2015/2016 farming season."I feel a sense of relief, as I now know a number of agriculture techniques that I can use on my farm. I know my family will be food secure and I don't have to worry like before," he continues.

With assistance from SIMLESA and other partners, farmers like Mkangeni are learning to practice conservation agriculture, or innovation agriculture, a cropping systems based on the principles of reduced tillage systems, keeping crop residues on the soil, and diversification through rotation or intercropping maize with other crops. Conservation agriculture approaches can mean the difference between farmers being able to feed their families or having to go hungry.

For Mkangeni, traditional farming practices are now history. As a follower farmer, he says he has learned the benefits of not burning off the moisture and nutrient-dense plant residue in his soil.

Figure 6.1 Matthias Mkangeni and wife Lesitina, spreading mulch in their field. Photo: Johnson Siamachira/CIMMYT

In Malawi, an estimated three million people are in need of urgent humanitarian food assistance due to this year's drought. But some will escape hunger, among them 400 smallholder farmers in Salima District, who have begun using conservation agriculture.

Malawi presents a good case for conservation agriculture. Few farmers have livestock, so crop residues can be kept on the fields instead of going for fodder.

In line with the program design, SIMLESA continued to embark on an extensive experimentation program to assess the longer-term benefits of conservation agriculture compared to conventional farming systems such that it was concluded beyond any contestation that conservation agriculture is the way to go to improve food security across SIMLESA sites, and beyond. It is against this background that the general recommendation was made to scale up and out conservation agriculture techniques as one of the strategic options for ensuring that SIMLESA is able to achieve its overall goal of increasing productivity in Eastern and Southern Africa by 30% from 2009 average by year 2023 and also reaching 650,000 farmers.

3.2 Capacity impacts

During the period under review, SIMLESA continued relentlessly to deliberately direct its effort on trainings in conservation agriculture principles and technologies; sustainable and climate responsive agriculture production systems; agricultural production systems simulations; risk management and systems modelling acknowledging the socio-economic dynamics of households in different sites.

The program continued to give priority to capacity building trainings at different levels of implementation, more specifically to both NARS and farmers at country level as well as through long- term graduate level studies. SIMLESA program managed to strengthen the capacity of smallholder famers in good agricultural practices through an array of initiatives such as farmer-to - farmer exchange visits, specific trainings on improved agricultural practices, information exchange and participation in IP meetings.

A case in point is what the ME and L and Communications specialists witnessed during one of the ME & L visits in western Kenya in July 2015 where operations of Bungoma Innovation Platform were articulated to the visiting team enumerating the benefits farmers were enjoying because of the IP.

The program prioritized capacity building of researchers and extension practitioners as shown by the number of people who got enrolled at different levels to improve their academic and professional qualifications so as to enhance implementation effectiveness and efficiency. This was also done with an ultimate aim to improve the capacity of young researchers in the areas of agricultural economics and plant science in an effort to build Eastern and Southern African national agriculture research and development capacity. A cumulative total of 65 students (42 students pursuing Master of Science degrees and 23 PhD students at national universities in SIMLESA partner countries) were being supported. Field days and exchange visits have continued to improve knowledge transfer which, as evidenced by stories of change has led to increase in yield of both maize and legumes thereby resulting in improved food security in SIMLESA operational sites.

Through the 56 Innovations platforms across SIMLESA countries including spill overs, links were formed with agro dealers facilitating improvement of market systems for framers thereby boosting their incomes and widening market opportunity options. Efforts were being made for the innovation platforms to give more benefits to the program acknowledging that the IPs have great potential to address the issue of sustainability.

Linkages with the private sector and some seed companies across the SIMLESA countries has brought huge benefits in terms of expertise for NARS as implementers and program participants (farmers) in modern agronomic practices.

3.3 Community Impacts

SIMLESA aims to reach out in an efficient and effective manner, as many communities as the resources can allow so that there is more coverage as far as modern and scientifically proven farming technologies are concerned which at the end will improve food security at both regional and household level. During the design phase, the program set targets and adoption pathways to achieve this scaling out process in terms of the number of research communities covered, number of farmers reached out and the number of adopters (these being the farmers who have learned, embraced and started practising SI technologies)

During the period under review, the program managed to maintain a cumulative total of 196 research communities against a set target of 222 across the five countries, accounting for an 88.3% achievement with a cumulative of 173,533 farmers. It can be seen that SIMLESA has led to increased uptake of CA technologies both at community and household level though acknowledging that in some cases farmers were not taking the whole CA package. Participating farmers have given testimonies of better nutrition from legumes, improved soil fertility from residue utilization and reduced labour.

Figure 6.2 below shows the detailed adoption of technologies/practices target population and achieved by country:

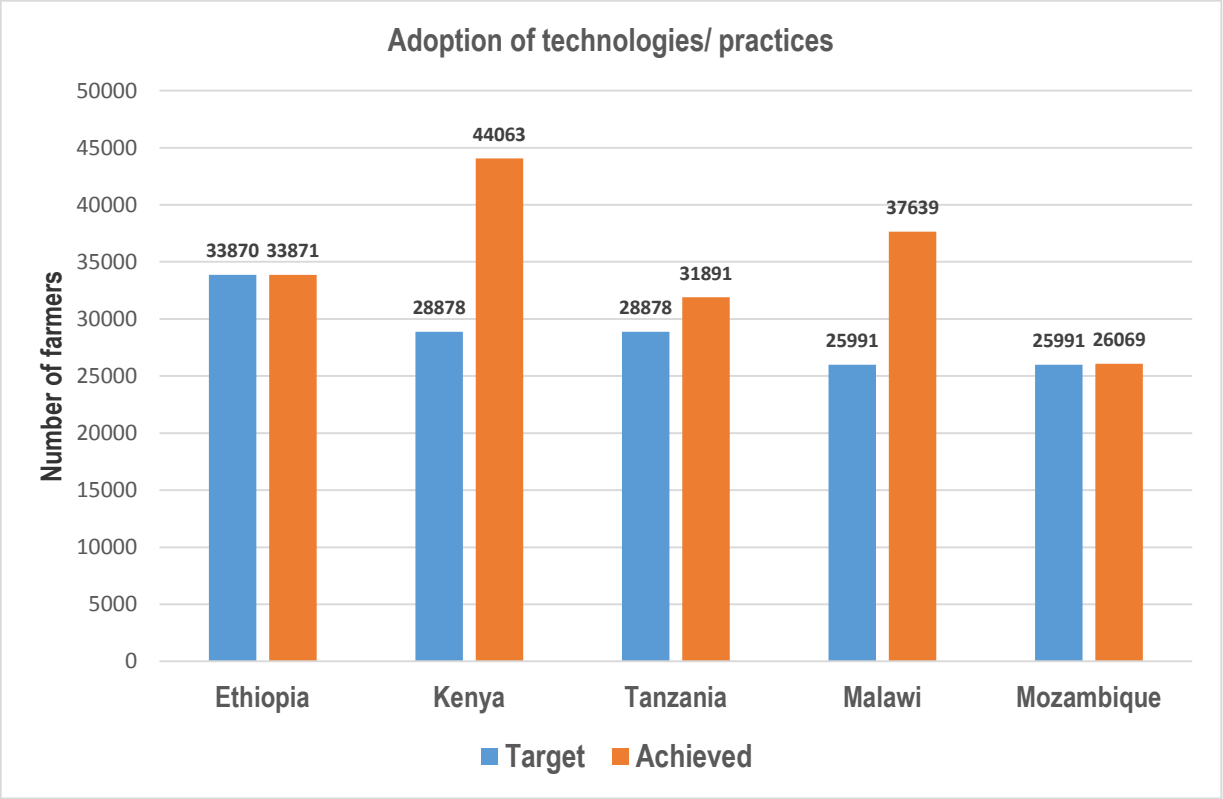

Figure 6.2: Adoption of technologies/practices (*Source: Adoption Pathways Project Report 2015)*

All countries managed to achieve at least the set targets.

Table 6.1: Adoption of technology/practices, targeted adopters and achieved by sex

Country	Target and Actual adoption			
	Targeted adopters	Farmers who have tried		
		Male	Female	Total
Ethiopia	33,870	28,449	5,421	33,871
Kenya	28,878	17.379	26,684	44,063
Tanzania	28,878	21,756	10,135	31,891
Malawi	25,991	18,454	19,185	37,639
Mozambique	25,991	18,770	7,299	26,069
Total	143,607	104,808	68,724	173,533

***Source**: SIMLESA Highlights of Achievements 2010-2015*

In Malawi, the national farmers' association, NASFAM, is using SIMLESA scaling-out approaches to reach out farmers beyond SIMLESA operational areas and spread out the community benefits. The SIMLESA ME & L system has invested time to devise mechanisms of investigating and documenting this multiplier effect and report the actual figures brought about by this NGO innovation. The ME & L focal person in Malawi had been tasked to gather information to comprehensively inform this initiative.

3.4 Economic impacts

SIMLESA has brought increased use of CA technology in communities which have also led to evident reduction of production costs and increased crop productivity per unit area especially and dietary diversification in farm households where maize and legumes are intercropped. Maize and legume intercropping has also led to reduced risk in the event of moisture stress, provision of both carbohydrates and proteins to households as well as improved soil fertility in the long run through crop residue retention. The use of crop residues to improve soil fertility has led to the reduction in expensive fertilizer use. The program has also led to the breeding of area specific maize and legume seeds thereby leading to less drought risk and pests and reduced yields. If this momentum could be maintained, the program will enhance income, food and nutritional security through science and partnerships, as espoused by the overall SIMLESA goal.

3.5 Social impacts

On the social dimension, SIMLESA continues to improve family fabric through the hosting of exploratory trials which promote the participation of men, women and youths thereby making everyone strategic and important participant in household farming activities.

The approach has also led to improved family cohesion giving women opportunities to contribute to household decision- making as was evidenced by one of the ME & L visits in Ethiopia and Kenya in September 2015, where selected households were interviewed and data .was collected using the Open Data Kit (ODK) platform. CA as a farming technology premised on the concept of minimum soil disturbance, has also brought an opportunity for improved food security for the labour constrained households including those with no capacity to mobilize draught power for conventional tilling. The establishment of innovation platforms in the communities has created a sense of ownership of SIMLESA and assisted in demand driven research and development approach. Innovation platforms continue to be enablers for the sustainability of intensifications options beyond SIMLESA hence building their capacity remains crucial.

In terms of partnerships, SIMLESA Phase II has been well aligned and has benefited immensely from a number of past and current ACIAR-funded projects and initiatives. The emphasis of linkages with projects such as Adoption Pathways, Farm Mechanization and Conservation Agriculture for Sustainable Intensification (FACASI) and but not limited to ZIMCLIFS (the Zimbabwe-based crop-livestock integration) has brought some bridging in agricultural research and development and led to accelerated adoption for early impact on food security as evidenced

by a number of case studies and Most Significant Change Stories (MSC) captured across the five SIMLESA countries.

SIMLESA has also presented a significant reinforcement and complementarity of other sustainable intensification research in CGIAR Research Programs (CRPs) particularly with the CRP MAIZE (led by CIMMYT) which has sustainable intensification of maize systems as one of its strategic initiatives and includes innovation systems approach. Overall, these linkages have also brought in capacity to SIMLESA program participants since there has been synergies in terms of expertise.

The social impacts attributable to SIMLESA partnering with the private sector and seed companies cannot be underestimated as evidenced by what was witnessed during the ME&L visit in Eastern Kenya, Embu where participation of seed companies at a field day at a demonstration plot at Geeto Primary School, showed how they had responded to different ecological needs in SIMLESA sites.

3.6 Environmental impacts

Lack of access to information and inputs, poor soils, unfavourable weather conditions, pests, disease and inadequate agricultural extension services are major factors limiting smallholder farmers in Eastern and Southern Africa, from increasing their maize productivity.

The El Niño-induced drought did not spare Eastern and Southern African countries. More specifically, El Niño put 30 million people on the brink of starvation in Southern Africa. The outlook for smallholder farmers in Southern Africa in the cropping season was bleak. Erratic rainfall and record-breaking temperatures resulted in large-scale crop failures in most countries.

Tens of thousands of cattle died and reservoirs were depleted. Maize prices soared in countries that largely depend on maize as staple food such as Malawi. Meat prices fell to record lows as farmers had to slaughter their cattle as a last resort.

Climate change is expected to negatively impact agricultural production in SIMLESA countries. Low-nitrogen stress combined with drought and heat stress will become increasing constraints on maize production, and on growing improved varieties. Improved agricultural technologies, agronomic practices and climate-smart national policies are essential to offset projected yield declines.

SIMLESA places environmental concerns as key to its agricultural development interventions because sustainable farming practices are critical to long-term profitability.

Through its projects, SIMLESA promotes conservation agriculture and maize-legume intensification to respond to declining soil fertility and sustainably increase the productivity and profitability of current farming systems. Increasingly, SIMLESA adapts its products to more erratic rainfall, increased heat stress and seasonal dry spells in Eastern and Southern Africa. The cropping systems it promotes can be labelled as climate-resilient, according to IPCC(2014), SIMLESA uses different strategies to improve farming system productivity depending on the agroecology, the socioeconomic environment and farmers' resource endowment, and its

interventions are based on good agricultural practices, minimum soil disturbance, residue retention and diversification through rotation with legumes and green manures.

Traditionally, SIMLESA has used the cluster approach in target communities to expose farmers to new technologies and options, but this has widened in recent years by using different partnership models to reach impact at scale. SIMLESA works with government research and extension services in all countries it operates, and also engages with major NGOs to achieve the greatest outreach. The program has institutionalized sustainable intensification practices and has been increasingly acknowledged for its expertise in this area.

3.7 Monitoring, Evaluation & Learning

During the period under review, ACIAR contracted an external review team to carry out a Mid-Term Review (MTR) of SIMLESA which coincided with the second year of implementing Phase II of the program. The MTR was carried out in the last quarter of the year, 16-31 October 2015. The activity was dominated by review of documents, field visits, stakeholder meetings, informant and farmer focused group discussions. All major documents like program proposal, logframe, progress reports, spill over and monitoring reports were availed to the reviewers before field visits. Four countries out of five main SIMLESA were physically visited by MTR external reviewers. The visited countries were Ethiopia, Malawi and Tanzania and Kenya. An MTR meeting was organized with reviewers after field visits to discuss program milestones, outcomes and impact on 30-31 October 2015 in Addis Ababa, Ethiopia. The meeting was attended by 40 participants comprising of key program staff, such as objective leaders, country coordinators, MTR reviewers and PSC members. The MTR observations and recommendations are summarized below:

Recommendation 1: Program Data and Documentation: SIMLESA, in conjunction with all partners, urgently develop a data management policy that addresses quality assurance, data archival, annotation, ownership, and timely access within and external to SIMLESA, and post-SIMLESA.

Recommendation 2: Program management: The PMC should ensure that it takes appropriate steps to support SIMLESA II to achieve its objectives by taking a more active role in the program management over the remaining life of the program. Special attention should be given to ensure delivery of milestones as per contract, and to prioritising activities and resources for impact.

Recommendation 3: SIMLESA's role in formulating policy: SIMLESA should approach policy practice as an 'action-learning' process, using SIMLESA data and AIPs to inform policy dialogue.

Recommendation 4: Monitoring and Evaluation: The program should maintain its output indicators of "reach" and add defined adoption and impact indicators that reflect combinations of technologies adopted and years of practice.

Recommendation 5: Communication: SIMLESA should develop and implement a revised communication plan that includes particular focus on providing support material for influencing national policies, and supporting the AIPs in their role as important vehicles for adoption of SI technologies/practices.

Recommendation 6: Science: The focus on science should be to complete field research and progress that to peer-reviewed publication and extension reports especially where the findings

directly underpin the SI packages being recommended and associated policy implementation. The program should place particular emphasis on quantifying the benefits of SI packages and their components with respect to climate variability, risk and gender.

Recommendation: 7: Partnerships: SIMLESA should put greater emphasis on engagement with the three associated ACIAR projects (FACASI, Adoption Pathways and ZimCLIFS) to assist it in refocussing some key research areas such as livestock and mechanisation.

Recommendation 8: Objective 1: The information generated under Objective 1 must not simply be recorded in a descriptive form. It needs to be analysed to provide a synthesis for publication and dissemination as part of SIMLESA's knowledge management framework to ensure that Objective 1 makes a stronger contribution to:

- incorporating the baseline situation analysis within the M&E framework;
- informing the policy analysis work, especially with regard to identifying SI adoption constraints and options for addressing these;
- identifying evidence based understanding of how SIMLESA scaling can be designed for maximum impact
- generating further insights into the risks associated with various SI options and adoption pathways and how farmers respond to these.

The Objective 1 team should develop a risk reduction options framework that includes both crop and livestock system components and their interactions that can be used to assist decision making in the AIPs and policy dialogues.

Recommendation: 9: Objective 2: The SI practices for scaling-out should be documented as soon as possible so that they provide the basis for scaling out under Objective 4. SI technologies/practices appropriate for widespread dissemination through national extension systems, NGOs and the private sector should continue to be refined and adjusted through trials and demonstrations.

Recommendation 10: Objective 3: Seed production for legumes (both grain and fodder) should be given a high priority, and a plan should be developed as soon as possible on where and how delivery of legume seed to farmers can be scaled-up before the end of the program. This plan should be based on other successful legume seed production programs in the region.

Recommendation 11: Objective 4: The CGS and the Objective 4 team members should prepare a comprehensive scaling out plan that harnesses appropriate program elements and

associated public, business and NGO organizations that support scaling-out, especially those of gender, M&E and communication.

Recommendation 12: Objective 5: Capacity building should continue its current commitments for post-graduate students but focus new training on improving the broad range of skills that will be required to directly support scaling-out of the SI technologies/practices in each location/country. The priority skill sets will likely range at least from AIP facilitation and governance, to agronomy, systems analysis, communication and extension**.**

The SIMLESA management team compiled a comprehensive response to the recommendations (see attached technical annexes).

Between July 2015 and June 2016, monitoring visits were also conducted in all the SIMLESA countries in an attempt to get some good understanding of how the countries were progressing with their implementation plans of the program and also giving support on how they are supposed to document their activities as evidence for progress in program performance more so when the program now has an internal M E & L system following the coming in of an ME & L focal person in June 2015. Countries through their SIMLESA country focal persons were also encouraged to keep track and updating figures in database as a way of strengthening the internalised SIMLESA M & E system. The ME & L visits proved to be very beneficial in terms of improving data management at country level and also provided proof for farmers' understanding of maize legume value chains particularly in western Kenya where a field day was attended and issues of value chains were articulated in a very impressive way.

The Monitoring and Evaluation desk has taken note of the MTR observation that the indicators which were presented at the MTR meeting in Addis Ababa, Ethiopia were chiefly at output level so during the reporting phase, the M E & L Specialist has worked on a revised ME & L plan with capacity to capture more outcome/impact level indicators. The revised and deployable plan has since been shared with CIMMYT headquarters for input and with Dr Andrew Alford (ACIAR Research Program Manager Impact Assessments). The plan is supported by tools which already have been shared across countries starting with the Malawi team during the 8 December 2015 M & E data management meeting with successive roll out in other countries for use in ME & L work. Concerted efforts have been put in place for country teams to start populating outcome and impact indicators as well as documenting more MSC stories.

3.7.1 SIMLESA Achievements from an ME & L perspective

SIMLESA has performed a number of activities in CA-based sustainable intensification which the ME & L desk has kept tracking overtime. The ME & L desk invested sometime to check the effects of these activities on the communities and enumerated these among other benefits which are directly attributable to the program:

Selection of best bet options through exploratory trials has led to increase in crop yield. For example, in Kenya maize grain yield increased from 0.4 tons per hectare in 2010 to about 4.0 tons per hectare at the end of 2015. At the same time, the sole bean yield increased from 0.2

tons per hectare in 2010 to over 2.0 tons per hectare. The yield increase was attributed to improved field management after being exposed to SIMLESA SI technologies.

In Tanzania, the results of exploratory trials showed an improvement of maize grain yield from 0.5 tons per hectare to about 2.5 to 4 tons per hectare and 1.5-3 tons/ha legumes yields through drought-tolerant crops from practicing conservation agriculture to other farming practices. By adopting conservation agriculture, smallholder farmers benefited from reduced cost of production while saving on labor. Farmers have saved on time by 50% for other economic activities through adopting zero tillage.

In one of the spill over countries, Uganda, a combination of PPB and rip-line tillage together with improved seed and fertilizer brought maize yield within the expected country productivity range for maize range from 3.8 to 8.0 tons per hectare.

A total of 268 and 378 maize and legume on farm Participatory Variety Selection (PVS) were conducted where best performing maize and legume varieties that met famers' preferences were selected and scaled up by partner companies. The varieties were selected based on grain yield, maturity, drought-tolerance, pest resistance and palatability. The selected hybrids yielded 30-40% more under drought and 20-25% under optimum conditions compared to commercial checks. Drought has become very prevalent in Eastern and Southern Africa such that the coming in of selected drought - tolerant varieties came as a great relief to farmers.

Malawi, for example, has proved that the adoption of CA-based sustainable intensification practices can enhance production risk management. The highest crop yield and reduction in downside risk as well as reduction in the cost of risk was achieved when farmers adopted crop diversification and minimum tillage jointly rather than individually. The reduction in probability of crop failure was higher (72%) with joint adoption of sustainable intensification practices than when they were adopted individually (30-42%). The results also indicated that the cost of risk is higher for non-adopters compared to adopters' counterparts.

To date, farmers participating in the SIMLESA program, among other benefits, have realized that maize yields in CA systems involving crop rotations and intercropping with legumes increase yields. Furthermore, the results from the field confirms that CA saves labor, which enables farmers to plant timely leading to improved profitability. This has been witnessed across all the five SIMLESA countries.

In terms of learning, the following are some of the learning points identified:

- Farmers belonging to groups had higher chances to adopt SI technologies
- Farmers with better access to markets were likely to adopt SI practices
- For CA to succeed, there should be available and alternative livestock feed – crop livestock interaction has bought in competition for residue.
- From ILRI - led action researches, it has been found that traditional feeding and storage practices lead to considerable postharvest loss of feed resources. It is, therefore, important to promote improved feeding trough and feed storage technologies that would minimize wastage and help to cope with dry season feed deficits.

3.8 Gender Integration

Women comprise more than half of the agricultural labour force in Eastern and Southern Africa, yet they generally produce less than males farmers do. Limited access to land and inputs such as improved seed, fertilizer and other resources cause these gender differences in productivity. If women had the same access to resources as men, they could increase their yields by 20 to 30 %.

Evidence from the field and different observations demonstrate that there is a need for additional and continued capacity building on understanding of gender, especially gender mainstreaming in agricultural research for development and its application in real life. As part of this process of work, financial assistance, training and technical support was provided to undertaker gender capacity building for participating countries. The gender training and other gender-related activities are summarized in this section of the report.

3.8.1 Training

A gender mainstreaming and planning workshop was held in Pretoria, South Africa from 24 - 28 August, 2015. The overall goal of the SIMLESA Phase II gender training workshop was to enhance the capacity of management, objective leaders, country coordinators and gender focal points from each participating country to integrate and mainstream gender in the SIMLESA planning and implementation process. The workshop had eight objectives:

- to develop an improved understanding and knowledge of gender concepts for effective gender integration in SIMLESA;
- to initiate the scope for behaviour change/innovation to determine the set of gender interventions;
- Identify influencing factors affecting the final decision towards gender change in SIMLESA;
- to provide participants the opportunity to acquire gender change agency skills;
- to discuss and reach consensus on topics for strategic gender research in SIMLESA;
- to revisit the SIMLESA logframe and discuss gender entry points, indicators, and monitoring and evaluation plans;
- to produce action plans for immediate application of gender integration in SIMLESA; and
- to facilitate networking among SIMLESA team members.

The gender training workshop was attended by the SIMLESA Program Leader, the Project Manager, the Monitoring and Evaluation Specialist and the Communications Specialist. Gender focal points (GFPs) from Ethiopia, Malawi, Mozambique and Tanzania, and two participants from the host institution, the Agricultural Research Council of South Africa (ARC), also participated. The SIMLESA – Ethiopia country coordinator also attended the training workshop.

3.8.2 Women Empowerment and Decision-Making

Technologies likely to make a difference in the daily lives of rural women farmers are those that address their specific needs based on the division of labor in developing countries.

For women, benefits would have to go beyond increased productivity and income. When their drudgery and tedium are reduced, women have more time and confidence to pursue different activities. This includes assuming leadership in their communities, which in turn can help ensure the benefits of improved agriculture are shared more equally among both women and men.

A key commitment for SIMLESA is to empower rural women. One of the ways SIMLESA strives to do this is through time- and labor-saving technologies targeting women. Since women generally handle the bulk of the weeding on Africa's smallholder farms, using herbicides can be a major time-saver.

Angeline Odero, a smallholder farmer from Boro Community in Central Alego Ward, in Siaya County, Western Kenya, is a member of the Boro Innovation Platform who benefited from SIMLESA technologies. Eastern and Southern Africa farmers lose about 30 percent of their potential maize yield because of late weeding.

Thanks to the SIMLESA project, Angeline and 2,000 other farmers in her area received training in good agricultural practices focusing on the importance of using new technologies for weed-free crops and increased yields. Using farmer-hosted demonstration plots, SIMLESA introduced the use of herbicide technology to help reduce drudgery for smallholder farmers, for whom labor shortage is a major constraint.

After seeing the excellent weed control on the demonstration plots and receiving training and technical assistance this season, farmers in Boro applied the herbicide to their maize and legume crops.

Without herbicides, Angeline harvested two tons of maize per hectare; with the herbicide, she is now harvesting five tons of maize per hectare. The increase in yield translated to increased gross margins from less than USD 5,000 per hectare up to a range between USD 6,500 and USD 8,000 per hectare. With the herbicide, she reduced her cost of weeding from USD 160 per hectare using hired labor and traditional weeding practices to less than USD 60 per hectare.

3.8.3 Using existing datasets, specifically Adoption Pathways Data Analysis and SIMLESA data to produce knowledge (publishable articles) and Capacity Building

In the reporting period, the program started working on synthesizing and analyzing Adoption Pathways data for Tanzania, to extract gender issues and key messages as they relate to conservation agricultural-based sustainable intensification adoption and decision making with regards to smallholder farmers growing commercial crops and food crops. To help in the process, two MS and/or PhD level students from the Agricultural Economics Department at the University of Nairobi, Kenya, were recruited to assist the newly recruited gender and

development specialist by analyzing available data to understand further gender issues as they relate to sustainable intensification.

3.8.4 Research activities in SIMLESA Ethiopia, which involved participation of all genders

Women, men and youth farmers and development agents participated in SILESA program activities.

Table 6.2: Summary Table of activities disaggregated into male and female participants, gender in scaling out technologies.

Activity	Male	Female	Total participants	% of women
Participatory Variety Selection of Maize and Soybean varieties	18	18	36	50
Field day and exchange participation on Conservation agriculture and improved maize legume variety demonstration	1646	284	1930	15
Training on Conservation Agriculture	18	3	21	14
Scaling up of technologies of maize and Soybean using CA	3143	777	3920	25
Small seed packs (improved maize)	895	160	1055	18
Participation on demonstration improved maize, Maize-Common bean intercropping, low land pulses	126	21	147	14
Total	**5846**	**1263**	**7109**	**18**

Research activities in SIMLESA Mozambique, which involved participation of all genders

Table 6.3: Summary Table of activities disaggregated into male and female participants, gender in scaling out technologies.

Activity	Male	Female	Total participants	% of women
Exploratory trials	25	5	30	17
Field days	30	20	50	40
Exchange visits	9	3	12	25
Typology trials	2	1	3	33
Research workshop	26	5	31	16
Total	**92**	**34**	**126**	**27**

Gender activities in SIMLESA Tanzania, which involved participation of all genders

Table 6.4: Summary Table of activities disaggregated into male and females participants, gender in scaling out technologies.

Activity	Male	Female	Total participants	% of women
Demos	36	25	61	41
National Agricultural Shows	37	16	53	30**
Field Days	420	358	778	46
Exchange visits	77	43	120	36
Training on Innovation Platforms	25	9	34	26
Total	**595**	**451**	**1046**	**43**

** Farmers who were facilitated by SIMLESA project to attend the National Agricultural Shows in 2015.

3.8.5 Gender activities in SIMLESA-Kenya (Kakamega County), which involved participation of all genders:

Quantified productivity and risk trade-offs faced by farmers under different risk attitude: Assessed adoption and impact to refine impact pathways and facilitate learning, priority setting processes for maize-legume-forage/fodder production systems. Adoption monitoring involved five extension staff (four men and one woman), farmers (28 men and 36 women) and non-governmental organizations (two men) in Siaya and Bungoma.

Annual on-farm exploratory trials to verify co-identified promising CA-based intensification options in terms of productivity, yield stability/risk, profitability and sustainability: Twelve exploratory trials established during the long rains of 2015 continued to be managed by five women and seven men farmers. The trials were established in close partnership between SIMLESA - KALRO scientists and four innovation platform (IPs). In addition, each of the IPs hosted three on-farm exploratory trials. The effects of minimum tillage and conventional practices on the yields of maize, legumes, and fodder as intercrop or in rotation were being evaluated.

Annual on-farm participatory evaluation trials of released improved maize, legume and forage/fodder varieties under CA practices to identify most suitable varieties with male and female farmers: Two participatory evaluation trials were continued, one in each county, Bungoma managed both by a man and his wife and in Siaya managed mainly by the farmer's wife. The improved maize varieties tested were KM 1201, KM 1101 and KSTP 94 all under conservation agriculture. Nineteen men and 11 women were involved in the evaluation of the trials.

Table 6.5: Summary Table of activities disaggregated into male and female participants, gender in scaling out technologies in Kenya, Kakamega County only.

Activity	Male	Female	Total participants	% of women
Assessed adoption and impact to refine impact pathways	28	36	64	56
Annual on-farm exploratory	7	5	12	42
On-farm participatory trials	19	11	30	37
Total	**54**	**52**	**106**	**49**

Overall, in the four SIMLESA countries (Ethiopia, Kenya, Mozambique and Malawi), which presented their gender disaggregated data in scaling out activities, showed that women's participation in the research activities to be less than 50 %. Two exceptions can be found in the data presented here. The first exception is in Ethiopia, where 50% of the women participated in the participatory variety selection of maize and soybean varieties, research activity. The second exception is found in Kenya, were 56 % of the women participated in assessing adoption and impact of CA to refine impact pathways research activity. These findings show the need for all participating SIMLESA countries to campaign and conduct due diligence to increase the proportion of women who are participating in research activities, to make sure that women are also brought on board regarding knowledge on, and applying CA- based sustainable intensification farming technologies.

3.9 Communication and dissemination activities

To achieve the program's aim and overall objective, communications, knowledge and information dissemination activities were carried out and enhanced. Overall, the communication activities aimed at identifying appropriate communication materials and approaches, focusing on SIMLESA and sister programs, research and management team, national stakeholders – as well as farmers and farmer organizations and the global research community.

During the reporting period, the program generated bulletins and technical reports such as semi and annual reports, and technical briefs. The program produced eight technical briefs. The briefs highlight research looking at the performance of the five SIMLESA countries focusing on maize and legume markets with regard to some of the principles of structured value chains. The following are the titles:

- Tracing the Path: What Happens to Maize and Legumes from Research to Farm and Market in Central Mozambique.
- Ares Structured Value Chains Possible or Necessary? Some Highlights from Ethiopian and Kenyan Maize and Legume Markets.
- From few to many: Taking Conservation Agriculture Practices to Scale in Malawi.
- Going to Scale: How do Conservation Agriculture Practices Spread among Farmers in Kenya?
- What's in it for Farmers? Farm Level Advantages of Conservation Agriculture (CA) in Kenya.
- Seed Value Chains to Support Sustainable Intensification in Tanzania.
- The Benefits Package: The promise of conservation agriculture in maize-based systems of Malawi and Mozambique.
- Sustainable Agricultural Intensification in Eastern and Southern Africa: Evidence, Lessons and Imperatives for Scaling Up and Out.

The specific technical briefs can be found on the SIMLESA website: http://simlesa.cimmyt.org/publications/.

A policy brief write shop was held in July 2016, in Entebbe, Uganda. The workshop, jointly coordinated by ASARECA and CIMMYT, was attended by SIMLESA Program Coordinator, SIMLESA-Uganda National Coordinator Drake Mubiru, SIMLESA Objective 1, 2, 3 and 4 leaders, as well as the SIMLESA Communications Specialist. Five policy briefs were developed and later printed. These focused on:

- Sustainable intensification of maize and legume production and livestock integration
- Building on social capital for collective action
- Facilitating access to key farm inputs
- Removing barriers to border trade
- Containing maize lethal necrosis: current knowledge

(http://www.asareca.org/~asareca/sites/default/files/SIMLESA%20POLICY%20BRIEFS.pdf.) .

A high-level policy forum with policy makers on the outcomes of the value chain and farm-level technology assessments was held to foster policy adjustments which favor seed enterprises and farmer adoption.

The forum, whose theme was “Mobilizing policy action to scale-up best agricultural practices,” was attended by the ministers for agriculture of Kenya (represented by Jacinta Ngwiri), Mozambique (Feliciano Mazuze), Rwanda (Charles Murekezi), Tanzania (Hussein Mansoor), and Uganda (Ambrose Agona).

Forty-eight people participated, including researchers from CIMMYT, national agricultural research systems (NARS), ACIAR, international and regional non-governmental organizations, farmer associations, and private companies. The ministers pledged to support sustainable agricultural intensification and concurred that enhancing access to markets, extension services, and inputs is a fundamental policy issue that must be urgently addressed so farmers can reap more benefits from agriculture.

High on the agenda was formulating policies that would shape an agricultural market estimated to be worth billions of dollars. At the end of the two-day forum, the ministers acknowledged in a joint communiqué that the market faces many operational challenges. They also pledged to influence their governments to establish sound policies backed by evidence from agricultural research.

The representatives of the agriculture ministers expressed a continued commitment to the region’s smallholder farmers including pushing for further progress under the African Union (AU)’s Comprehensive Africa Agriculture Development Program. Launched 11 years ago by the AU in Maputo, Mozambique, and approved by African governments, the program calls on these governments to commit at least 10% of their annual national budgets to agriculture and reach 6% annual agricultural growth by 2015.

The forum was extensively covered by the local Ugandan media. SIMLESA produced a four-minute multimedia product focusing on major forum highlights: Policy Forum on SIMLESA: https://youtu.be/cnkwipOhT9E

The program also produced the December 2015 bulletin, revised and published the SIMLESA overview brochure. In preparation for SIMLESA Mid-Term Review held on 16-31 October, the program also produced five country highlights booklets (2010-2015), and one booklet on the 2010-2015 program achievements in brief. Fifteen posters on different SIMLESA promoted technologies and interventions were also produced during the reporting period.

The program produced a four-minute minute overview video highlighting its interventions and approaches SIMLESA Project https://youtu.be/_Sbww9Q9GYk. There were news and feature story contributions to the CIMMYT-wide English website and the Informa, CIMMYT’s weekly internal newsletter.The SIMLESA website was revamped and most sections updated (http://simlesa.cimmyt.org/).

Communication is critical at all levels of the program and was fostered using multiple and innovative techniques.

During the period under review, SIMLESA held a gender training workshop from 24-28 August 2015, in Pretoria, South Africa. The five-day workshop was facilitated by the ARC-South Africa.

Called “Situating Gender in SIMLESA”, the workshop aimed at increasing awareness of gender issues in agricultural research and development, and identifying practical solutions to integrate gender into SIMLESA. It brought together a core team comprised of SIMLESA’s project leader, project manager, gender focal points, monitoring and evaluation specialist, communications specialist, and country coordinators. The 14 participants discussed challenges and opportunities to embed gender within the relevant SIMLESA work sub-objectives. They collectively identified gender entry points, specified monitoring and evaluation indicators, and agreed on an effective accountability framework.

On 16-31 October 2015, SIMLESA undertook a two-week long Mid-Term Review (MTR) of its agricultural research and development activities on station and on farm. SIMLESA undertook this review to assess project performance and recommend actions to refine activities. The last MTR was carried out in 2012.

A five-member team from ACIAR assessed the different maize-legume and forage/fodder production systems in the project’s core countries of Ethiopia, Kenya, Malawi, and Tanzania, and one spill over country, Uganda. The team also analyzed reports and presentations from Mozambique.

At the meeting held in Addis Ababa, Ethiopia, on 31 October, the entire MTR team acknowledged that CA-based maize-legume cropping systems are a highly relevant intervention to reduce smallholder farmers’ vulnerability and food insecurity.

The MTR was particularly impressed with the energy and commitment of the program’s coordination team, the leadership of the various objectives and the national teams. The input during the MTR of those members of the PSC who were present was very valuable. They too demonstrated their commitment and understanding of the program’s many dimensions and the need to deliver outcomes and impact.

From 6-8 April 2016, SIMLESA held its sixth Annual review and Planning Meeting. More than 60 researchers and representatives of donors, seed companies, NARS, and non-governmental organizations from Africa and Australia gathered in Lilongwe, Malawi, for the sixth annual review and planning meeting. SIMLESA undertook this meeting to discuss the project’s progress and achievements, share the lessons learned during the last six years, and deliberate over better ways to implement phase II activities (2014-2018).

Participants discussed key issues in phase II, as per MTR recommendations, concluding that the overall focus should:

- consolidate activities during 2016-2018, with no new activities implemented during the remaining life of the program;

- document scientific outputs for all the research conducted and synthesize the lessons learned;
- given the available remaining resources, streamline the logframe activities and develop a revised work plan;
- scale-out available technologies in collaboration with partners; and
- redesign the livestock component to align it with SIMLESA objectives.

Officials from national partners, policy makers, agribusinesses and NGOs participated in meetings and targeted stakeholder forums and platforms. These modes were used to share research findings and elicit feedback, as well as to communicate the results and findings. To reach diverse sets of users/audiences, the following forms of media were used: print, electronic (including SMS building on the Mozambique pilot initiated by the Australian team) and website (http://simlesa.cimmyt.org/).

In the local learning platforms, farmer-to-farmer sharing and learning were supported and facilitated by NGOs, public extension, seed companies, agro-dealers and business development service providers, based on the promotion of core messages on conservation agriculture and farming system improvement.

Communication were also achieved through regular meetings of the members of the innovation platform in the target communities.

Annual national multidisciplinary study tours including program partners and other important players in the innovation platforms such as equipment developers and livestock researchers were conducted. For example, SIMLESA-Malawi conducted a study tour in Kasungu District to observe, evaluate and discuss advances, problems and opportunities. The fed into the evaluations and discussions at the national annual evaluation and planning meeting.

The Mid-Term Review recommended that SIMLESA's communications unit should strengthen its activities, namely:

"SIMLESA should develop and implement a revised communication plan that includes particular focus on providing support material for influencing national policies, and supporting the AIPs in their role as important vehicles for adoption of SI technologies/practices. Extra efforts should be made to ensure that the SIMLESA website is continually updated to include the breadth of outputs and data coming from the program."

As part of the recommendation on communications, a revised SIMLESA communications plan was produced.

During the first six months of 2016, the Communications unit produced another SIMLESA Bulletin. During the run-up to the sixth SIMLESA Annual Review and Planning Meeting, held in Lilongwe, Malawi in April, one summary of achievements bulletin, *SIMLESA Reflections,* was produced, as well as eight technical briefs produced under Objective 1. A workshop

proceedings report was also produced together with an 8-minute video on the ARPM proceedings.

As part of CIMMYT50 celebrations, SIMLESA was featured in a CIMMYT brochure and flyer, CIMMYT – Southern Africa.

4 Training activities

During the period under review, monitoring visits were also conducted in all the SIMLESA countries in an attempt to get some good understanding of how the countries were progressing with their implementation plans of the program and also giving support on how they are supposed to document their activities as evidence for progress in program performance more so when the program has now an internalized ME & L system following the coming in of an ME & L focal person in June 2015. Countries through their SIMLESA country focal persons were also encouraged to keep track and update figures in database as a way of strengthening the internalized SIMLESA ME & L system.

Forty-two students are pursuing Master of Science degrees at national universities in SIMLESA partner countries while 23 are enrolled for PhD studies. Two PhD candidates from Tanzania and Kenya graduated in April and June 2015 respectively. One MSc student, Kabirigi Michel in Rwanda graduated this year at Kenyatta University. Two MSc candidates (Mozambique) Gabriel Bragga and Custodia Jorge registered with the University of Free State. They have submitted their first drafts of their thesis for review and are anticipated to complete this year. A PhD student (Ethiopia) Mekonnen Simme is registered with the University of KwaZulu-Natal. These young professionals are expected to add to the ever-growing pool of young, skilled researchers and will hopefully contribute to national agricultural research capacity, particularly in plant science and agricultural economics.

A gender mainstreaming and planning workshop was held in Pretoria, South Africa from 24 - 28 August, 2015. The overall goal of the SIMLESA Phase II gender training workshop was to enhance the capacity of management, objective leaders, country coordinators and gender focal points from each participating country to integrate and mainstream gender in the SIMLESA planning and implementation processes. Details are reported under the gender section.

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5 Intellectual property

Nothing reported on intellectual property during the period under review.

6 Variations to future activities

During the period under review, the 6th SIMLESA Annual Review and Planning Meeting (ARPM) was held in Lilongwe, Malawi on the 6th to 8th April 2016 primarily to refocus program activities in line with the October 2015 Mid-Term Review (MTR) recommendations, as well as streamlining and prioritizing activities in line with the depreciation of the Australian Dollar against the United States Dollar. The shrinking of the SIMLESA resource base as a result of the poor performance of the Australian Dollar did not affected the entire program in the same manner. The depreciation of the Australian currency affected CIMMYT salaries and Mexico transactional costs. The severity of the impact of currency depreciation was not similar to NARS. In re-assessing program resources base in line with implementation period, SIMLESA Program Management was forced to rethink and prioritize of program activities particularly from now up to June 2018, without compromising the overall program goal. This will not affect the overall goal achievement since NARS were not much affected due to appreciation of local currency. The program activities were prioritised and realigned at objective level as follows:

Objective 1:

- Bring all published SIMLESA products and existing data to address gender and risk issues
- Produce synthesis paper(s) on yield benefits, risk and gender issues in SI
- ILRI to be given an opportunity to comment on work done in Ethiopia and Tanzania on evaluation of crop livestock interactions, feed demand and supply options in framing systems
- Link with AIPs where business partners are engaged and make use of the identified lessons to enhance famers' access to these inputs.
- Rely on existing work and make synthesis on testing of alternative values chain interventions for developing competitive and efficient market systems
- With QAAFI technical guidance, the program to finalise risk assessment in Mozambique and Ethiopia

SIMLESA Objective 2 will provide technical agronomic information, evaluation of agronomic performance, implementation quality and farmer uptake of technologies. Collected by SIMLESA not out-scaling partner from key sites

- Determine farmer circumstances
- Essential agronomic data collection
- Farmer feedback

Objective 2 outputs will be delivered through demand led activities by out-scaling partners. Country teams need to be the interface. Major tools to be used include simulation, expert knowledge and simulation modelling

The major thrust of Objective 3 will remain on stress tolerant maize varieties, higher yielding legume varieties and fodder/forage varieties. The breeding component will be done by sister projects like Drought Tolerant Maize for Africa Seed Scaling (DTMASS) and USAID's Feed the

Future Malawi Improved Seed Systems and Technologies (MISST) project and local seed companies already identified and capacitated in the initial phase of SIMLESA. Objective 3 team will ensure sustained availability of high quality seed varieties to farmers in the selected farming systems. The also include legume seed production through local seed companies, NGOs and communities.

The main focus of Objective 4 are to concentrate on scaling out of SIMLESA technologies through various partners. Implementation of competitive grants at country level will ensure implementation of sustained scaling out strategies. Organizational models are being developed in consultation with country partners.

Capacity building activities under Objective 5 will concentrate on short-term trainings mainly in-house and on-the job mentorship. In this last phase of the project it is critical to move away from long- term educational support to short -term since available capacity at institutions can facilitate these sessions. Most of the PhD and MSC supported students in phase I completed their studies and are now back at their respective work places.

7 Variations to personnel

Dr Rahma Adam, the SIMLESA Gender Specialist, joined the program in September 2015. She replaced Dr Vongai Kandiwa who moved to other CIIMMYT projects. Dr. Adam holds a Bachelor of Arts degree in Biology and minor in Anthropology from Macalester College, USA, a Master of Public Policy (MPP) degree from the Harvard Kennedy School (HKS), Harvard University, USA and a PhD degree in Rural Sociology with a focus on Agriculture, Gender and International Development from Pennsylvania State University, USA. Dr. Adam has previously worked as a Post-doctoral Fellow in Globalized Trade and Investments at the Center for International Forestry Research (CIFOR), World Bank Group Fellow in the Education unit in Africa, Consultant with the African Region Gender Innovation Lab team at the World Bank Group in Washington, DC, and as a Researcher for the Mo Ibrahim Index of African Governance (IIAG). Dr. Adam was born and raised in Tanzania and has lived in Kenya, Norway and the U.S.A. Dr. Adam has conducted research in Ghana, Kenya, Tanzania, Uganda and USA.

Aberra Adie (ILRI employee) replaced Elias Damtew (who left ILRI for further study) as a research officer for the SIMLESA II forage activities.

During the reporting period changes in personnel that took place in Kenya is listed in the Table 7.1 below:-

Table 7.1: Kenya personnel variations

Name	Agency, position (location)	Role in program (discipline)	Variation
Charles Nkonge	KALRO Headquarters	National Coordinator	
John Achieng	Senior Research Officer	Agronomy Research (Agronomist)	Left in August 2012
Charles Mutinda	KALRO, Principal Research Officer	Maize Breeder	Left in 2012
George Ayaga	New site Coordinator, western Kenya	Agronomy Research (Agronomist)	Joined in August 2012
Ezekiah Ngoroi	KALRO – Embu, Seed Specialist	Objective 3Lleader in Eastern Kenya	Retired with effect from 1st May 2015
Catherine Muriithi	KALRO –Embu, (Seed Systems)	Replacing Ezekiah Ngoroi; Objective 3 in Eastern Kenya	From May 2015
Dr. Patrick Gicheru	KALRO-Embu, Centre Director (Agronomist)	Project manager in E. Kenya	Joined from May 2015
Mr. James Ouma	KALRO – Embu, (Socio-economist)	Objective 1 leader in Eastern Kenya	Passed on, on 16th June 2015

With the changes taking place in Kenya, KALRO Kakamega was designated for Non-Ruminant Research with Food Crops Research designated for KALRO Kitale with other centre mandates. Most of the project activities will therefore be coordinated from Food Crops Research Centre Alupe, a 60- km distance from Kakamega but closer to the on- farm sites in Siaya and Bungoma

Table 7.2: Mozambique personnel variations

Name	Agency, position (location)	Role in program (discipline)	Variation
Domingos José Brás Dias	IIAM Head, Research Dept, Central Zone, Manica	Partner coordinator, Agronomy research (Agronomist, Objective 2 Coordinator)	National Coordinator replaced Rafael Uaiene in 2011, October.
Pedro Fato	IIAM Biologist and Maize Breeder	Maize breeding (Objective 3 Coordinator)	Joined the team in October 2011
Isabel Sitoe Cachomba	IIAM, Economist, M&E	Socioeconomy	Joined the team in 2011 Coordinator Objective 1, replaced by Maria da Luz in 2014
Manuel Fungulane	IIAM, Angonia, Agronomist	Agronomy ,Objective 2	Joined the team in August 2010
Gabriel Braga	IIAM, Angonia, Agronomist	Agronomy, objective 2	Joined the team in August 2010
Angela Manjichi	IIAM, Agronomist	Agronomy, Objective 4 IP focal person	Joined the team in August 2010
Eduardo Mulima	IIAM, Maize & Wheat Breeder	Maize breeding, Sussundenga, Objective 3	Joined the team in August 2010
Maria da Luz Quinhentos	IIAM, Economist	Socioeconomy, Objective 1 Coordinator, Gender Focal person	Joined the team in 2014, replaced Isabel Cachomba
Amâncio Nhantumbo	IIAM agro-economist	Socioeconomy	Joined the team in 2011
Custódio Fernando Jorge	Agronomist,	Agronomy, Objective 2	Joined the team in 2013
José Domingos dos Santos Chiocho	Agronomist,	Coordinator, Objective 4	Joined the team in 2011, New objective 4 Coordinator as per 2014
Cláudio Gundana	Agronomist	M&E focal person, 2014	Replaced by Isabel Cachomba as per June 2015
Anacleta Mugabe	Agronomist	Socioeconomy Objective 4	Joined the team in 2013

Table 7.3: Tanzania personnel variations

Name	Agency (location)	Role in program (discipline)	Variation
Dr Lucas Mugendi	SARI	National Coordinator	Relocated out of SIMLESA sites
Dr. John Sariah	SARI	National Coordinator	Replaced Dr Mugendi in 2015
Bashir Makoko	Ilonga ARI	Agronomist (Site Coordinator)	
Adrian Mbiza	Ilonga ARI	Agronomist	Left in July 2011
Thresia Greory	SARI	Social – economist	
Phillemon Mushi	SARI	Legume Seed Systems	
Frank Mmbando	SARI	Socio-economist	
Kheri Kitenge	SARI	Maize breeder	
Twael Mmbaga	SARI	Agronomist	Left September 2012
Elisha Mkandya	Ilonga ARI	Socio-economist	
Dr. Joseph Mligo	Ilonga ARI	Legume Breeder	Passed away 2012
Beatrice Mwaipopo	Ilonga ARI	Legume breeder	Joined 2012
George Iranga	Ilonga ARI	Agronomist	
Dr. Albert Mushi	Ilonga ARI	Maize Breeder	Passed away 2011
Dr. Barnabas Kiula	Ilonga ARI	Maize breeder	Joined June 2011
Christine Kaswahili	Ilonga ARI	Maize breeder	
Ruth Madulu	Mikocheni ARI	Soci-economists	
Meshack Makenge	Ilonga ARI	Legume breeder	
Gonzaz Kazimoto	SARI	Legume breeder	
Shida Nestory	SARI	Agronomist	On study leave MSc SUA

John Joseph	DAKAWA	Agronomy	On study leave MSc SUA
Jacob Kiyyo	Ilonga ARI	Maize breeding	On study leave MSc SUA
Theophl Tarmo	Arusha	Crop protection	On study leave MSc SUA
Rose Sakwera	Mvomero	Extension	On study leave MSc SUA

Table 7.4: Ethiopia personnel variations

Name	Agency, position (location)	Role in program (discipline)	Variation
Ferede Alemu	Pawe ARC	Forage researcher	Joined in July 2015
Zewdineh Melike	Pawe ARC	Agronomist	Left in September 2015
Fitsum Merkeb	Pawe ARC	Agronomist	Joined in September 2015
Yayeh Bitew	ARARI (Adet),	Center Coordinator, Agronomist	Left in September, 2015
Gobezie Chakelie	ARARI (Adet),	Agronomist, Agronomist	Joined in September, 2015
Ashebre Tegen	EIAR	Forage researcher	Left in August 2015
Aklilu Mekasha	EIAR	Agronomy Forage researcher (Agronomist)	joined in August 2015
Dereje Ayalneh	EIAR-MARC	Researcher –objective 3	Joined Sep 2015
Alemshet Lemma	EIAR-MARC	Researcher and objective 3 Coordinator	Left August 2015
Yaya Tesfa	EIAR-MARC	Researcher objective 2	Joined Sep 2015
Bahru Tilahun	EIAR-MARC	Researcher objective 2	Left for school Sep 2015

Table 7.5: CIAT Personnel

No	Name	Sex (m/f)	Agency, position (location)	Role in SIMLESA program (discipline)	Total time input (%) to SIMLESA	Funding % of time funded from ACIAR
1	Job Kihara	M	CIAT in Nairobi, Agronomist	Soil research support	35%	35% SIMLESA
2	Lulseged Tamene Desta	M	CIAT in Malawi, Landscape ecologist	Mapping of recommendation domains	13%	13% SIMLESA

No	Name	Sex (m/f)	Agency, position (location)	Role in SIMLESA program (discipline)	Total time input (%) to SIMLESA	Funding % of time funded from ACIAR
3	John Mukalama	M	CIAT in Maseno, Kenya. Associate Scientist	Data collection in Long-term trial	10%	10% SIMLESA
4	Michael Kinyua	M	Kenyatta University, kenya. Student	Data collection and MSc thesis writing	70%	70% SIMLESA

Table 7.6: ILRI Personnel

No	Name	Sex (m/f)	Agency, position (location)	Role in SIMLESA program (discipline)	Total time input (%) to SIMLESA	Funding % of time funded from ACIAR
1	Anniye, Endalkachew Wolde-meskel	M	ILRI-Ethiopia, Country Coordinator-N2Africa	Coordination and technical backup (Rhizobiology and Legumes Agronomy)	20%	20%
2	Derseh, Melkamu Bezabih	M	ILRI-Ethiopia, Post-Doctoral- Livestock Feeds	Technical backup (Feed and forage)	15%	15%
3	Thorne, Peter John	M	ILRI-Ethiopia, Scientist: crop-livestock systems	Overall project leader (Systems integration)	5%	5%
4	Abera Addie	M	ILRI-Ethiopia, Research Assistant	Technician	40%	40%

Table 7.7: ASARECA Personnel

No	Name	Sex (m/f)	Agency, position (location)	Role in SIMLESA program (discipline)	Total time input (%) to SIMLESA	Funding % of time funded from ACIAR
1	Michael Waithaka	M	ASARECA, Entebbe	Policy	30	30
2	Miriam Kyotalimye	F	ASARECA, Entebbe	Policy	10	10
3	Ben Ilakut	M	ASARECA, Entebbe	Communications	5	5

Table 7.8: ARC Personnel

1.	Dr. Yolisa Pakela-Jazile	Senior Manager	ARC

Table 7.9 Uganda Personnel

1.	Dr. Drake N Mubiru	Senior Research Officer	NARO
2.	Dr. William N Nanyeenya	Senior Research Officer	NARO
3.	Jalia Namakula	Graduate Assistant	NARO

Table 7.10: Botswana Personnel

1.	Mr. W. President Emmanuel	SIMLESA Country Coordinator	Department of Agriculture Research
2.	Mr. Elias Kethobile	Objective 2. Agronomy	Department of Agriculture Research
3.	Ms. Boitumelo Matlapeng	Weeds Specialist	Department of Agriculture Research

Table 7.11: Rwanda Personnel

1.	Pascal N. Rushemuka (PhD)	Agri-Environmental Senior Soil Scientist	Rwanda Agricultural Board
2.	Jacqueline Tuyisenge	Agricultural Researcher	Rwanda Agricultural Board
3.	Rutebuka Jules	Agricultural Researcher	Rwanda Agricultural Board

8 Problems and opportunities

In Southern Africa, particularly in Malawi and Mozambique, countries are affected by climatic change. For example in most parts of Malawi and Mozambique they received erratic rains this season, 2015/16 contrary to heavy rains which led to flooding in the previous farming period. In Malawi and Mozambique, rains were received late and the season looked unpredictable. The effects of El Niño in Eastern and Southern Africa has brought a daunting challenge to the different farming systems where SIMLESA activities are implemented. In Ethiopia, most farmers in the semi-arid regions of the country faced a total crop failure hence the recent reports of famine in the country affecting more than 15 million people. As a result, the program runs the risk of losing some trials due to the effects of climate variability and change.

In Malawi, it was discovered that most seed companies' staff involved in seed multiplication programs had little experience in seed production hence they required constant backstopping by the Department of Agricultural Research Services (DARS) as well as training in seed production processes. Lack of irrigation facilities for most seed companies limited their seed production.

Other challenges included:

- The chronic problem of overstretched NARS partners and limited number of new recruits not coming into the system (Malawi and Kenya) is still a challenge in implementing a rigorous field level research, particularly getting comprehensive and quality data on time. The capacity to produce quality reports and timely is gradually improving compared to the first phase. The series of quality presentations and synthesis shared at the 6th ARPM in Lilongwe, Malawi. There is still room for improvement, however.
- Keeping the momentum for IP members particularly those from the private sector remains a concern and without them SIMLESA's scaling out objective will be highly constrained.
- ILRI progress reporting on forage to be enhanced. This issue was raised and presented to ILRI Director General's Representative in Ethiopia, Dr Siboniso Moyo in August 2016. It is expected that ILRI would improve their reporting starting from the next contractual report – the semi-annual report.
- The de-emphasis on graduate level training (PhD scholarships) is not a welcome development for young researchers who want to advance their qualifications

Opportunities

As noted by the MTR team, SIMLESA (I and II) is complex program with many partner countries, agencies, science disciplines, and objectives. Despite that complexity, the MTR found the program on the whole to be well managed by CIMMYT, and the NARS partners who have a strong sense of ownership of the program. The team also noted that the whole SIMLESA team is determined to meet the objectives of the program, to contribute and to work as a team which creates a good opportunity for success. The MTR was particularly impressed with the energy and commitment of the program's coordination team, the leadership of the various objectives

and the national teams. The input during the MTR of those members of the PSC who were present was deemed very valuable implying that there is impressive synergizing of skills in SIMLESA at different levels.

Reports from the first year activities confirm that SIMLESA II is on course to achieve its main objectives. In all, SIMLESA operational countries it was noted that farmers, key stakeholders and members of the community were ready to work and scale out the project technologies. Participatory methodologies used in the selection process of the best bet technologies empowered the communities and it gave them a sense of ownership. Farmers' efforts were also being complemented by the established local innovation platforms giving more sense of belonging. This enables effective transfer of SIMLESA technologies to many farmers in a sustainable manner. The much anticipated implementation of the Competitive Grant system is bound to enhance scaling out effort. The emergence of local seed companies provides SIMLESA with an opportunity to create access for new generations of maize and legume varieties leading to improvement of food and income security across the SIMLESA countries.

There are local champions in each country and community where SIMLESA activities are implemented. These include SIMLESA PSC members, ministry of agriculture staff, extension agents, technicians, NGOs and private seed companies that are championing sustainable intensification production systems as an integral part of Climate Smart Agriculture strategy

ASARECA, SIMLESA and its partners organized a ministerial and high-level SIMLESA Policy Forum hosted by Uganda at the end of October 2015. The objectives were to build a consensus to promote SIMLESA technologies in the respective countries and beyond, and ensure buy-in from regional bodies and donors (AU, COMESA, USAID and the World Bank, among others).

The linkages with new projects within CIMMYT and outside CIMMYT (N2Africa, AGRA Soil Health Program) will improve the potential impacts of SIMLESA.

9 Budget

CIMMYT headquarters to provide financial progress report.

10 Annex 1: SIMLESA Partners and Spillovers Progress Reports

International Center for Tropical Agriculture (CIAT)

During the reporting period, CIAT participated in the SIMLESA II Mid-Term Review in Addis Ababa in Ethiopia, annual planning and review meeting in Malawi and held separate meetings with specific country- based teams in Kenya. CIAT sampled soils for mineral nitrogen, undertook assessment of soil biology with regard to presence and diversity of microbial, meso and microfauna in two trials in Embu, Kenya (one is a six-year and the second, a one-year old trial). At the same time, lysimeters to assess leaching have been installed in the young Embu trial, as well as temperature loggers. Other activities include development of recommendation domains for CA in Tanzania and Mozambique. CIAT continues to lead discussions on soil analysis including considerations for sampling depths and important parameters to evaluate the impact of the CA practices. Strategies for support in coordinated generation of soil indicators for multi-locational CA trials in Malawi and Mozambique has been developed and currently being executed (basically all samples are being sent to Nairobi for agreed analysis between CIAT, CIMMYT and national partners). The list of the activities undertaken during the period under review are shown below:

On-station long-term CA trials

Desmodium seeds for the CIAT-developed relay protocol being implemented by Mozambique national partners were shipped from Kenya. This trial has also been moved from its previous location to ensure it is not grazed by livestock. The trial on relay-intercropping with lablab established in Tanzania (Babati), initiated to compare with results from the trial in Mozambique and also to gain synergy with existing agronomic work CIAT is conducting, has been planted. The assessment undertaken last season resulted in very good establishment of the lablab under maize but extended drought in Tanzania during that season affected ultimate yields.

CIAT continues to undertake soil sampling and conduct assessments based on the specific soil-related questions for CA systems framed based on SIMLESA-II program document. With regard to residue x N interactions, CIAT is working together with KARLO and is undertaking sampling in a newly established Kitonyo trial which offers excellent opportunity to study this aspect. In line with this, soil sampling for mineral N (including from leaching), carbon and soil functional groups analysis has been undertaken for the long-term and newly established trials at KARLO, Embu.

Effects of tillage and residue management on soil fauna were determined in November and December 2015 in Embu, Eastern Kenya. Two techniques were employed to sample fauna for diversity and abundance. Monoliths of size 25 cm x 25 cm x 30 cm were used to study macrofauna where samples were taken eight weeks after planting crops in the season. A monolith was placed over a randomly selected spot and dug with a spade and hoe to the desired level (to obtain soils for 0-15 and 15−30 cm depths). The soil from the monolith were removed by hand depth-wise into plastic buckets. The soil from each depth were placed in different plastic trays (20 cm by 30 cm) and gently sorted out to locate the macrofauna which were separated into major taxonomic groups, recorded and then collected in plastic bottles. The

soil fauna collected were preserved in 75% alcohol and taken to the soil microbiology laboratory of CIAT, ICIPE Duduville Campus, Nairobi, Kenya where subsequent identification and counting was undertaken. Earthworms were killed in 75% alcohol and fixed in 4% formaldehyde. Species richness, and number of different category of animals were expressed per meter square. For mesofauna, soil samples were collected using a metallic core of 10 cm diameter up to 30 cm depth and delivered to the laboratory in cooler boxes the same day. Extraction of mesofauna groups was undertaken at the CIAT laboratory using the behavioural or dynamic method with Berlese-Tullgren as the basic apparatus. This apparatus was originally designed by an Italian entomologist, Berlese, A. and later modified by a Swede, Tullgren, A. who used a light bulb as the source of heat. The apparatus has since been modified by many workers (Southwood, 1995) and CIAT constructed one locally at CIAT-Nairobi for this purpose. In CIAT's case, heat was applied to the soil samples using a 75 watts bulb placed above the sample container and mesofauna escaping the heat were collected in jars filled with 75% alcohol. The mesofauna collected were sorted out and counted under a light microscope, and then taxonomically identified.

The results show that species richness and abundance is higher under the SIMLESA CA practices compared to conventional tillage systems (Table 1 and Figure 1) and this is consistent for long-term and short-term systems. This indicates that soil fauna are sensitive when disturbed by tillage, as commonly done by farmers (except for the foraging groups like ants and some species of termites e.g. *Microtermes* sp.). Earthworm species, among them, the *Dichogaster* sp. are sensitive to disturbance and were lacking under conventional till as opposed to zero till system. Also, *P. annulatus* earthworms that thrive best under high organic matter environments were only recorded under maize-bean zero till system where crop residues were retained. Tillage cause habitat destruction affecting the horizontal and vertical distributions of soil biota. Even in situations where crop residues are incorporated by tillage, the resulting process destroys habitat for some soil fauna, and inverting soil exposes certain fauna species to weather conditions, which can contribute to population suppression of these soil fauna groups. This possibly explains why many fauna groups were absent from the conventional till systems, hence the lower diversity and abundances. On the other hand, conducive microclimate (litter layer ameliorate soil temperature and moisture extremes) and improved food provision in conservation tillage is beneficial to soil macrofauna and mesofauna.

CIAT is in close contact with CIMMYT colleagues in Kenya who have also undertaken similar soil macrofauna assessments in other SIMLESA trials in Kiboko and Kakamega, together providing a rich data on this aspect.

Table 10.1: Effect of tillage practice on soil macrofauna species richness as observed in KARLO-EMBU on-station CA trial

Treatment	Species Richness (macrofauna)	Species Richness (mesofauna)
Conventional tillage with maize bean intercropping and residues removed	21	4
Zero tillage with maize bean intercropping and residues retained	31	7
Zero tillage with sole maize and residues retained	26	8
Zero tillage with sole beans and residues retained	22	6

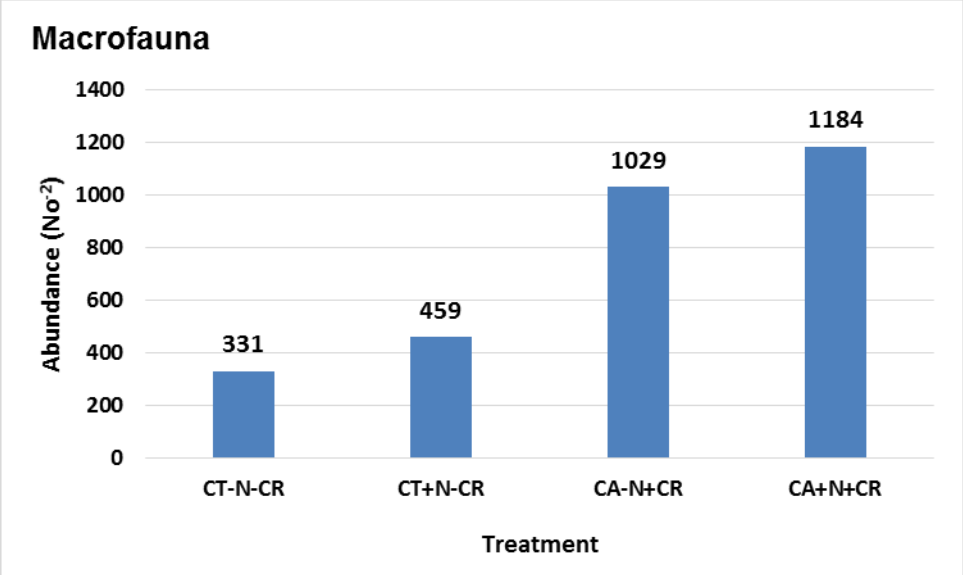

Figure 10.1: Soil macrofauna abundance across different treatments in a one year old CA trial at KARLO, Embu. CT=conventional tillage, CA=conservation tillage. CR=Crop residue, N=nitrogen.

What remains on the soil biology is further analysis of the available data to determine the dominant macro and mesofauna groups in each of the systems and linking those to key drivers.

Soil Physical properties: In Embu (Kenya) and Arusha (Tanzania), penetration resistance was measured in key treatments to compare conventional tillage and conservation agriculture. Measurements were done, using a penetrometer, for the three experimental replicates with three repeats within an individual plot. Recording, in Newton per square centimeter, were taken

at 5 cm increments to a maximum depth of 50 cm (i.e., 10 soil depths). The results for Embu show that conventional tillage resulted in large variations in soil resistance with very loose soils at the top soil, hardened layer at around 20-30 cm and loose soils below that depth. On the contrary, conservation agriculture resulted in soils of medium resistance to penetration (less variations; Figure 10.2). Increased resistance at the 20-30 cm in the conventional tillage system is due to loose silt and clay particles that settle at the bottom of the plough layer (maximum tillage depth is about 20 cm).

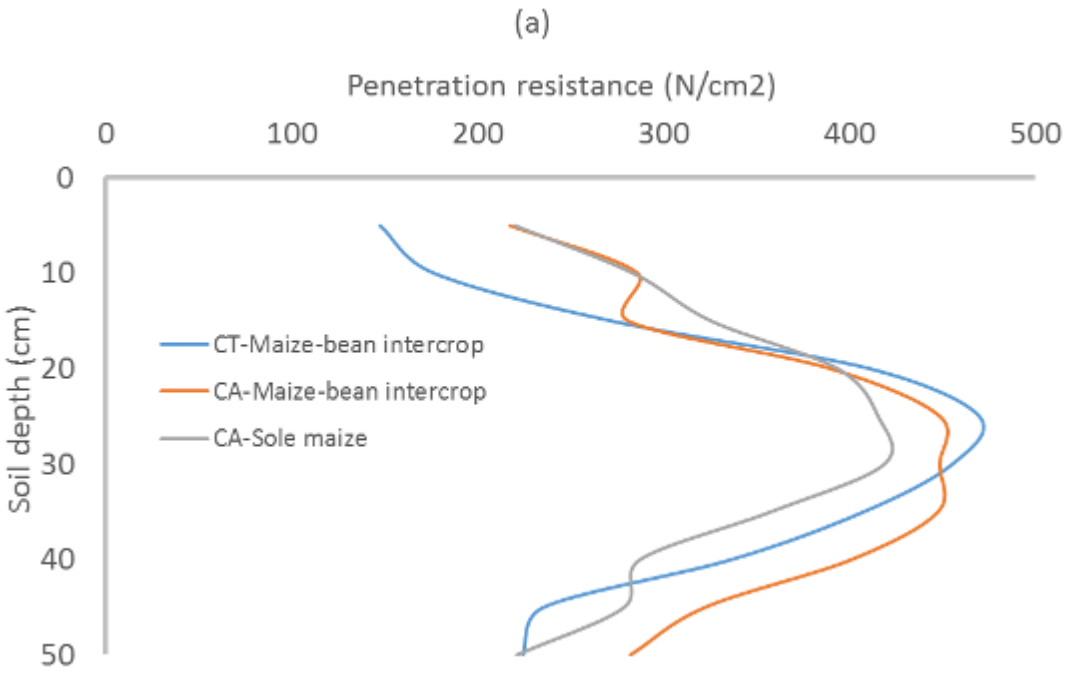

Figure 10.2: Soil penetration resistance in different tillage systems as observed in a six-year experiment in Embu, Eastern Kenya

Previously, CIAT showed preliminary analysis for infiltration data taken at different suctions (-2 and -6 cm/s) with Mini Disk Infiltrometer (Decagon Devices, Inc.) in Tanzania. Here, higher overall infiltration rates in conventional tillage where topsoil are often loose (Figure 3), consistent with penetration data. As a result, hydraulic conductivity data (taken over 18 minutes of infiltration assessment at a suction of -2 cm/s, i.e., where water infiltrate through pores of up to 1.5 mm) indicate little difference in hydraulic conductivity in conventional (K=38 cm/day) relative to conservation tillage (K=42 cm/day). The soils, with 45% clay and 24% sand are classified by USDA textural calculator as being clay.

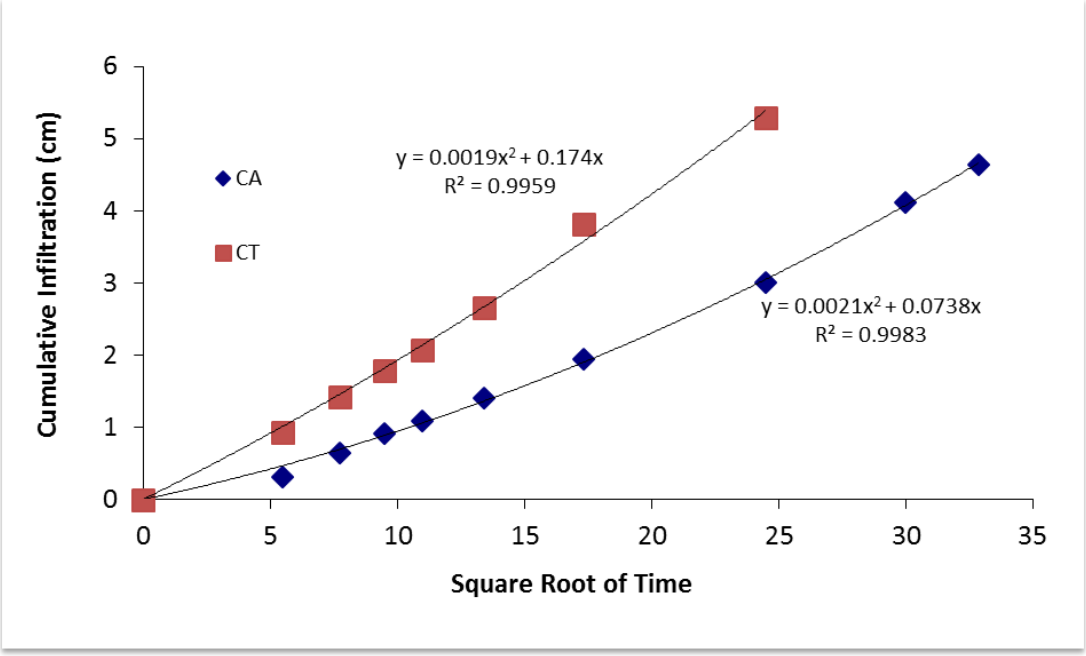

Figure 10.3: Cumulative infiltration in conventional and conservation tillage practices in a six-year experiment in Embu, Eastern Kenya.

Non-responsive soils / micronutrients

As noted earlier, only one experimental site where SIMLESA is working has been reported as being non-responsive (Kilosa in Tanzania). As such, the need for a meta-analysis on crop response to secondary and micronutrients was identified. During this reporting period, further progress has been made on improvement of a draft manuscript on crop response to these focus nutrients. Briefly, data from field trials carried out in Sub-Saharan Africa (SSA) between 1969 and 2013 constituting 434 data points derived from 29 peer reviewed publications. A study was included if it was conducted in SSA, focused on either maize, sorghum, rice, cowpea, soybean or wheat, and included (i) a treatment with macronutrients only (fertilized control) and (ii) a similarly managed treatment but with secondary and or micronutrients in addition to the macronutrients in the control treatment. The most commonly reported of the interest nutrients is S with 42.9% of the data points followed by Zn with 21.2%, while each of Cu, Mo, Fe, and B had less than 10% of the cases. These data are derived from both on- farm and on- station trials under researcher management, from 13 countries. The results, based on a mixed-effects model of the form Yld~Trt+(Trt|SITE), show a 28% maize yield increment due to application of either individual or combined secondary and micronutrients (see also Figure 4 and 5). This increase is over what is usually obtained with N, P and K application. Although the positive crop response to secondary and micronutrient fertilizer application is observed across the whole range of control yields, highest response is at the low control yields (especially between 1-2 t/ha where yield increases by up to 4 t/ha are observed). The responses have been calculated for individual nutrients, e.g., for Zinc in Figure 5. These results indicate that these nutrients are needed to bridge the yield gap between potential and actual yields on such farms. Because of high variability in crop response to secondary and micronutrients from one study to another, there is need for more research to unravel conditions under which acceptable response to

micronutrients is observed (there is no data reported using conservation agriculture). This manuscript will be submitted for journal publication within 2016.

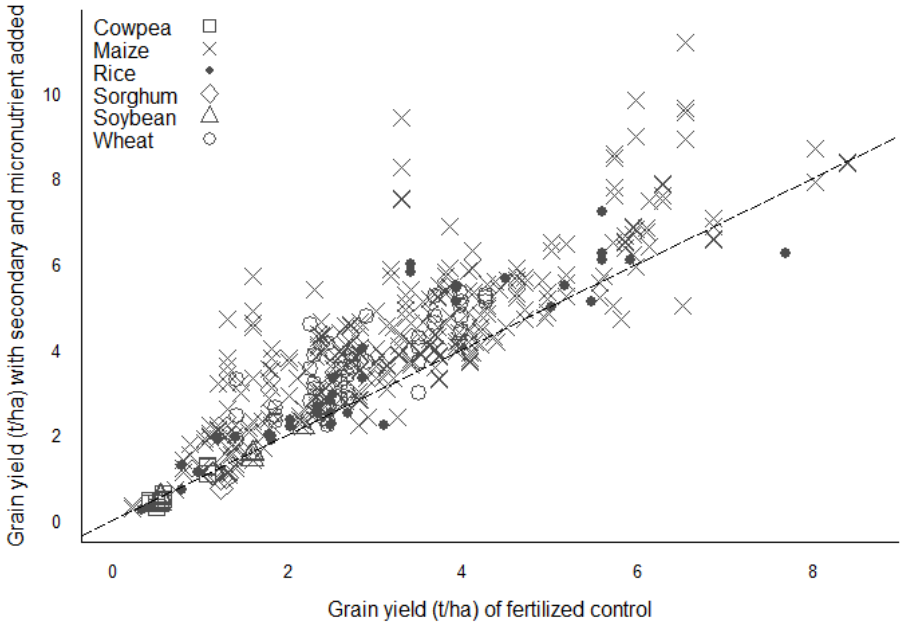

Figure 10.4. Effect of secondary and micronutrient application on yield of different crops as observed in SSA at different levels of the macronutrient control treatment yield.

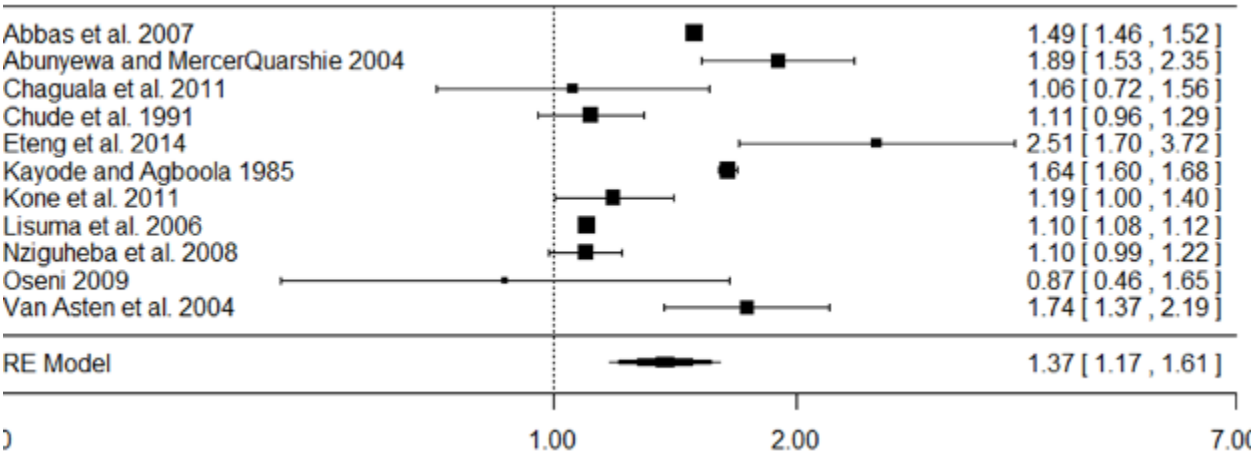

Figure 10.5: Response ratio and the 95% confidence intervals for maize following application of zinc in different studies in SSA

Nitrogen management

During the reporting period, CIAT has installed lysimeters in one of the trials in Embu and initial samples for nitrogen leaching obtained. Also, six temperature loggers (for continuous temperature data capture) have been installed in selected treatments for two trials in Embu.

Besides, sampling and measurements for mineral N have been obtained (two sampling periods (beginning of season and five weeks after planting) and two depths) and lab analysis done.

In assessment of nitrogen dynamics in Embu, soil samples from three treatments (the same ones used for penetration resistance) were taken from the six-year experiment during maize flowering stage at two depths (0-5cm and 5-20 cm), and delivered in cooler boxes to CIAT lab where chemical determination was undertaken. Although no specific patterns have been observed for mineral and total nitrogen, except a significant decrease by soil depth, other variables have showed interesting results. For example, active carbon of topsoil (0-5 cm) is improved by 25% due to practice of conservation agriculture. The increase in active carbon is accompanied by an increase in pH by 0.2 to 0.4 units, affirming the potential of organic resources to ameliorate soil acidity. Whether the changes in pH in the Embu soils are related to presence of Aluminium or other factors is yet to be established

Recommended domains for soil health management

One of the activities to be undertaken by CIAT include developing CA recommendation domains for the remaining countries of Tanzania and Mozambique. Accordingly, the team consulted literature and CIMMYT colleagues (specifically Kindie and Motti) to exchange ideas and resources. In order to make the recommendation domains across the ESA countries comparable, it was agreed to follow similar approach when developing the domains. CIAT thus used the approach followed by Tesfaye et al. (2014) to identify potential recommendation domains for CA in Tanzania and Mozambique. Data were collected from different sources and standardized (projections, resolution, etc.) and integrated in a GIS environment. Figure 6 shows the potential areas where CA can be practiced in the two countries (with potential biophysical favorable and socio-economically feasible conditions).

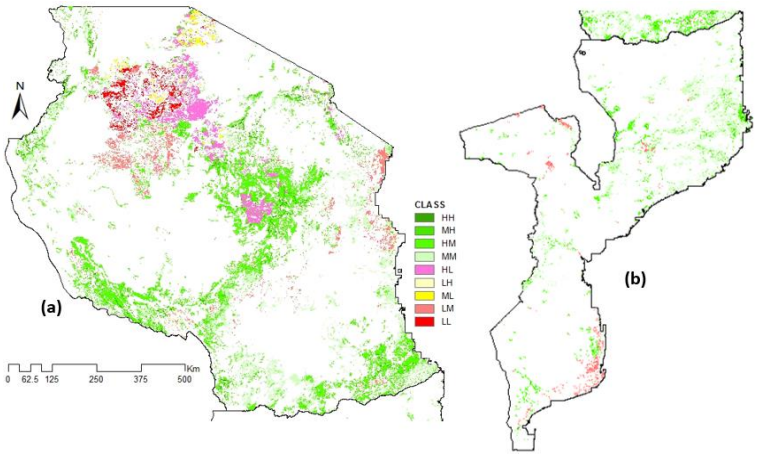

Figure 10.6: The potential areas where CA can be practiced in the two countries

Potential recommendation domain for (a) Tanzania and (b) Mozambique generated by integrating key biophysical and socioeconomic drivers. Note: H=high; M=medium; L=low, with

HH means high potential considering both biophysical and socio-economic factors. The first letter stands for biophysical conditions.

Results show that larger part of Mozambique is not applicable for CA because it is dominated by other land use systems than crop farming. Generally, the North Eastern part of the country has some pockets of areas that can potentially be suitable for CA. About 870 km^2 of the country is agronomically possible and socioeconomically feasible to implement CA. This however is less than 1% of the cultivated area. About 12453 km^2 of the country (which covers 11% of the cultivated area) shows high agronomic suitability for CA while it has medium feasibility socio-economically. On the other hand, about 4% of the cultivated areas (which covers 4630 km^2) has high socioeconomic feasibility while it is medium class in terms of agronomic suitability. About 46% of the cultivated areas in the country (40061 km^2) show medium suitability both in terms of agronomic and socioeconomic factors. Among the socioeconomic factors, the impact on CA practices of livestock density is least constraining in the country.

In the case of Tanzania, pockets in the southern and central parts of the country show good potential for CA. About 3% of the cultivated areas are suitable both biophysically and socio-economically while nearly same proportion (2%) of the cultivated areas are not suitable for CA. About 30% of the cultivated land can support CA while these areas have medium suitability socioeconomically. Over 25% of the cultivated area in the country has both biophysical and socioeconomic satiability for CA.

It is important to recognize here that the quality of the potential recommendation maps is as good as the various inputs used. This means that there is a need to 'validate' the inputs used as well as the final potential CA recommendation domains.

Activity 2.3.3: Monitoring protocol for on-farm experiments

No activity during this reporting period.

Partnerships: CIAT in partnership with KARLO (Dr. George Ayaga) now has a small funded project mainly on soil biology but which provides opportunity to evaluate a few other important questions relevant to CA.

ILRI Progress Summary

ILRI's involvement in SIMLESA II commenced in March 2015 with the aim of integrating livestock feed development research interventions into the broader SIMLESA II agenda of sustainably intensifying the maize-legume farming system in Eastern and Southern Africa. It was believed working on livestock feed in general and crop residue management in particular was cross-cutting in dealing with the livestock sub-system and SIMLESA Objective 2 of assessing conservation agriculture (CA) practices. Within the framework of activities outlined in Objective 1 and Objective 2, ILRI developed a logframe focusing on evaluation of year-round feed availability and utilization, and prioritization of alternative intervention approaches using systematic and robust FEAST and Techfit tools in selected SIMLESA II sites. Based on the results obtained from these assessment studies it was planned to initiate a set of on-farm evaluations of feed and forage - based technologies and practices.

Before launching the assessment studies ILRI joined a field visit organized by CIMMYT to Hawassa Zuria to assess the intervention site and the farmers that have been working with the SIMLESA program. Having access to this information and CIMMYT's previous typology study in the area, ILRI randomly selected farmers (within the already defined) topologies and conducted the feed assessment studies (using FEAST methodology). Two feed assessment studies in Boricha and Hawassa Zuria were carried out that shade more light on the farming system, livestock feed related opportunities and constraints, and that informed possible livestock feed intervention in the area. The Techfit score results were also used to prioritize intervention options among the different farm types.

In late August, just before the end of the rainy season, ILRI implemented the first field trial on different fodder/forage types (Sesbania, Leucaena, Alfaalfa and Desho grass) with 11 voluntary farmers in three of the five districts/kebeles identified as intervention sites in Hawassa Zuria District. ILRI developed a data collection and management monitoring sheet and have been collecting and compiling data from October to December 2015.

In Tanzania, two pronged FEAST assessments were completed to identify feed interventions at SIMILESA II project target locations (Mubulu and Karatu) and to help engender the FEAST tool.

Based on the recommendations from the SIMLESA Mid-Term Review, ILRI-SIMLESA forage/fodder team has made a series of discussions with partners on how to strengthen the livestock component and meet the evolving needs of the program. Accordingly, the activity plans were revised to address the recommendations of the reviewers. This included:

- Use of whole farm modelling approach to conduct scenario analysis around different livestock intensification trajectories and probable success of different livestock innovations,
- scaling forage innovations,
- establishing local forage seed systems, and;
- post-harvest handling and utilization of feed resources to cope with feed calendar deficits.

For the whole farm modelling, experts from QAAFI have been consulted and agreed to take part in the modelling work. The model framework has been discussed and outlined and basic data required for the modelling work in relation to local feed quality characteristics are being gathered. ILRI also redesigned the field trials toward scaling proven forage innovations in the SIMLESA II sites, initially by targeting farmers who have been involved in practicing SIMLESA II agronomic trials and then radiating to reach more number of farmers through demonstrations, field days and media outlets. From other ILRI - led action researches, it has been found that traditional feeding and storage practices lead to considerable postharvest loss of feed resources. Therefore, it has been planned to promote improved feeding trough and feed storage technologies that would minimize wastage and help to cope with dry season feed deficits.

To implement the scaling of proven forage innovations and their postharvest management in Ethiopia, ILRI has invited national research centers (ARARI, SoRPARI, BARC, WARC, and MARC) who are part of the bigger SIMLESA program for a one-day consultation workshop. The planning meeting took place in May 2016 in Addis Ababa, with the objective of discussing and harmonizing activity plans for scaling feed and forage innovations in the respective action sites. The meeting was also attended by CIMMYT staff, including Dr. Mulugetta Mekuria (SIMLESA project leader) and Dr, Haekoo Kim (cropping systems agronomist), who gave valuable inputs and directions on the approaches to follow to contribute to the broader objectives of SIMLESA II with the remaining time and available resources. Participating centers presented feed related initiatives at their respective sites by all actors in general and by SIMLESA project in particular. ILRI also presented its lessons so far and proposals for SIMLESA II feed related activities in the upcoming season. This helped to identify possible areas of synergies and joint planning. Nevertheless, all centers disclosed that they did not have budgets to implement any feed related activities this season.

During the workshop each centre developed and submitted its own harmonized plan with budget estimates. After a thorough review of plans and available funds at disposal, ILRI agreed to provide budget and technical backstopping for three of the centers, namely ARARI, BARC, and WGRC. The planned activities to be implemented through the three centers include on-farm forage seed multiplication for sweet lupin, cowpea, lablab, Rhodes grass, desmodium, brachiaria and pigeonpea; scaling of on-farm forage production for some of these species; as well as demonstration of improved feeding troughs and storage sheds. A total of 43 hectares of land is planned to be used for the above activities during the current main rainy season, and through demonstrations, trainings, field days and media outlets, it is planned to reach about 6,099 farmers across the three regions (Oromia, Amhara and Southern region). Three Collaborative Research Agreements (CRAs) were prepared and submitted for signing by ILRI administration and the implementing centers for disbursement of payments, while in the meantime the centers are using their own resources to cover field expenses.

Association for Strengthening Agricultural Research in East and Central Africa (ASARECA)

Background

The main activity during the review period was the hosting of a high-level policy forum. During the SIMLESA 5th Annual Review and Planning Meeting (ARPM) in March 2015, in Harare, Zimbabwe, five challenges that stand in the way of wide-scale adoption of sustainable intensification were identified. It was agreed that policy options to overcome these challenges be the subject of discussions in the high-level policy forum.

The five challenges are:

1. **Sustainable intensification of maize and legumes production and livestock integration**

Research evidence has shown that sustained application of resource conservation practices, crop diversification and livestock integration can increase productivity. The forum aimed at discussing options of mainstreaming sustainable farming practices to increase productivity of smallholder systems.

2. **Building on social capital for collective action**

Research evidence shows that farmers belonging to groups are more likely to diversify cropping patterns. They are also more likely to build their resilience by trying out new farming practices, use improved varieties and adopt soil and water conservation practices. The forum would demonstrate practical approaches that support collective action.

3. **Access to key farming inputs**

Farmers who are close to markets have better access to farm inputs and can readily sell their farm produce. Such farmers are more likely to adopt maize and legume intercrops and rotations, improved varieties and improved management practices. The forum would deliberate on practical ways of enhancing sustainable access to inputs, e.g. seeds, fertilizers, and credit for successful intensification of farming enterprises.

4. **Cross border trade**

Most farmers in Eastern and Southern Africa are dependent on agriculture as the main source of income and spend a large proportion of their household budgets on food. Removing barriers to regional trade in food and facilitating access to key inputs such as seeds or fertilizers would provide farmers with incentives to supply the growing demand for food in the region. The forum would discuss ways of delivering integrated regional markets for agricultural products and inputs.

5. Containing Maize Lethal Necrosis disease: current knowledge

Maize Lethal Necrosis (MLN) disease was first reported in Kenya in September 2011. Since then it has been reported in DR Congo, Ethiopia, Rwanda, Tanzania, South Sudan and Uganda In Kenya, the disease had spread across most maize-growing areas causing an estimated loss of 10 % of national maize production equivalent to US$ 50 million in 2014. Rates of transmission from seed to seedling are low, but have been reported to be as high as 17% in one seed lot. Resistant varieties are still a long way to commercialization. This forum would deliberate on practical management practices farmers and seed producers could employ to contain the spread of the disease within and between countries.

Main activities

1. Write shop

A write shop to finalize the policy briefs was held in Entebbe, Uganda between 27 and 29 July, 2015. The technical participants in the write shop were: Paswel Marenya, CIMMYT- Ethiopia, Michael Misiko, CIMMYT - Kenya, Isaiah Nyagumbo, CIMMYT - Zimbabwe, Drake Mubiru, National Agricultural Research Organization (NARO), - Uganda, Miriam Kyotalimye, ASARECA, Uganda and Michael Waithaka, ASARECA, Uganda. Communications experts - Johnson Siamachira, CIMMYT – Southern Africa Regional Office and Ben Ilakut, ASARECA, Uganda, assisted the team.

Seven draft policy briefs were produced in a common format. The format included a short but succinct title, one key fact, supportive facts and figures, short summary, background, policy options and references. Between August and October 2015, the technical team worked with ASARECA and SIMLESA to finalize the briefs. Each brief was shared with the SIMLESA Coordinator and three independent reviewers before they were finalized for publication.

2. Preparations of the forum

The main activities leading to this forum were contacting of the high-level participants, preparation of a program, finalization of the policy briefs, holding of a media briefing and hosting of the forum. The draft program for the high-level policy forum and draft flier were shared with the hosts the Hon. Tress Bucyanayandi, the Minister for Agriculture, Animal Industry and Fisheries (MAAIF) in Uganda and Dr Ambrose Agona, the Director General, NARO, Uganda. Hon. Bucyanayandi sent invitation letter to the Ministers for Agriculture in Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda and Tanzania.

3. Hosting of the forum

The forum was held on 27-28 October 2015 in Entebbe Uganda. Fifty participants drawn from Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, and Uganda attended the forum. The participants represented policy makers, scientists, farmers, private sector and development partners.

The official opening consisted of statements by five representatives of the Ministers for Agriculture in Kenya, Mozambique, Rwanda, Tanzania and Uganda. The keynote presentation by Professor Mandivamba Rukuni addressed the question “Does agricultural policy matter in agricultural Transformation?”

After the opening session the five challenges identified in March 20015, were discussed in plenary. Each challenge was presented by a discussant who was one of the authors of the policy brief. The presentations were based on seven policy briefs that the discussants had produced which are available at

http://www.asareca.org/~asareca/sites/default/files/SIMLESA%20POLICY%20BRIEFS.pdf.

This was followed by comments on the presentation by diverse mix of practitioners who shared their experiences in the field. This was then followed by open discussions from the plenary.

The highlight of the forum was the signing of a joint communiqué, which posted actions which can be used to address each challenge and targeting diverse stakeholders, e.g., policy makers, regulators, farmers and seed companies.

The full text of the communiqué is available at

http://www.asareca.org/~asareca/sites/default/files/Joint%20Communique%20by%20Ministers%20of%20Agric%5B1%5D.pdf

The forum would not have succeeded were it for the continuous support and guidance from the SIMLESA Coordinator’s office, the National SIMLESA coordinators, the Directors General of the NARS in the SIMLESA countries who connected with the Ministers for Agriculture.

4. Follow-up on implementation of actions from the joint communiqué

The main activity in 2016 has been the follow-up on countries to implement the actions in the communiqué. SIMLESA implementing countries are preparing meetings with the top ministry of agriculture organs to sensitize them on the aspirations of SIMLESA and how the actions from the communiqué can be mainstreamed in the planning cycles. The meetings will be followed by meetings with ministry technocrats to prioritize action points and sequence them in the annual and medium- term plans.

5. Synthesis of evidence on conservation agriculture for policy action

The other activity in 2016 is a collation and synthesis of evidence from on-going initiatives on conservation agriculture, e.g., by the Feed the Future program – the US Government’s Global Hunger and Food Security Initiative that is active in SIMLESA implementing countries. The intention is to augment evidence from SIMLESA’s activities with that from like-minded initiatives. This will aid decision-making by highlighting common threads and approaches.

Challenges

The main challenge encountered was lack of economic and financial information to back the evidence we needed to concretize the policy briefs.

SPILLOVER COUNTRY UPDATES

Uganda

Summary of Achievements

The program is being implemented in Lira District, Northern Uganda and Nakasongola District, Central Uganda. The implementing institutions include the National Agricultural Research Organization (NARO) through its institutes: National Agricultural Research Laboratories (NARL) – Kawanda and Ngetta Zonal Agricultural Research and Development Institute (NgeZARDI); and the local governments of Lira and Nakasongola districts. Since 2012, the project has supported 16 farmer groups with a total membership of 320 farmers, each farmer representing a household of five members, on average. Two sub counties from each district; one of low potential and another of high potential in maize-legume production, were selected for implementing the project activities.

During the period under review, the SIMLESA-Uganda program designed a six-month work plan as follows:

- SIMLESA best bet technologies scaled up/ out along commodity value chains
- Interventions addressing key maize and legume constraints tested, demonstrated and promoted

Achievements against outputs/milestones

SIMLESA best bet technologies scaled up/ out along commodity value chains

Milestones

Eight trainers and 16 lead farmers were trained (hands-on) in:

- Conservation agriculture (CA) practices and utilization of CA equipment/ implements [for example. oxen drawn rippers, planters)

- Establishment of permanent planting basins

- Soil and water conservation

-Postharvest handling techniques

Achievements

NARO organized a training workshop which was facilitated by African Conservation Tillage Network (ACT), Nairobi, Kenya. The workshop, held from 16 - 21 November. 2015, aimed at building the capacity of conservation agriculture farmers and extension agents from Nakasongola and Lira districts, and the NARO CA implementation team. The workshop objectives were:

- To enhance understanding of the principles of CA;
- To provide practical knowledge and skills in the application of CA.
- To provide the participants with approaches and methodologies for enhanced documentation and wide scale adoption of profitable CA.
- To strengthen the competency of the participants to facilitate in learning and understanding of CA

The participants were trained on the basic principles of CA (minimum soil disturbance, soil cover, and crop rotation). Other aspects of the training included conservation agriculture entailing use of permanent planting basins and rippers, soil fertility management, and soil and water conservation.

During the workshop, participants identified eight technical service units (TSU) from the two districts. These were each equipped with CA tools and implements, including a pedestal sprayer and a combo ripper and a direct seeder for the purpose of scaling up CA activities in the two districts.

Interventions addressing key maize and legume constraints tested, demonstrated and promoted

Milestones

- Two on-station trials/ demonstrations on conservation agriculture were established each at NARL-Kawanda and NgeZARDI
- One long- term trial to evaluate the performance of different cover crop varieties in terms of biomass yield and nutrient build up maintained at NgeZARDI and performance indicators documented
- Pigeonpea elite lines multiplication plots maintained at NARL – Kawanda and performance indicators documented
- Sixteen farmer groups and 32 adopting individual farmers from Lira and Nakasongola districts were each given inputs [improved maize and bean seed, herbicides, fertilizers and pesticides] to establish on-farm demonstrations/ trials to compare crop performance and grain yields of maize and beans under conventional means of production with the newly introduced conservation farming practices [permanent planting basins and rip lines] with and without fertilizer

Achievements

On-station demonstrations/ trials were established to determine optimum seed rates of maize and beans under the planting basins and ripper tillage in two contrasting AEZs [on-going for a total of five seasons].

Covering the soil with live or dead vegetation materials is one of three principles of conservation agriculture (CA). Leguminous cover crops add into the soil system the much needed nitrogen. In addition, soil cover conserves soil moisture and improves soil biology. Four cover crop species (Mucuna, canavalia, lablab and pigeon peas) were planted at NgeZARDI. These are going to be evaluated for biomass yields; soil nutrient and organic matter build up over a period of 24 months [on-going for a total of four seasons]. This activity is intended to address two main challenges: weed management and soil fertility, in the commodity value chains.

Five pigeonpea elite lines [ICEAP 00850, ICEAP 00540, ICEAP 00557, KAT 60/8, and ICEAP 00554] have been acquired from ICRISAT and planted at NARL – Kawanda. These are going to be evaluated for performance and the seed multiplied for up-scaling. Initial performance indicators have been documented.

As a means of intensifying maize-legume production, the SIMLESA-Uganda project adopted conservation agriculture practices from Zambia, Southern Africa, which have been adapted and integrated into the Uganda farming systems and agroecological zones. The purpose of the on-farm demonstrations/ trials was to get farmers to appreciate the resilience offered by the newly introduced conservation agriculture practices e.g. permanent planting basins and rip lines used in combination with improved seed and fertilizer. In addition, the demonstrations/ trials were intended to provide empirical evidence and yield data to ascertain the superiority of the new practices over the convention methods of production. Both PPB and rip-line tillage significantly increased maize and bean grain yields relative to conventional tillage methods. A combination of PPB and rip-line tillage together with improved seed and fertilizer brought maize yield within the expected productivity range for maize in Uganda. Maize yield in Uganda is estimated to range from 3.8 to 8.0 t ha.

Project activities monitoring and evaluated in a participatory manner

Milestones

Two participatory evaluations conducted each in Nakasongola and Lira districts.

Achievements

- SIMLESA Program Leader, Mulugetta Mekuria, together with the SIMLESA-Uganda team visited the SIMLESA program participating households in Nakasongola District, Kalongo sub-county in August, 2015.
- The SIMLESA-Uganda team carried out a reconnaissance visit to the project areas in Nakasongola District to prepare for a Mid -Term Review (MTR) of the project.
- A SIMLESA team from Zimbabwe visited the country for a Mid-Term Review of the SIMLESA Project. The team visited SIMLESA supported trials and interacted with the project beneficiaries and other stakeholders including the district technical staff. They reviewed progress of project activities since 2012 to that particular month.

The reporting period also witnessed the development of an operational field guide for establishing and managing CA demonstration sites and trials. NARO and ASARECA jointly convened the SIMLESA High-Level policy forum in Entebbe, in Uganda, on October 27-28. Policy briefs presented at the forum included:

- Sustainable intensification of maize and legume production and livestock integration
- Building on social capital for collective action
- Facilitating access to key farm inputs
- Removing barriers to border trade
- Containing maize lethal necrosis: current knowledge

The team also conducted a business modelling study. The study showed that the performance of most agrodealers was not impressive. The underlying issues were lack of capital, agronomic skills and input application skills. Therefore, strong linkages between big supplier companies and agro dealers should be strengthened; agro-dealers should be trained and equipped with good agronomic and input application practices to deliver to their customers.

The study also revealed that most of the farmers cultivate small portion of land because of fear of seasonal timing, soil hardpan and lack of mechanization services on land preparation. For scaling-and adoption to increase production, farmers should feel profitable to cultivate large areas of their land and this can be achieved if reliable modern mechanization services are available and accessible to farmers.

RWANDA

In Rwanda, during the fiscal year 2015/2016, SIMLESA has been implemented in three sites located in three Agro-Ecological Zones (AEZ) located in three Districts (Table 1). These AEZs have different characteristics in terms of soils and rainfall. Bugesera is located in the lowlands of Rwanda (1000-1400 m above the sea) and is characterised by good soil fertility level but constrained by relatively low and especially erratic rainfall (900mm/year). The Central Plateau which is located in the middle altitude lands of Rwanda (1400-1800) is characterised by less fertile soils but by good rainfall although also unpredictable (1200 mm/year). Cyuve is located in the highlands of Rwanda (2000 m) and is characterized by fertile soils (volcanic ash) and heavy and well distributed rains (>2000mm/year). Rainfall in the sites is bimodal allowing two crop growing seasons. The specific crop production limitations is drought, in Bugesera, declining soil fertility in the Central Plateau and Birunga. The declining soil fertility is due to over cultivation and its corollary high susceptibility to erosion.

Table 10.2: Location of SIMLESA sites in different AEZ and Districts of Rwanda

Site	AEZ	District
GASHORA	BUGESERA	BUGESERA
RUNDA	Central Plateau	KAMONYI
CYUVE	BIRUNGA/VOLCANIC	MUSANZE

In all three sites, the objective of the intervention was to create awareness of farmers about the benefit of conservation agriculture in terms soil property and soil fertility improvement and positive impact on crop yields. Rwanda being a spillover country, and given the fact that previous demonstrations focused mainly on the on-stations trials, the first step during this fiscal year was to create the awareness of farmers and our technicians that conservation agriculture is a feasible option at field level. For this purpose, the mirror approach consisting of comparing non tilled and tilled plots under the same treatment side by side was adopted.

The objective of the trial was to compare the three sites in terms of response to CA, to compare the effect of tillage and non-tillage practice within each site and the effect of different treatment tested. The following treatment were adopted. The Bean-Maize rotation is envisaged. However, is this report we present only the bean results because the maize was affected by dry spells at maturing stage. In both Runda and Gashora site the same variety of bush bean was used (RWR2245). In Cyuve, the climbing bean was used (RWV1129 variety). Again here we present the results of Gashora and Runda (Figure 1), because the beans in Cyuve are not yet to be harvested.

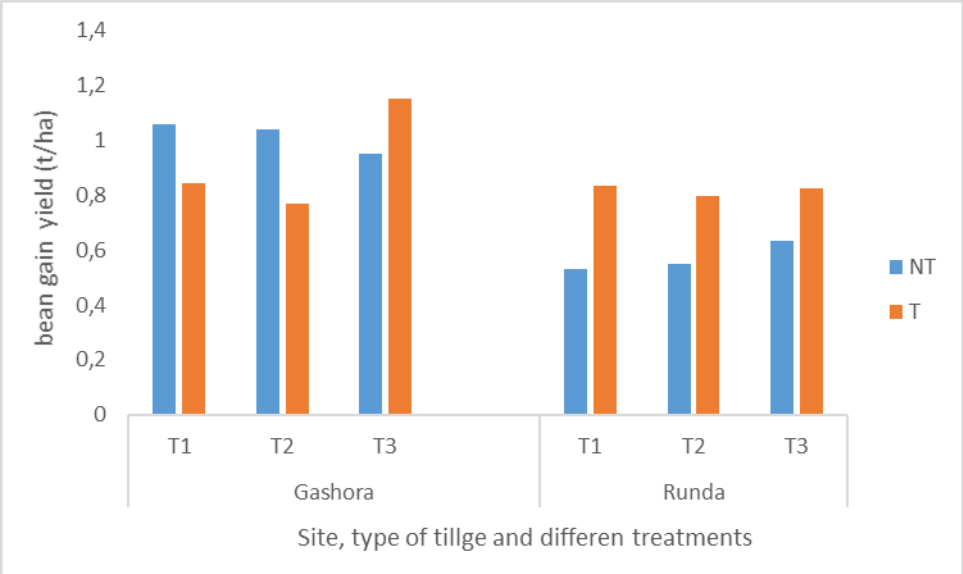

Figure 10.7: Comparison of bean grain yield in Gashora and Runda under tillage (T) and Non-Tillage (NT) practice and different treatment (T). T1: Manure; T2: Manure + DAP; T3: Manure + DAP + DI-Agro[1].

The above results are full of information vis-à-vis the two sites and the agricultural practices and different treatment as well. It can be observed from them that, in general Gashora has been more productive than Runda. This is explained by the fact that the soil fertility is good in Bugesera than in the Central Plateau (data not shown) and whereas the constraints of this AEZ is normally the rainfall, the rainfall for this season was enough for bean production. Regarding the farming practice (T and NT).The general trend is that in Bugesera the NT has been superior to the T whereas in Runda the contrary has been observed. This may be explained by the fact that Bugesera being more fertile, the weeds may have got little impact on crop yields while in the Central Plateau where the soil is less fertile there was a lot of weeds. The weeds may have impacted negatively the crop yields.

About the treatments, it can be observed that T1 produce well in Bugesera. The addition of DAP is not being translated into crop yields in both tilled and non-tilled plots. However, a positive impact of Di-Agro was observed. By contrast in the central plateau, the more inputs are added, the more crop yields increase. This is explained by the fact that poor soils require a lot of work (tillage) and inputs (fertilizers). This implies that CA consisting of improving soil fertility through non-tillage practices, mulching and minimum use of inorganic fertilizers might be a good option for sustainable agriculture in Rwanda.

The results of this one-season on-farm demonstration trials are really encouraging as it has shown to farmers but also to scientists and field technicians in all three sites that CA agriculture (no-tillage) is a feasible option. Before the trials no one could believe that planting crop seeds without tillage could have positive results and only small plots were given for trials. Now after one growing season SIMLSEA has got many demands to undertake CA and on large plots. This has been possible by considering the innovation platform approach including the gender consideration.

From a scientific point of view, the lesson learned is that CA needs to be site-specific. The example of Gashora and Runda is eloquent. This means that beyond all socio-economic and agronomic practices considerations, good understanding of the biophysical environment in terms of soils, soil properties and climatic conditions is paramount important. Sufficient to say that there remain important rooms to improve the CA in Rwanda.

SIMLESA is being implemented in two districts located in different agroecological zones of the country. These districts are Kamonyi in the Southern Province (mid- altitude zone, with better

[1] *Di-Agro is an organic fertilizer enriched with micronutrients and used as a supplement in fertilizer use.*

climate conditions) and Bugesera in the Eastern Province (low altitude zone, experiencing severe climate variations including drought).

Strengthen established innovation platforms and cost-benefit analysis

The program reviewed, synthesized and monitored progress of innovation platforms. The program responded to the challenge raised by farmers during previous constraints analysis whereby the most challenging problem is climate variability and change, particularly in Bugesera District where drought is an annual threat. As part of mitigating the effects of drought and climate change, a community action plan was developed. The exercise used a four-step formal priority-setting methodology centered around a series of three workshops and meetings,as follows:

1. Developing consensus among workshop participants about the indicators of climate change and its impacts on crop production systems
2. Identification of current and future adaptation options to address climate change impacts.
3. Priority-setting of the individual adaptation options identified in Step 2,
4. Developing a community action plan (CAP) based on the response options prioritized.

Botswana

SIMLESA-Botswana activities are implemented in the Southern District. Rainfall started in mid-December 2015, but there were long dry spells between the rainfall events. The cropping season in this region ends around March.

Summary of achievements

A three-day training and technical assistance program on conservation agriculture and sustainable intensification was held on 13-15 October 2015. Attended by 40 people (16 female), the main objective of the training package was equipping participants with CA principles and SIMLESA objectives and activities. Other training objectives were:

- To prepare and equip scientists, SIMLESA extension agents and technicians with knowledge on the principles, methodologies, approaches and practices for conservation agriculture and water conservation technologies.
- To empower and build capacity of scientists, extension agents participating in SIMLESA field activities to investigate, identify problems, test possible solutions and adopt the practices most suitable to their farming systems.
- To review and develop new action plans for SIMLESA II, based on previous experiences

After the training, the team held a planning session on the 2015/16 activities at which priorities were set and agreed on.

Annex 2: QAAFI Progress report

D Rodriguez, P deVoil, J. Eyre, S Irvine-Brown, James McLean, Miranda Mortlock

Progress on QAAFI's Logframe

Progress on QAAFI's Log-frame is reported below. Links to downloadable documents have been included in the document.

Progress on QAAFI's PhD students

Abeya Tefera (Ethiopia): Abeya has competed his PhD studies and has published one article in a high impact journal i.e. Field Crops Research and has been invited to be senior author in the publishing of a book chapter. The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://dl.dropboxusercontent.com/u/20788757/TRANSFERS/Abeya%20et%20al.pdf

Nascimento Nathumbo (Mozambique): Nascimento has returned to Mozambique to his position in Chimoio and is expected to submit the answers to the reviewers of his PhD thesis soon.

Solomon Jemal (Ethiopia): Solomon is having his mid-term review in July 2016.

Yohannis Tesema (Ethiopia): has completed his PhD studies and published his studies in a high impact journal. The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://www.dropbox.com/s/97pyu4mdz5754oz/Bioeconomic%20paper.pdf?dl=0

Caspar Roxburgh (Australia): Caspar has completed his experimental work and is on track to complete his final thesis review this month. Caspar has published an article for publication in a high impact journal (Agricultural Systems). The article in Field Crops Research can be downloaded if you copy the url below into your browser:

https://www.dropbox.com/s/9ukvsn6vubgj4de/Caspar.pdf?dl=0

QAAFI's Summary Report:

Objective 1: To enhance the understanding of CA-based intensification options for maize-legume production systems, value chains and impact pathways.

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
Output 1.1	**Understanding CA-based intensification and feed options in selected farming systems**			
Activity 1.2.3	Participatory exploration of opportunities for investment in maize, legume and forage value chains through a better understanding of climate and market risks i) Two participatory modeling workshops per SIMLESA at one site per year identifying opportunities for the on farm demonstration of profitable and risk neutral CA-based intensification opportunities, ii) Risk analysis and investment options discussed at farmer group, and public-private partnership meetings.	Pre-season participatory modeling workshops with farmers, agribusinesses, extension and researchers across all SIMLESA countries and agro-ecologies to evaluate: • Expected seasonal conditions and necessary adjustments to best fit practice change • Analysis of risks and benefits from alternative practices, technologies and investment options • Changes in farmers' risk perception and farm investment	Farmers from Sussundenga Mozambique will be selected as case study farmers based on the analysis of typologies (Rodriguez et al., 2014), i.e. cluster centers. By January 2015 three case study farms will be identified representing three different levels of endowment-food security. By March 2015 farmers will be interviewed to draw visioning maps. This visioning map will allow the researchers identify feasible stepping stone interventions that better match farmers' expectations, aspirations and levels of resource availability. During August 2015 the farmers will be visited again to design on farm trials that better suit their needs and opportunities. We expect to replicate the exercise in Ethiopia during the second	**Reporting to July 2016** The case study farmers identified from Mozambique were visited to discuss and agree on trial treatments. The trials were then planted at two farms in collaboration between QAAFI and IAMM. The objective of these trials was to support farmers experimenting with low cost (labour and cash inputs) weed management options for different household types in Sussundenga. The questions were (i) whether relaying cowpea into maize crop would provide good weed control, and (ii) whether the relay cowpea should be planted at the first or second weeding event. Maize seeds distributed to all farmers. Only 1 trial was sown to date due to the late start to the season. One on-station replicated trial established at ISPM to evaluate weed suppression by relay crops against farmers practice and chemical fallow. This trial is co-managed by Dr Cremildo Francisco, Dr Rafael Massinga and 3 final year agronomy students. Treatments therefore included a cash crop (sesame), a sole maize control, and the relay of cowpea after the first and second weeding event. The protocol for these trials can be downloaded from this HERE. Sub treatments included the use of lime, manure, or fertiliser depending on the type of household. The protocol for this trial can be downloaded from HERE. Only the relatively wealthy "stepping out" farmer successfully complete the maize and legume rotation. The other "hanging in" and "stepping up" farmers did not complete their trials due to family breakdown potentially related to poverty and the drought effects of the 2015/16 El Nino. A final participatory evaluation will be completed after land preparation. It must be indicated that drought conditions during 2015/16 dramatically affected the farmers in this region. Consequences included heads of the household migrating to find work, severe lack off food particularly among the poorest households across Sussundenga.

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
			half of the year	
Output 1.3	**Functional farm-household typologies matched to CA-based intensification options**			
Activity 1.3.1	Adjusting structural typology of SIMLESA-1 to a functional typology based on adoption constraints of CA-based intensification options for different farm household types , building on additional survey data and interviews with identified representative case study households (i.e. output from SIMLESA-1),	A typology of farm households developed and validated Matched CA-based intensification options with identified farm typologies for potential out-scaling	See 1.2.3	**Reporting to June 2016** Focus of the work has been on publishing project results in high impact journals and as book chapters An article was submitted for publication to Agricultural Systems. Two book chapters are in press, one by Rodriguez et al. (download from HERE), and one by Abeya et al.
Activity 1.3.2	Quantify the benefits and trade-offs of alternative CA-based intensification options for different farm household types	Report on benefits and trade-offs of alternative CA-based intensification options for different farm household types	Analysis of benefits and trade-offs from alternative interventions will be developed using the APSFarm-LivSim model and the results from activities 1.2.1 and 1.3.1 Same analysis will be run for Ethiopia and the rest of the countries during the course of the project.	**Reporting to July 2016** • Focus of the work has been on publishing project results in high impact journals and as book chapters • An article authored by Isaiah Nyagumbo was submitted to Agricultural Systems and is under revision. • Two book chapters are in press, one by Rodriguez et al. (download from HERE), and one by Abeya et al. • QAAFI is working closely with ILRI on modeling benefits and tradeoffs from alternative forage feeding strategies using the APSFarm-LivSim model. Progress includes: 1. ILRI delivered high quality data on the nutritional value of alternative forages. 2. QAAFI modellers (Peter deVoil) used the new data provided by ILRI to run alternative feed scenarios and the model was able to represent the different feeding strategies into large differences in animal weigh gain. This means that the collaboration is active and productive. We expect to present results in the next reporting face.

Objective 2: To test and adapt productive, CA-based intensification options for sustainable smallholder maize-legume production systems

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
Output 2.2	**Understanding productivity and soil health dynamics of CA based intensification practices**			
2.2.5	Testing the value of existing seasonal climate forecasting tools for Sub Saharan Africa	A report on the value of existing seasonal climate forecasting tools and native knowledge available across all five SIMLESA countries, and identification of how this information could be used to inform practice change across SIMLESA activities.	Critical review of N and residue routines in crop models Evaluate rapid tests for soil characterisation Evaluate surface residue decomposition and interactions with SOC and mineral N Develop complimentary work plans to Activity 2.2.4	**Reporting to June 2016** • Available rainfall data digitized and patched with long-term synthesized climate data (MARKSIM). • Long-term on-farm CA trials demonstrate that maize grain yields can be doubled in seasons with mild dry spells during the crop establishment and early vegetative growth phases when retaining crop residues on no-till fields. Decreased seedling mortality contributes to the increased yield. Click HERE to download
Activity 2.2.6	Developing site specific crop nutrient management tools under conservation practices	Development, calibration and validation of simple site-specific crop nutrient management tools for farmers and extension officers e.g. leaf colour charts for maize (as developed by IPNI for rice - Witt et al., 2005), in collaboration with farmers Objective 2 and 3	Evaluate the GxExM approaches to manage production risk in maize based cropping systems Identify genotypic correlations between IPNI leaf colour charts and N response	**Reporting to June 2016** • Final version of SIMLESA's Soil Manual outlining soil sampling protocols, analyses, and application to field based research activities is pending. Summary can be downloaded from HERE (2 pages); and the first draft of the full manual from HERE (129 pages). Analysis of soil organic carbon fractions show that lower inputs of nitrogen and crop residues have no long-term (5 to 7 years) effect on total organic carbon but reduce the proportional contributions of the more dynamic particulate and humic fractions thereby validating ex-ante APSIM modelling HERE. An abstract on the was submitted and scholarship obtained to present this research at the New Zealand Society of Soil Science and Soil Science Australia biannual conference, click HERE to download
Activity 2.2.7	Developing more sustainable and profitable intensification options in summer rainfall dominated environments of Queensland: Alternative sources of nitrogen inputs	A participatory study on the opportunities to reduce Queensland farmers' dependence on the use of nitrogen	Evaluation of legume species for opportunistic cover or grain crops in summer and winter rotations	**Reporting to July 2016** • All empirical trials competed and analyzed. • The final report HERE identified - Crop management decisions are more likely to influence rotational benefits than species selection. - High soil nitrate that mineralizes during the fallow likely inhibits

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
		fertilisers. A communication program in collaboration with Conservation Farmers Inc. (www.cfi.org.au) reaching more than 300 farmers from Northern New South Wales and Queensland.		biological nitrogen fixation. - The first summer cereal rotation must be sown in early spring or double cropping a cover crop and cereal rotation is unlikely (i.e. spring sorghum – winter cover crop – summer sorghum). • Longer-term (2 years after legume) benefits of legume cover crops are not evident in assay cereal crops.
Activity 2.2.8	Developing more sustainable and profitable intensification options in summer rainfall dominated environments of Queensland: Reducing yield gaps in the grains industry	Results from replicated on-research station and on-farm trials reaching 300 farmers from Northern New South Wales and Queensland At least four field days and workshops in the Darling Downs and Central Queensland in collaboration with the Grower Solutions Teams from CQ, and CFI in the Darling Downs.	Evaluate intensification options for maize, sorghum and wheat. Demonstrate intensification options to farmers.	**Reporting to July 2016** • All 15-16 summer trials harvested and sample processing will be complete by Aug 16. • One manuscript submitted to Field Crops Research (HERE) and one to the 7th International Crop Science Congress (HERE). • Published one book chapter on sustainable maize cultivation (HERE) • The book of annual results for the 2015/16 season has been released (HERE). • Hosted industry and partner consultation and planning meetings.

Objective 4: To support the development of local and regional innovations systems and scaling-out modalities

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
Output 4.3	**Knowledge sharing of relevant program innovations**			
Activity 4.3.1	Develop -based tools for site-specific decision support to deliver: (1) simple heuristics for crop management and other information at key times during the year to registered mobile users (service includes information from global	SMS services established in at least three SIMLESA countries	To develop SIMLESA's SMS delivery system for Kenya KARI will run a workshop with farmers to build the calendar of SMSs as done previously in Mozambique Daniel Rodriguez will	**Reporting to July 2016** • SIMLESA's SMS delivery system is now live and operational • Meetings with NARS have taken place to develop their calendar of SMS messages. • Testing of the system and sending of preliminary SMS messages to regions. • Administrator and Operator access and familiarization in all SIMLESA countries.

No.	Outputs / Activities	Milestones	Work plan 2015	Progress
	seasonal climate forecasts, and in-crop nitrogen management tools). (2) technical, social networking (e.g. information on field days, trials, farmer to farmer exchanges (m/f), etc.), and market information to farmers, extension officers and other participants in the maize-legume value chain.		provide a first template of the calendar of SMS	• Ongoing activities include the collection of details for farmers and extension officers across the regions. • Development of SIMLESA SMS User Manual. Both in hardcopy and online access. Used as support tool for existing administrators and operators and as introduction for new SIMLESA extension officers.

Objective 5: Capacity building

Objective 5: Capacity building to increase the efficiency of agricultural research today and in the future **No.**	**Outputs / Activities**	**Milestones**	**Work plan 2015**	**Progress**
Output 5.1	**Training on technology targeting, value chain and system analysis provided to build and enhance capacity of national and regional programs (integrating gender where relevant)**			
Activity 5.1.1	Technical training on: (1) farm and household typologies and system analysis; (2) recommendation domains (including GIS skills); (3) CA-based Intensification in smallholder agriculture; (4) fodder/forage management in CA-based intensification; (5) soil quality in CA-based intensification; (6) interdisciplinary farming systems analysis; (7) value chain analysis; and (8) emerging topics. Supported by on site/on the job training.	Socio-economic, agronomic research skills of program partners in the national and regional programs enhanced - Systems agronomy research skills of program partners in the national and regional programs enhanced. - Interdisciplinary research		**Reporting to July 2016** • Training has been provided on soil sampling, soil processing, and rapid test methodologies from SIMLESA Soils Manual to gauge insight, acceptance and recommendation for the Manual from NARs. • The SIMLESA Soils Manual is incorporating and updating its content prior to distribution to NARs in July 2016. • Training provided on utilization of the SIMLESA SMS platform by administrators and operators has been completed in each of the countries during late 2015 and early 2016.

Objective 5: Capacity building to increase the efficiency of agricultural research today and in the future **No.**	**Outputs / Activities**	**Milestones**	**Work plan 2015**	**Progress**
Activity 5.1.2	Free on-line training courses on: 1. Experimental design, basic statistics and use of R (free statistics software) 2. Soil and weather monitoring	1. Experimental design and basic statistics using R free course available on line 2. Soil and weather monitoring free course available on line	Continue to develop further modules in the Online site. Under development are regression, working with count data and plotting data. Solving technical challenges in the online environment, while keeping the site simple so as to be available worldwide. Monitor the use and respond to feedback. Investigate methods/technology to allow online consultations with field staff.	**Previous reporting until June 2015** • The course has linked to eDX at UQ as a special private online course (SPOC) whereby we gain access to their development workshops and some professional video production. • Potential to be a MOOC in 2016 once the modules are completed. **Reporting to July 2016** • This activity has been delivered, there is no new reporting to add • A detailed report on this deliverable can be downloaded from HERE.
Output 5.5	**Training on extension capacity**			
Activity5.5.1	Extension capacity building based on country-specific training needs and short courses	Identified training needs, and provided relevant training		**Reporting to July 2016** • No specific requests for training have been received.

QAAFI Level of Investments, Activities and Outputs Summaries:

Level of investment, expected outcomes, activities and outputs in Queensland from QAAFI's involvement in ACIAR's Sustainable Intensification of Maize Legume Based Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA II) (2015-2018)				
Theme	Investment in Queensland activities	Expected outcome	Activities	Outputs
Research & development				
• Developing more sustainable and profitable	•1 FTE (J McLean – TO) 137K pa	• Results from replicated on-research station and	• Evaluate intensification	• 2000 plots of on research station and on

intensification options in summer rainfall dominated environments of Queensland: Reducing yield gaps in the grains industry	•Operating 27k pa • Transport 12.5k pa •Support to students 3k pa •One off shared contribution towards capital items 60k (planter, vehicle, drone, cameras, sensors)	on-farm trials reaching 300 + farmers from Northern New South Wales and Queensland. • At least four field days and workshops in the Darling Downs and Central Queensland in collaboration with the Grower Solutions Teams from CQ, and CFI in the Darling Downs.	options for maize, sorghum and wheat. • Demonstrate intensification options to farmers.	farm agronomic trials were planted between 2014/15 and 2015/16 seasons. • One manuscript submitted to Field Crops Research (HERE) and one to the 7th International Crop Science Congress (HERE). • Published one book chapter on sustainable maize cultivation (HERE). • The book of annual results for the 2015/16 season has been released (HERE). • Hosted industry and partner consultation and planning meetings. • Hosted two field days at Gatton Research Station, and at least 10 presentations to farmers and public for a reaching several hundred farmers and consultants.
• Developing more sustainable and profitable intensification options in summer rainfall dominated environments of Queensland: Alternative sources of nitrogen inputs		• A participatory study on the opportunities to reduce Queensland farmers' dependence on the use of nitrogen fertilisers. • A communication program in collaboration with Conservation Farmers Inc. (www.cfi.org.au) reaching more than 300 farmers from Northern New South Wales and Queensland	• Evaluation of legume species for opportunistic cover or grain crops in summer and winter rotations	• All empirical trials competed and analysed. • A publication for farmers was published in the CFI Newsletter reaching ca 300 farmers. • Results were presented at field days in the Darling Downs during 2015 and 2016. • A journal article is being prepared and will be circulated soon. Main findings include: • Crop management decisions are more likely to influence rotational benefits than species selection. • High soil nitrate that mineralizes during the fallow likely inhibits biological nitrogen fixation in the legumes green manured. • The first summer cereal rotation must be sown in early spring or double cropping a

				cover crop and cereal rotation is unlikely (i.e. spring sorghum – winter cover crop – summer sorghum). • Longer-term (2 years after legume) benefits of legume cover crops are not evident in assay cereal crops.
• Software development (APSIM / APSFarm) for Africa with applications in Queensland	•0.7 FTE (P deVoil – TO) 120k pa •Operating 5k pa	• Improved APSFarm capacity to model mixed grain – livestock farms in Queensland • Improved collaborations within UQ, and ILRI (CGIAR) on animal and whole farm modelling • Modelling support to PhD students	• Development of APSFarm's herd modelling and animal nutrition capabilities for cattle, small ruminants	• The APSFarm-LivSim model was developed and is able to simulate herds of cattle and small ruminants. A publication has been submitted to Agricultural Systems. • New collaboration between QAAFI-ILRI in the application of whole farm modelling tools is being carried out by QAAFI.
Capacity building				
• Investment in human capacity in Queensland	• 1.7 FTEs (J Mclean and P deVoil) • 0.5 FTE PhD student	• Increased R&D capacity in Queensland	• Support Australian and OS PhD students	• Field technical capacity was increased • Caspar Roxburgh has developed skills in Australian and African agriculture. • Caspar has published in Agricultural Systems on African Agriculture (HERE) and submitted an article on his results in Queensland for publication (HERE)
• Research infrastructure & equipment in Queensland	1/3 contribution towards vehicle, soil rig, 4x 3G weather stations, 3 x logger weather stations, IR sensors and camera, 35 x stationary line PAR sensors, 1 x wireless portable ceptometer, 1 x canopy imager, 4 x lap top computers, 2 x field tablets, contribution towards precision, field balance, SPAD, time laps cameras, bird scare, cob de-sheller	• New research capacity available and used to leverage other project activities, e.g. New GRDC projects on Maize and sorghum agronomy and high yielding cereals.	• New project submissions adding value to SIMLESA infrastructure have been submitted for funding	• Two new GRDC projects have been funded that leverage SIMLESA funding to increase R&D capacity in the region
• Development of young agriculture professionals	• Australian PhDs Caspar Roxburgh	• Two PhD graduations are expected by 2016		• New R&D capacity and skills available in Qld

Annex 3: 2015 High-level policy forum (ASARECA)

Association for Strengthening Agricultural Research in East and Central Africa (ASARECA)

Semi - Annual progress Report – July 2015 to June 2016

Markets, Market Linkages and Trade Theme, ASARECA

Background

The main activity for 2015 was the hosting of a high-level policy forum. In the 5th Annual Partners and Programme Steering Committee Review and Planning meeting held from 16-19 March 2015 in Harare, Zimbabwe, five challenges that stand in the way of wide-scale adoption of sustainable intensification were identified. It was agreed that policy options to overcome these challenges be the subject of discussions in the high-level policy forum.

The five challenges are:

6. **Sustainable intensification of maize and legumes production and livestock integration**

Research evidence has shown that sustained application of resource conservation practices, crop diversification and livestock integration can increase productivity. The forum will discuss options of mainstreaming sustainable farming practices to increase productivity of smallholder systems.

7. **Building on social capital for collective action**

Research evidence shows that farmers belonging to groups are more likely to diversify cropping patters. They are also more likely to build their resilience by trying out new farming practices, use improved varieties and adopt soil and water conservation practices. The forum will demonstrate practical approaches that support collective action.

8. **Access to key farming inputs**

Farmers who are close to markets have better access to farm inputs and can readily sell their farm produce. Such farmers are more likely to adopt maize and legume intercrops and rotations, improved varieties and improved management practices. The forum will deliberate on practical ways of enhancing sustainable access to inputs, e.g., seeds, fertilizers, and credit for successful intensification of farming enterprises.

9. **Cross border trade**

Most farmers in Eastern and Southern Africa dependent on agriculture as the main source of income and spend a large proportion of their household budgets on food. Removing barriers to regional trade in food and facilitating access to key inputs such as seeds or fertilizers would provide farmers with incentives to supply the growing demand for food in the region. The forum will discuss ways of delivering integrated regional markets for agricultural products and inputs.

10. Containing Maize Lethal Necrosis disease: current knowledge

Maize Lethal Necrosis disease was first report in Kenya in September 2011. Since then it has been reported in DR Congo, Ethiopia, Rwanda, Tanzania, South Sudan and Uganda In Kenya, the disease had spread across most maize-growing areas causing an estimated loss of 10 per cent of national maize production equivalent to US$ 50 million in 2014. Rates of transmission from seed to seedling are low, but have been reported to be as high as 17% in one seed lot. Resistant varieties are still a long way to commercialization. This forum will deliberate on practical management practices farmers and seed producers can employ to contain the spread of the disease within and between countries.

Main activities

1. Write shop

A write shop to finalize the policy briefs was held in Entebbe Uganda between 27-29, July 2015. The technical participants in the write shop were: Paswel Marenya, CIMMYT Ethiopia, Michael Misiko, CIMMYT Kenya, Isaiah Nyagumbo, CIMMYT Zimbabwe, Drake Mubiru, NARO Uganda, Miriam Kyotalimye, ASARECA, Uganda and Michael Waithaka, ASARECA, Uganda. Communications experts - Johnson Siamachira, CIMMYT Zimbabwe and Ben Ilakut, ASARECA, UGANDA, assisted the team.

Seven draft policy briefs were produced in a common format. The format included a short but succinct title, one key fact, supportive facts and figures, short summary, background, policy options and references. Between August and October, the technical team worked with ASARECA to finalize the briefs. Each brief was shared with the SIMLESA coordinator and three independent reviewers before they were finalized for publication.

2. Preparations of the forum

The main activities leading to this forum were contacting of the high-level invitees, preparation of a programme, finalization of the policy briefs, holding of a media briefing and hosting of the forum in Entebbe, Uganda. The draft programme for the high-level policy forum and draft flier were shared with our hosts the Hon. Tress Bucyanayandi, the Minister of Agriculture, Animal Industry and Fisheries (MAAIF) in Uganda and Dr Ambrose Agona, the Director General, National Agricultural Research Organization (NARO) in Uganda. Hon. Bucyanayandi sent invitation letter to the Ministers of Agriculture in Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda and Tanzania.

3. Hosting of the forum

The forum was held on 27-28 October 2015 in Entebbe Uganda. 48 participants drawn from Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, and Uganda attended the forum. The participants represented policy makers, scientists, farmers, private sector and development partners.

The official opening consisted of statements by five representatives of the Ministers of Agriculture in Kenya, Mozambique, Rwanda, Tanzania and Uganda. The Keynote

presentation by Prof. Mandivamba Rukuni addressed the question “Does agricultural policy matter in agricultural Transformation?”

After the opening session the five challenges identified in March 20015, were discussed in plenary. Each challenge was presented by a discussant who was one of the authors of the policy brief. The presentations were based seven policy briefs that the discussants had produced which are available at http://www.asareca.org/~asareca/sites/default/files/SIMLESA%20POLICY%20BRIEFS.pdf . This was followed by comments on the presentation by diverse mix of practitioners who shared their experiences in the field. This was then followed by open discussions from the plenary.

The highlight of the forum was the signing of a joint communiqué, which posted actions which can be used to address each challenge and targeting diverse stakeholders, e.g., policy makers, regulators, farmers, and seed companies.

The full text of the communiqué is available at

http://www.asareca.org/~asareca/sites/default/files/Joint%20Communique%20by%20Ministers%20of%20Agric%5B1%5D.pdf

The forum would not have succeeded were it for the continuous support and guidance from the SIMLESA coordinator’s office, the National SIMLESA coordinators, the Director Generals of the NARS in the SIMLESA countries who connected us with the Ministers of Agriculture.

4. Follow-up on implementation of actions from the joint communiqué

The main activity in 2016 has been the follow-up on countries to implement the actions in the communiqué. SIMLESA implementing countries are preparing meeting with the top ministry of agriculture organs to sensitize them on the aspirations of SIMLESA and how the actions from the communiqué can be mainstreamed in the planning cycles. The meetings will be followed by meeting with ministry technocrats to prioritize actions points and sequence them in the annual and medium term plans.

5. Synthesis of evidence on conservation agriculture for policy action

The other activity in 2016 is a collation and synthesis of evidence from on-going initiatives on conservation agriculture, e.g., by the Feed the Future program – the US Government’s global hunger and food security initiative that is active in SIMLESA implementing countries. The intention is to augment evidence from SIMLESA’s activities with that from like-minded initiatives. This will aid decision-making by highlighting common threads and approaches.

Challenges

The main challenge that was encountered was paucity of economic and financial information to back the evidence we needed to concretize the policy briefs.

Annex 4: ARC Report

CAPACITY BUILDING IN SIMLESA

CIMMYT Annual Report 1st July 2015- 30th June 2016

1. Introduction

In the period July 2015-June 2016, the capacity building component of SIMLESA Phase 2 that is managed by the Agricultural Research Council (ARC) has focused on Gender Leadership & Planning as well as Post Graduate Studies. In 2016/17 financial year, a reshuffling of programs was conducted to prioritized activities such as development of Conservation Agriculture videos and Field Guide. The reason for re-prioritization is two-fold; to develop cost-effective information products considering the limited funding allocated to the program and secondly, to disseminated the information products to a wider audience through a variety of platforms such as YouTube, mobile Applications and other communication channels accessible to farmers and advisors.

A detailed plan and status of Capacity Building program for SIMLESA phase 2 is tabulated on Annexure 1.

2. Capacity Building Program

2.1 Gender Leadership and Planning

A five-day training workshop on Gender-integrated Planning was conducted at ARC Central Office in Hatfield, Pretoria (South Africa) on 14-18 March 2016. The purpose of the training was to develop an improved understanding among participating staff of the use of gender analysis concepts to build effective planning processes and integrate gender into these. The workshop content was based on four modules for gender-integrated planning, i.e., situation analysis, followed by setting objectives, developing activities and inputs, and indicators for monitoring and evaluation. The workshop used three project proposals as case studies to evaluate if any of the steps introduced had been referred to.

The training program was attended by SIMLESA Gender Focal Point from all five countries ; Communication Specialist; some Objective Leaders and four ARC Training Coordinators.

While most participants found the contents useful to their work, the more 'field-based' participants were under the impression that the workshop would expose them to field methods and tools for gender analysis, community participation, etc. Developing skills for field-based methods and tools requires separate treatment and cannot be combined with more upstream, gender-integrated planning skills.

2.2 Information Products on Conservation Agriculture

Two information products, namely CA video and CA field Guide have been commissioned to the ARC specialist to manage their production. Costing for the production of these has been conducted to ensure maximum benefit at the least price. In the meantime, the ARC

is in the process of developing a Mobile Application for Agricultural 'how to" Information Hub, whereby all production, processing, marketing and early warning, information will be available, amongst others. The mobile Application will be accessible to SIMLESA Advisors and farmers, as well as their intended audience in Southern Africa. The two information products to be developed for SIMLESA will feature strongly in the mobile Application being developed.

A 3-day workshop is planned in August 2016 to discuss the prosed plan (by the ARC) with SIMLESA colleagues and agree so that a final product is presented by 30 December 2016.

2.3 Human Capital Development

iii. **Two MSc candidates** (Mozambique) Gabriel Bragga and Custodia Jorge registered with the University of Free State. The 2 students submitted their 1st drafts of the thesis for review; however, due to poor reviews associated with language, the drafts were returned for further improvement. This required that the students re-register with the university. Mr Bragga has submitted his thesis for review on the 28th June 2016.

iv. **One PhD student** (Ethiopia), Mr Mekonnen Simme is registered with the university of KwaZulu-Natal, since May 2015. Mr Simme has finished all course work and literature review and is currently working to finalize his project proposal for approval by the end of September 2016.

3. General comments

The economic downturn and the lack of sufficient funding has a negative impact on the capacity building efforts of the SIMLESA program. The ARC's decision to incorporate some SIMLESA activities to its core programs helps to alleviate some of the financial pressure and to make sure that both SIMLESA and ARC participate in the training programs and the products developed benefit both South Africa and SIMLESA Countries.

Status of planned Capacity Building activities for SIMLESA Phase 2

Program	Issues to tackle	Intended outcomes	Trainees	Status
Gender Leadership & Planning	Integrating gender into SIMLESA especially during priority setting, planning and implementation processes	Get gender activities, M&E indicators and budgets; collective ownership and accountability for gender outcomes by all team members; strengthening local gender focal points	Gender focal people Objective leaders Country coordinators	**Completed**
Economic Benefits of	Increased productivity and	Data collection	2 people per	**Under**

CA	spins-offs Diversification and intensification to cash crops and livestock	format Costs at input and output level of different farming operations Cost of spin-off operations Publications	country (10-14)	**consideration**
CA Field Guide/ Resource Book	Practical "how to" colour and step by step Pest and disease management Costs and benefits	Full colour and durable resource book	5 people	**In-progress** **December 2016**
CA Videos	Clear videos of each stage of CA and in different countries; capturing the before and after to visualize and track the changes	Videos than can be shared and uploaded for learning & media	1 person per country led by SIMLESA Communications Manager	**In-progress** **December 2016**
Post-Harvest Management	Storage of maize & legume grain and seed, especially as output increases Access to markets Processing	Post-harvest management guide Analysis of potential markets/ country Facilitate access to suitable storage facilities	10 people (1 technical and 1 economist/country)	**To be negotiated**
Publications	Develop and implement a strategy for accelerating generation of publications from SIMLESA's research activities. Key issues to be articulated are	Publications	10 people at a time	**Under consideration**

	• **Time:** How to ensure scientist set aside time to writing: what platforms have to be created for this • **Access to literature:** assist scientist improve access to non-open access journals literature • **Language Editing:** Support some finished products with language polishing • **Statistical support**: Facilitate 1:1 contacts with Biometricians			

Annex 5: SIMLESA Gender Activities

Study 1: Gender Analysis on Maize or Legume Value Chain, a Case Study of Tanzania

The first study, which was conducted in one of the five major SIMLESA countries, namely Tanzania was on Gender analysis on maize or legume value chain. The study was carried out in February and March of 2016, which aims to answer the following two questions: (1) Where and how can maize and legumes be scaled for sustainable intensification of maize-based farming systems? (2) What would the potential impacts be, in the medium term, across food systems in the four countries under study? The study analyzed the maize and legume value chain using a rapid assessment approach and the Integrating Gender into Agricultural Value Chains analytical framework. We used qualitative methods, focus group discussions and key informant interviews. The study was carried out in the North (Arusha Region) and in the Eastern (Morogoro Region).

Table 10.7: Methods of Data Collection

Value chain node	Data collection mode (n)	Female	Male	Total respondents
Seed actors	Key Informant Interviews (8)	3	5	8
Producers	Focus Group (12)	72	62	134
Producer association	Focus Group (3)	35	30	65
Retailers and processors	Key Informant Interviews (5)	1	4	5
Local buyers and traders	Key Informant Interviews (7)	1	6	7
Export market buyers and traders	Key Informant Interviews (1)	-	-	1
		112	107	220

The findings of this study show that from production to processing, gendered patterns of behaviour and resource allocation exists. Moreover, opportunity to expand maize and pigeon pea production in Tanzania exists. However, this will require improving farmers' access (men and women) to high yielding seeds, fertilizer or manure and pesticides. The result shows that female headed households (FHHs) are at a disadvantage at every aspect of the value chain for maize and legumes as compared to male headed households (MHHs).

In addition, the study shows that there are differences across the regions. Starting with the North (Arusha Region), gender mapping of the value chain reveals that women in the Region particularly are heavily concentrated at points along the value chain with minimal resources. In addition, intra-household gender relations, which give men control over income generated from women's labour and allow expenditure behaviour, which do not

reflect the needs of all household members, weaken the incentives to expand production beyond households consumption needs. Moreover, men would appropriate the crop if access to profitable markets is improved, thus women's income can be increased by involving them in local seed production and processing of maize and pigeon pea.

On the other hand, women in the Eastern Region are involved in every aspect of the value chain. In addition, frequent price fluctuations and price information asymmetries means that innovations to improve the efficiency of trade and the wellbeing of value chain actors need to support reliable access to price information. This can be done through Information Communication and Technology (ICT) and Agricultural Innovation Platforms (AIPs). Furthermore, when women are given access to resources, the likelihood for success of food security programs is increased. Lastly, the findings show that there is a need to tighten the quality control and seed policies. Specifically, smallholder farmers noted that the qualities of maize seeds that are sold to the smallholders are not good and they need to be checked.

Study 2: Gender and Equitable Benefits Sharing among Men and Women through Agricultural Innovation Platforms in Rwanda

The second study was conducted in one of the SIMLESA spill over countries, namely Rwanda. The study was carried out from November 2015 to May 2016. The study, "Gender and Equitable Benefits Sharing among Men and Women through Agricultural Innovation Platforms (AIPs)", sought to (i) investigate mechanisms of equitable generation and sharing of benefits among men and women members; (ii) to document underlying success factors that are critical for the positive outcomes of Innovation platform; and (iii) inform national policy of Rwanda; (iv) to draw lessons, which can be used in other Sub Saharan African countries to facilitate gender mainstreaming in Sub-Saharan African countries.

The preliminary study was done in which nine AIPs were studied and out of those, we chose to study four successful AIPs and two not so successful AIPs. The Participatory Audit Tool (P-Audit) is a holistic technique for assessing AIP scientifically. We triangulated data through case research. P-Audit is structured, designed to be administered including by non-social scientists to generate both numeric and qualitative data. P-AudiT is based on the Likert's summative scaling method. However, rating of benefits (items) is done by knowledgeable informants on a scale of 0-3, X in an *interactive workshop* set-up rather than by judges (i.e. scientists) on a scale of 1 to 5 (or 1 to 7).

The study documents broad benefits of AIPs, and also shows the transition from weak, benefactor-dependent entities, to multifunctional organizations with resourceful means to catalyze equitable rural development. The more mature the AIP, the longer term benefits it generated. AIPs relied on complex set of interactive process among policy, culture, native business acumen and innovation to generate and equitably share four broad ***types*** of ***benefits***:

i). Crop related – yield increase, drought tolerant, disease/ pest tolerant, and water use efficient varieties, crop diversity
ii). Business related – higher income, market access, better agribusiness, lower input costs, capital access (e.g. credit)
iii). Infrastructural – new business building/s, new feeder road/ path, new processing centre, farmer resource centre, better produce storage

iv). Social – enhanced youth (e.g. for agribusiness) and women participation (e.g. through table banking), better nutrition (e.g. through processing), better societal or household harmony (e.g. reduced conflicts) and reduced drudgery (e.g. through commercialized food processing)

v). Environment – reduced soil erosion, reduced weeds, better soil health, better water retention, and more critically, better habitat (incl. soil C and general).

Why AIP succeeded in Rwanda: public policy, strong business ethics, public-donor-private engagement and coordination, niche utilisation and identification and building upon on positive gender culture. In brief, the government policy in Rwanda, clearly notes that each gender is entitled to equal pay or compensation for similar work. The business ethics, which are gained through trainings, were very critical to AIP success. Lastly culture of Rwanda, which demands folks, "cannot reap where they did not sow."

Submitted paper to the **Development in Practice** journal:

"Gender and Equitable Benefit Sharing Mechanisms through Agricultural Innovation Platforms"
Manuscript ID is CDIP-2016-0091.

Study 3 (Ongoing): Influence of Gender on the Adoption of Conservation Agricultural in Malawi

This study investigates whether female-plot managers in both female-headed households (FHHs) and male-headed households (MHHs) in rural Malawi are equally as likely as male-plot managers to adopt Conservation Agriculture (CA) technologies. We attempt to disentangle the effects of different types of gender inequalities in CA in more detail than most previous studies have done. Few studies on adoption of CA practices have recognized the role that the social context, and in particular gender relations can play in the adoption of CA practices. Specifically questions such as factors, which influence or explain CA adoption decisions, any gender gaps in these factors and quantifying the effect of any gender gaps in asset or factors on CA adoption decisions have not been answered.

In order to carry out this study, we use the Malawi Adoption Pathways datasets, which was carried out in 2013 in the Northern, Central and Southern Regions of Malawi, to answer the hypothesis set above. In this study we examine how gender influence CA adoption decisions in Malawi. We look at the three CA technology options that are mostly carried out in Sub-Saharan Africa. In comparison to existing studies on the gender technology adoption gap, which focus mainly on the adoption of external inputs (such as seeds and fertilizer), we go further this analysis to the adoption of crop-rotation (maize-legume rotation), minimum tillage, and crop residue retention.

Below, we only provide a brief snapshot of the descriptive statistics results, other analysis are still being carried out. The study shows that 346 plots are intercropped, which is 14.2% of total number of subplots. In addition, 145 (41.9%) of the total number of subplots that are intercropped are managed by men; while 101 (29.1%) of the total number of subplots that are intercropped are managed by women. The rest of the intercropped plots are either managed jointly or by others. This preliminary analysis indicates that men smallholder farmers are dominating in the adoption of CA technology.

Furthermore, distribution of main crop by gender of the sub-plot manager indicates that of the 145 subplots that are intercropped and managed by men, 81.4% of the plots have maize as main crop, 6.9% of the plots have groundnuts as main crop; 5.5% of the plots have cotton as main crop, while 3.4% of the plots have tobacco as main crop. Considering the intercropped plots managed by women (101 subplots), data reveals that maize is the main crop on 87.1% of the subplots, followed by groundnuts (6.9%), then cotton (3.0%). The preliminary study then shows that regardless of the gender of the plot manager, maize is the major crop grown by farmers for their daily needs.

Training and Capacity Building

Currently, we have two Masters Students, who are pursuing Agricultural and Applied Economics degree at University of Nairobi. The first student, namely Jessica Osanya, her thesis is titled "An Assessment of Gender Roles in Farm Decision-Making and their Effect on Maize Productivity in Kenya." Ms. Osanya is using Kenya Households and Individual Adoption Pathways Responses, collected in 2013 to carry out her study. Ms. Osanya is expecting to graduate in May, 2017. The second student, namely Mr. Dennis Olumeh, his thesis is titled, "A Comparative Analysis of Determinants of Market Participation in Male and Female Maize Farmers in Southern and Eastern Africa: Case Study of Kenya and Mozambique." Mr. Olumeh is using Mozambique and Kenya household SIMLESA datasets collected in 2010/2011, to carry out his study. Mr. Olumeh is expecting to graduate in August, 2017. The students are both Kenyans.

In addition, we have an intern, whose name is Ms. Grace Wamwandu. Ms. Wamwandu is a Kenyan who has a Bachelor's degree in Psychology (Hons) from University of Bradford, in the U.K. Her dissertation was titled Black Beauty and she looked at what constitutes as beauty among black women in our today modern society. Her research found that colorism had a significant impact on black women and their perceptions of beauty. In addition, Ms. Wamwandu has a Postgraduate Diploma in International Business Management, from the University of Bradford, in the U.K.

Other Studies in Session

From July to September 2016, we will be carrying out two studies in four SIMLESA countries: Ethiopia, Kenya, Malawi and Mozambique. The first study will produce a gender analysis of maize and legumes value chains, a replicate of the study that was done in Tanzania while the second study will examine how men and women benefit differently from membership in Agricultural Innovation Platforms (AIP), a replicate of the study done in Rwanda. If a country does not have functional AIPs, farmers' groups will be studied instead. Lastly, because the Gender Equity and AIPs study has not been done in Tanzania, we will carry that study in Tanzania as well.

Annex 6: ILRI SIMLESA II Semi Annual report

January 2016 – June 2016

co-authors/ contributors/ collaborators	Aberra Adie, Melkamu Derseh, Endalkachew Wolde-meskel, Ben Lukuyu
approved by	Peter Throne, Moyo Siboniso

Progress Summary

As reported in the semi-annual report (March to December 2015), ILRI's engagement during the first few months focused, within the agreed log-frame, on understanding the system (with the help of diagnostic tools) in the SIMLESA II sites in relation to feed resources availability, quality, and utilization as well as major livestock production constraints and opportunities. Through systematic prioritization of alternative feed and forage innovations that suit the local context, forage intervention demos have been initiated before the end of the last main rainy season. Afterwards, based on the recommendations from the midterm review, ILRI-SIMLESA forage/fodder team has made a series of discussions with partners on how to strengthen the livestock component and meet the evolving needs of the program. Accordingly, the activity plans were revised to address the recommendations of the reviewers. This included 1) use of whole farm modelling approach to conduct scenario analysis around different livestock intensification trajectories and probable success of different livestock innovations, 2) scaling forage innovations, 3) establishing local forage seed systems, and 4) post-harvest handling and utilization of feed resources to cope with feed calendar deficits.

For the whole farm modelling, experts from Queensland Alliance for Agriculture and Food Innovation institute (QAAFI) have been consulted and agreed to take part in the modelling work. The model framework has been discussed and outlined and basic data required for the modelling work in relation to local feed quality characteristics are being gathered. ILRI also redesigned the field trials towards scaling proven forage innovations in the SIMLESA II sites, initially by targeting farmers who have been involved in practicing SIMLESA II agronomic trials and then radiating to reach more number of farmers through demonstrations, field days and media outlets. From other ILRI - led action researches, it has been found that traditional feeding and storage practices lead to considerable post-harvest loss of feed resources. Therefore, it has been planned to promote improved feeding trough and feed storage technologies that would minimise wastage and help to cope with dry season feed deficits.

To implement the scaling of proven forage innovations and their post-harvest management in Ethiopia, ILRI has invited national research centres (ARARI, SoRPARI, BARC, WARC, and MARC) who are part of the bigger SIMLESA program for a one-day consultation workshop. The planning meeting took place on 23 May 2016 in the ILRI

campus, with the objective of discussing and harmonizing activity plans for scaling feed and forage innovations in the respective action sites. The meeting was also attended by CIMMYT staffs, Dr. Mulugetta Mekuria (SIMLESA project leader) and Dr, Haekoo Kim (agronomist), who gave valuable inputs and directions on the approaches to follow to contribute to the broader objectives of SIMLESA II with the remaining time and available resources. Participant centres presented feed related initiatives at their respective sites by all actors in general and by SIMLESA project in particular. ILRI also presented its lessons so far and proposals for SIMLESA II feed related activities in the up-coming season. This helped to identify possible areas of synergies and joint planning. Nevertheless, all centres disclosed that they don't have budget to implement any feed related activities this season.

During the workshop each centre developed and submitted its own harmonized plan with budget estimates. After a thorough review of plans and available funds at disposal, ILRI agreed to provide budget and technical backstopping for three of the centres, namely ARARI, BARC, and WGRC. The planned activities to be implemented through the three centres include on farm forage seed multiplication for sweet lupin, cowpea, lablab, Rhodes grass, desmodium, brachiaria and pigeon pea; scaling of on farm forage production for some of these species; as well as demonstration of improved feeding troughs and storage sheds. A total of 43 hectares of land is planned to be used for the above activities during the current main rainy season, and through demonstrations, trainings, field days and media outlets, it is planned to reach about 6099 farmers across the three regions (Oromia, Amhara and Southern region) (see details in Annex 1). Three Collaborative Research Agreements (CRAs) are prepared and submitted for signing by ILRI administration and the implementing centres for disbursement of payments, while in the meantime the centres are using their own resources to cover field expenses.

In Tanzania, ILRI team and field technicians have conducted joint meeting to work out detailed activity plan around scaling promising forage innovations in the Mbulu and Karatu districts. The Tanzania team reviewed the FEAST reports from Mbulu and Karatu district. The current situation shows that the main feed resources for livestock are natural pastures, crop residues and cereal by-products. There is strong seasonal availability of natural pastures with plenty of pastures in the wet seasons (March to June) and extreme pasture shortages in the dry season (July and October) often of poor quality. Crop residues the main sources of feed in the dry season however they are not well managed. Often farmers allow livestock to graze crop residues in-situ. Farmers commonly use abundant cereal by-products for supplementation however they lack knowledge on how to mix the ingredients at farm level.

As a result the team resolved to initiate

(i) Introducing and promoting improved forages.
(ii) Interventions to enhance harvesting, management and use of crop residues on farms
(iii) Capacity Developing strategy to support the two interventions

Work plans and research protocols for these activities are under devotement

Achievements against project activities and outputs/milestones

Objective 1: To enhance the understanding of CA-based sustainable intensification for maize-legume production systems, value chains and impact pathways.

No.	Activity	Outputs/ milestones	Completion date	Comments
1.2	Initiate a set of on-farm evaluations of feed and forage based technologies and combinations.	Fodder interventions with different forage types have been implemented in Hawassa Zuria woreda, and data collected on the survival and performance of planted forages	August until now	Seedling of two fodder legumes (Leaucaena, and Sesbania) and root splits of a grass species (Desho grass) were introduced into different planting niches. Survival of the fodder trees was affected by the El Nino and was limited to about 30%, whereas the Desho grass established more than 95% performed very well. Farmers started to get feed biomass from the planted forage.

PC = partner country, A = Australia

Objective 2: To test and adapt productive, CA-based intensification options for sustainable smallholder maize-legume production systems.

No.	Activity	Outputs/ milestones	Completion date	Comments
2.1	Participate in the design of appropriate farm scale research activities.	ILRI managed to forge links with SIMLESA II national research partners working on livestock feed. A consultation workshop organized in Addis Ababa and centres invited to develop and harmonize activity plans on scaling forage technologies. ILRI committed to support technically and financially the on farm scaling activities in three regions in Ethiopia (Oromia, Amhara and Southern regions) and two sites in Tanzania. On farm scaling of forage technologies is planned on 20 ha of land across 145 farmers' fields in the main rainy season	June to December 2016	National research centres do not have funds to implement on farm scaling of forage innovations. With the available budget at disposal ILRI agreed to provide financial grant to three centres in Ethiopia, and two sites in Tanzania, in addition to the technical backstopping
2.2	Explore synergies with ILRI's BMZ-funded Feed Seed project to promote the private sector seed production model in SIMLESA target communities	In collaboration with the national research centres, it is planned to strengthen the local forage seed system. In the main rainy season forage seeds planned to be produced on about 23 ha of land across 47 farmers' fields. In order to create market links consultations with concerned stakeholders, trainings planned.	May 2016	Forage seeds which have market value and are in demand by the local extension systems have been chosen. Farmers engaged in seed production will be organized into cooperatives, trained for forage seed production and management, and connected to forage seed markets in collaboration with feed-seed project

PC = partner country, A = Australia

Communication and dissemination activities

For effective internal communication of activities and outputs ILRI has been using online platforms like CG spaces.

To facilitate scaling of forage innovations and integration into the cropping system, various means of communication and technology disseminations including field days, demonstrations, trainings, and local media outlets are targeted for the coming main rainy season field activities

Training Activities

About 33 training activities have been planned to take place in the current physical year in relation to forage technology scaling, forage seed multiplication and utilization of feed resources across three regions in Ethiopia.

Variations to future activities

ILRI redesigned its activities based on midterm review recommendations and included whole modelling work and postharvest feed utilization technologies into the activity plans.

Variations to personnel

Aberra Adie replaced Elias Damtew (who left ILRI for further study) as a research officer for the SIMLESA II forage activities

Opportunities and Challenges

As livestock are an integral part of the livelihood strategy of smallholders, feed is an important input in the mixed farming system. Currently, crop residues constitute about 20-80% of the diet of ruminants in the highlands of Ethiopia. This has become a serious challenge for the farming system, because firstly the feeding quality of crop residues is poor and does not fulfil the nutrient requirements of animals for a target production level. Secondly, the soil is continuously mined and depleted of its organic matter leading to loss of soil fertility and erosion. To advance the concept of conservation agriculture that the SIMLESA program is dealing with, it is imperative to produce alternative feed resources that can replace crop residues. The fact that farmers have good understanding of the advantages of conservation agriculture and that they are willing to involve in improved forage cultivation practices can be considered as an opportunity that ILRI and national partners can exploit. On the other hand, to produce sufficient feed biomass for various livestock functions, adequate land and resource input are needed, which appears to be a major constraint in highly populated areas where the land holding is less than a quarter of a hectare. Therefore, prioritization of forage technologies that fit local contexts and farm typologies and support farmers to meet their own specific demands appears to be an area to focus on.

ILRI_NARS joint activity plan for SIMLESA forage development work for 2016 in Ethiopia (Oromia, Amhara, and southern regions)

	Activity	**Number of targeted former for on farm activity**	**Total Plot size (ha)**	**Number of training events**	**Field days**	**Number of targeted farmer to reach through brochure/media**	**Number of total beneficiaries reached**
1	**On farm Seed production**						
1.1	Sweet Lupin	15	5	1	1	200	315
1.2	Napier		6.5	3	2	100	480
1.3	cowpea	10	1.75	2	2	175	335
1.4	Lablab	10	3.5	3	2	350	560

1.5	Desmodium	7	1.25	3	2	200	507
1.6	Bracheria	5	0.425	3	2	200	505
1.7	Rhodes grass		3.75	2	1	100	300
1.8	Pigeon pea		0.15	2	1	100	300
2	**Scalable forage technology**						
2.1	Sweet Lupin	50	12.5	1	1	300	550
2.2	cow pea	20	5	1	1	75	145
2.3	Lablab	10	2.5	1	1	75	135
2.4	Bracheria	15	0.15	1	1	100	295
2.5	Napier	50	0.25	2	1	100	400
3	**Feed Conservation and Utilization technology**						
3.1	Training	10		2			
3.2	Feed troughs	11		3	2	200	636
3.3	Storage sheds	11		3	2	200	636
	Total	**224**	**42.7**	**33**	**22**	**2475**	**6099**

Annex 7: SIMLESA Responses to MTR Recommendations

Mid-term Review Report (Final)

Sustainable intensification of maize-legume cropping systems for food security in eastern and southern Africa — Phase II (SIMLESA-2)

CSE/2009/024 (variation 3)
CIMMYT Formal Response

Background

The SIMLESA program commenced in 2010 with the aim of assessing conservation agriculture (CA) practices for maize and legume based farming systems in Sub Saharan Africa (SSA) and having them widely adopted. CIMMYT has been the commissioned agency (lead office, Harare; supporting offices, Nairobi and Addis Ababa) and the National Agricultural Research Systems (NARS) of Ethiopia, Kenya, Tanzania, Malawi and Mozambique are collaborating partners. Australian collaborating partners under Phase I were Queensland Alliance for Agriculture, Food and Innovation (QAAFI) and Murdoch University (WA). The program was reviewed (Mid Term Review) in 2012 which provided a set of recommendations. The program continued in its first phase (Phase I) until December 2013.

This Mid-Term Review is designed to assess the SIMLESA Program over the 3 year period since the MTR 2012, i.e., from July 2012 until August 2015, covering the closing years of Phase 1 and the opening period of Phase II. An end-of-program review was not conducted at the completion of Phase I.

Phase II of SIMLESA commenced in May 2014 and will continue until 30 June 2018. Phase II which is a variation of the project design described in the original proposal, maintained the original five objectives with greater emphasis in each on delivering impact through adoption of technologies in the main five partnering countries, and what are termed “spill-over” countries (i.e., Rwanda, Uganda and Botswana) – countries not included in the original design but which are now partners in a wider SIMLESA network

Both phases of the program employed a management structure of a Program Steering Committee (PSC), a Program Management Committee (PMC), Program Coordinator, and leaders of each partner-country and each objective.

Phase II has a somewhat different set of collaborating partners. ICRISAT, and Murdoch University are no longer formal partners although additional agencies such as ILRI, CIAT and the ARC (South Africa) are now contributors to the program.

Summary and Recommendations:

SIMLESA (I and II) is a complex program with many partner countries, agencies, science disciplines, and objectives. Despite that complexity, the MTR found the program on the whole to be well managed by CIMMYT, and the NARS partners had a strong sense of ownership of the program. It was very evident that the whole SIMLESA team is determined to meet the objectives of the program, to contribute and to work as a team.

The MTR was particularly impressed with the energy and commitment of the program's coordination team, the leadership of the various objectives and the national teams. The input during the MTR of those members of the PSC who were present was very valuable. They too demonstrated their commitment and understanding of the program's many dimensions and the need to deliver outcomes and impact.

Fluctuations in the USD/AUD exchange rate have posed challenges for management, particularly since 2013/2014 and the end of Phase I. From that time the USD value of AUD-denominated payments from ACIAR to CIMMYT commenced their decline of about 30%. This reversed the trend of Phase I when exchange rate movements were favourable to CIMMYT. Between commencement of Phase I (early 2010) and June 2011 the Australian dollar appreciated against the USD by up to 25% compared to the exchange rate in early 2010. It is also noted that the national currencies of participating countries have also depreciated against the USD (to various degrees) since 2014 which has lessened the impact of the AUD decline at national level.

Notwithstanding the exchange rate challenges, SIMLESA II has in most respects successfully transitioned from Phase I with its foci on understanding of systems, developing CA-based Sustainable Intensification (SI) packages and support of commercialisation of new maize and legume varieties, to Phase II which is consolidating the findings of Phase 1 to underpin the adoption target of an additional 650,000 benefiting households.. Nevertheless the MTR suggests that more needs to be done to enable SIMLESA II to deliver its planned outputs by 2018 in such a way that the impact targets of 650, 000 farmers by 2023 are achievable. Many activities that are planned for the coming three years need to be refocussed so that the program can deliver on two major fronts:

- Achieve adoption of SI practices by farmers through the Agricultural Innovation Platforms (AIPs) and other pathways.

- Use program results to contribute to national and regional policy dialogue.

There is a need to rebalance plans and activities of all the program objectives, and the various program-wide themes. The program should ensure that the science which underpins the development of SI packages and policy dialogue is completed and published in extension reports and peer-reviewed literature. It should also refocus its Monitoring and Evaluation (M&E), communication plans and gender activities. To achieve these changes, each country and the Program as a whole should prepare a revised work plan within the approved budget through to the end of SIMLESA II. The program will then be able to make an informed decision on what to prioritise and what needs to be phased out, avoiding the risk of leaving un-

finished tasks at the end, due to lack of time and finance. If there is insufficient time or resources to complete an activity, consideration should be given to terminating it now or not starting it.

SIMLESA II should not become over stretched. It must continue work as a research-for-development program that will deliver pilot scale-out through its modest, but significant number of AIPs and other channels such as those of the various national agencies. It should not attempt to transform itself into a development program, but rather inform the design and implementation of other programs and policies. The progress of scale-out through AIPs will be supported by the Competitive Grants Scheme (CGS). However the CGS has limited resources and it will be best to focus them on supporting priority activities in selected AIPs.

SIMLESA I and II achieved a great deal. It has built an energetic, committed team including the NARS (including universities), PSC members, CGIAR, AIP members and some from the private sector. It has delivered impressive results in capacity building and science. Its final three years should be spent on synthesising and documenting research results and working towards its impact goals by being willing to make hard decisions on priorities and re-allocating resources accordingly.

The future of the SIMLESA or at least its impact and influence beyond 2018 is very much dependent on the delivery over the next 3 years. Measureable progress in adoption of SI interventions across target numbers of households in multiple locations across eastern and southern Africa by 2018 would provide a strong argument for continuing investment by ACIAR and /or other donors to use the lessons from that scale of success to underpin even wider adoption of SI.

Overarching Recommendations

Recommendation 1: Program Data and Documentation

1.1 SIMLESA, in conjunction with all partners, urgently develop and implement a data management policy that addresses quality assurance, archiving, annotation, ownership, and access to current SIMLESA partners and to the wider research community post-SIMLESA.

Response: CIMMYT has a new data management policy in place and it will be applied to SIMLESA accordingly. SIMLESA acknowledged the need for a comprehensive data management policy and responded promptly by sending the M & E Specialist for training for data management (facilitated by Gideon Kruseman, CIMMYT Ex-Ante & Foresight Specialist) where all data collected by the CIMMYT socio-economic program was identified and organised in some uniform way for easy access and retrieval. The process is still going on until all the data sets have been put in one repository.

Recommendation 2: Program management

2.1 The PMC should ensure that it takes appropriate steps to support SIMLESA II to achieve its objectives by taking a more active role in the program management over the remaining life of the program. Special attention should be given to ensure delivery of milestones as per contract, and to prioritising activities and resources for impact.

Response: Valid point to ensure project success. SIMLESA is deliberately prioritising its activities based on the desire to achieve the greatest impact with the available resources. The April scheduled mini ARPM is a deliberate step in that direction.

2.2 ACIAR and the PMC should review and where appropriate, revise, SIMLESA II plans and budgets in accordance with the recommendations of the MTR. ***(Agree)***

Recommendation 3: SIMLESA's role in formulating policy:

3.1 SIMLESA should approach policy practice as an 'action-learning' process, using SIMLESA data and AIPs to inform policy dialogue. ***(Agree)***

Response: The report mentions limited engagement in policy dialogue. In SIMLESA- 1 there was no planned policy activity. However, engagements of policy makers through policy dialogues were suggested in SIMLESA 2 through the facilitation by ASARECA. MTR report does not mention the new ground SIMLESA is engaging policy-makers and zeroing in on actions point options for implementation by diverse actors. There is a feeling that the policy forum held in October last year in Entebbe, Uganda is one huge step in engaging with policy makers that the report did not capture. A series of policy briefs were developed presented and discussed at the meeting. In 2014, 6 CIMMYT policy briefs summarizing empirical work in SIMLESA were published and extensively shared in Adoption Pathway meetings. ASARECA is expected to organize another round of policy dialogue in collaboration with CCARDESA which offered to host the meeting.

3.2 SIMLESA should avoid declaring policy or providing policy solutions. Rather it can be a more powerful agent for policy reform by providing advice to policymakers in the form of evidence-based analysis of options including their actual and/or expected distributional effects, and implications for inclusive development. ***(Agree)***

3.3 The program should go beyond the financial analysis of technologies undertaken so far, and extend that into economic analysis as a powerful tool for informing policy-makers (e.g., on economic implications of subsidies and other public investments). ***(Agree)***

Response: Objective 1 teams are expected to initiate a series of economic analysis of SIMLESA SI options to improve the financial analysis undertaken so far.

3.4 SIMLESA should take greater advantage of the influence of PSC members, some of whom are senior policy-makers, for direct engagement in the policy discourse. ***(Agree)***

Response: SIMLESA is making sure that there is PSC representation in all its strategic meetings to also increase acceptance and buy in of all the program work. The strategy of full engagement of PSC members is also viewed from a programmatic perspective as a way of promoting sustainability of program products.

Recommendation 4: Monitoring and Evaluation

4.1 The program's monitoring and evaluation should be built on defined outcome, adoption and impact indicators that reflect targeted impact on 650,000 households by 2023 through combinations of technologies adopted and years of practice change.

Response: It is agreed and acknowledged that the definition of 'reach" should be critically looked through a consultative process with objective leaders particularly Objective 1, 2 and 4 so that there is a robust and shared understanding of what is being measured. Deliberate efforts are going to be made to include impact indicators that reflect combinations of technologies adopted and years of practice. The planned 2016 Adoption Monitoring Surveys could be used to track these indicators and get improved understanding of SIMLESA program performance

4.2 M&E should also be strengthened to consider institutional and capacity outcomes, and appropriate analyses that can inform this and future SI initiatives in Africa.

Response: It is also agreed and acknowledged that the M & E system needs to be strengthened that is why the M & E desk has already initiated the process of compiling a comprehensive and deployable revised plan before the expiry of the first quarter of 2016. The MTR noted that the indicators presented in Addis were largely at process and output level while outcome and impact indicators were thinly articulated so a deliberate approach in being put in place to populate outcome and impact indicators in 2016 to 2018. M&E Focal persons from the NARS are now extensively engaged to assist in the collection of the required data.

Recommendation 5: Communication

5.1 SIMLESA should develop and implement a revised communication plan that includes particular focus on providing support material for influencing national policies, and supporting the AIPs in their role as important vehicles for adoption of SI technologies/practices. ***(Agree)***

Response: A revised communication plan seeking to provide information to influence the success of SIMLESA activities has been compiled in liaison with the CIMMYT Head of Communication. The plan will be ready for implementation during the 2016-2018 period.

5.2 Extra efforts should be made to ensure that the SIMLESA website is continually updated to include the breadth of outputs and data coming from the program.

Response: SIMLESA Website was revamped, and currently updated and it is work in progress hoping to put it in perfect position before end of April 2016. The website now has the latest products- policy Briefs, SIMLESA Bulletin (December 2015) and other updates and upcoming events to inform progress in program implementation.

Recommendation 6: Science

6.1 The focus on science should be to complete field research and progress that to peer-reviewed publication and extension reports especially where the findings directly underpin the SI packages being recommended and associated policy implementation.

Response: ***Attempts to encourage NARS partners on publications have been made but received limited responses in most cases. SIMLESA is exploring means of carefully designing a strategy that incentivises NARS partners to value these scientific outputs and meaningfully contribute to generation of these. CIMMYT and other scientists from technical partner organizations are encouraged to take a proactive role to ensure that a series of publications including peer reviewed journal articles, synthesis reports indicating lessons learned from the implementation of SIMLESA activities under the different objectives. These efforts will enhance the program's capacity to leverage its profile and inform policy makers and donors.***

6.2 The PMC should carefully review SIMLESA II research plans to ensure that the experimental program is focussed on completing existing work and providing essential knowledge required for fulfilling the program objectives. Non-essential research should not be commenced***. (Agree)***

Response: The April scheduled mini ARPM seeks to finalise the revised SIMLESA -2 research plans to ensure more focus as well as to be in line with the available resources. The mini ARPM expected outputs include: streamlined activities, identified set of documents and publications for the remaining life of the program, and a rolling out plan for the competitive grant scheme.

6.3 The livestock component should be redesigned to align it with the program's objectives. Given the small amount of time remaining, it should be fast-tracked so it can add value to the implementation in AIPs.

The response from ILRI is a detailed one and there is a need to have a joint discussion between ILRI, ACIAR and SIMLESA PMC chair to ensure MTR recommendation is implemented which calls for a redesign of ILRI's proposed activities.

Response: Livestock studies should not only focus on diagnosis of generally known challenges but should also look at technologies that can be applied directly to bring about desired crop-livestock integration using experiences from other projects eg ZimCLIFS

ILRI's Response: The report is, on the whole, positive. This should be encouraging for us as a project team as we move to complete Phase II. ILRI will address a number of specific points below but, in general, felt that there is a need for more specificity around some of the review's recommendations vis a vis livestock research in SIMLESA II. There are areas in which according to ILRI the review team clearly missed some of the key outputs from the livestock component to date.

So, in response to what ILRI see as the specific key issues raised:

Move from a focus on livestock keeping to livestock production. This recommendation represents a misunderstanding of what ILRI have been doing. The work of the livestock team is based on establishing current use patterns of organic resources for livestock (principally as feed) and identifying opportunities to make more efficient use of these – either through reallocation or augmentation – to increase the productivity of the livestock enterprises in our target systems. As with much of our other work on sustainable intensification, this is all about shifting from keeping / subsistence to marketable production surpluses. This work on feeding is not being conducted in isolation and, as we move forward with the workplan, the fact that we have been focusing on the wider contexts of resource use will help to strengthen the systems perspective of SIMLESA II as a whole. We have emphasised this in all our documentation and presentations within the project but the review team seems not to have picked this up. As this misperception underpins the recommendation to redesign the livestock component we request more detail from the review team on why, what and how.

Better feed-in from ZIMCLIFS findings. ILRI has been leading a number of increasingly successful systems projects with a focus on the sustainable intensification of mixed farming systems. The report rightly identifies ZIMCLIFS as one of these and, having played a leading role in the project design team for ZIMCLIFS, ILRI retain a strong personal interest in that project. ILRI team was happy to spend a week with the project team earlier in the year (2015) and was able to see some of the innovations that ZIMCLIFS has identified and is starting to promote more widely. The organization also

plans to host some members of the ZIMCLIFS team in Ethiopia so that they can see at first hand some of the successes of our Africa RISING project. At this point it is important to note that, due to delays in finalizing agreements, the livestock component in SIMLESA II started around March 2015 as a result ILRI have not reached the point of the feeding trials in the workplan; ZIMCLIFS operated on a similar time frame. Exchange visits, short trainings on feeds and feeding based on need will be planned in future. From organizational experience one of the most promising ZIMCLIFS innovation for wider dissemination would be the substitution of alternative biomass sources for soil augmentation and we hope that this would proliferate through SIMLESA II and that the agronomy teams would pick this up. Stronger mainstreaming of a systems approach in SIMLESA II would stop this kind of option from apparently falling through the cracks

6.4 The program should place particular emphasis on quantifying the benefits of SI packages and their components with respect to climate variability, risk and gender.

CIAT's Response: The MTR report is fine from the soils side that CIAT is working on. As emphasized in the document, there is need to document the methodologies and results of the good SIMLESA work in scientific literature and CIAT is committed to strengthen this area. CIAT understand the need to refine the SI practices especially with regard to nitrogen and residue management and will continue to generate science-based evidence for this. In Tanzania CIAT has initiated analysis of soil samples from the long term and exploratory trials to understand the effects of the SI treatments on soil dynamics.

Recommendation: 7: Partnerships

7.1 SIMLESA should put greater emphasis on engagement with the three associated ACIAR projects (FACASI, Adoption Pathways and ZimCLIFS) to assist it in refocussing some key research areas such as livestock and mechanisation. ***(Agree)***

Response: SIMLESA believes strongly that synergizing with other existing ACIAR supported project brings more benefits and avoid duplication of roles. Lessons on crop livestock integration from ZIMCLIFS and adoption analysis findings from the Adoption pathways will be integrated in SIMLESA's implementation plan for 2016-2018 period.

7.2 SIMLESA should strengthen partnerships beyond the research domain. These should include partnerships with Ministries of Agriculture and major development finance institutions (IFAD, AfDB, WB, EU, USAID, BMGF etc.) so that SIMLESA concepts, principles and technologies can be scaled-out through investment programs financed by and implemented through the Ministries and their financiers. ***(Agree)***

Response: SIMLESA's approach is already having a spillover effects on the design of bigger bilateral in Malawi (Sustainable Agricultural Practices-SAP- IFAD funded project which is now promoting SI options generated by SIMLESA Malawi and other CIMMYT CA projects). Sustainable intensification

components of World Bank supported projects i.e. Agricultural Productivity Program for Southern Africa-AAPSA are also benefiting from the SIMLLSA approaches.

Recommendations relating to specific objectives

Recommendation 8: Objective 1

8.1 The information generated under Objective 1 must not simply be recorded in a descriptive form. It needs to be analyzed to provide a synthesis for publication and dissemination as part of SIMLESA's knowledge management framework to ensure that Objective 1 makes a stronger contribution to:

- Incorporating the baseline situation analysis within the M&E framework;
- Informing the policy analysis work, especially with regard to identifying SI adoption constraints and options for addressing these;
- Identifying evidence based understanding of how SIMLESA scaling can be designed for maximum impact
- Generating further insights into the risks associated with various SI options and adoption pathways and how farmers respond to these.

Response: Objective-1 studies are the most cited and published in refereed international journals as indicated in the publication list. Many of these studies are quantitative that employed econometrics and modelling tools.

8.2 The Objective 1 team should develop a risk reduction options framework that includes both crop and livestock system components and their interactions that can be used to assist decision making in the AIPs and policy dialogues. ***(Agree)***

Response: Analysis of risk strategies and scaling out plans and targets are planned for upcoming seasons.

Recommendation: 9: Objective 2

9.1 The SI practices for scaling-out should be documented as soon as possible so that they provide the basis for scaling out under Objective 4.

Response: Scalable technologies have continuously been reviewed and updated from ongoing experiments while some were adopted from previous studies in each locality. It is expected that the upcoming ARPM would finalize the scaling out strategy, contents and targets.

9.2 SI technologies/practices appropriate for widespread dissemination through national extension systems, NGOs and the private sector should continue to be refined and adjusted through trials and demonstrations.

Response: This continues with the inclusion of newly released maize and legume varieties in the out scaling objective.

9.3 SIMLESA should undertake a literature review and focussed discussions with practitioners to identify emerging or potential pest, disease and weed threats with a view to initiating mitigation measures through the SIMLESA team or other agencies/ specialists (e.g. ICIPE). ***(Agree)***

9.4 There is a need to identify and integrate livestock practices that address the critical issue of crop residue management and opportunities for transitioning livestock "keeping" to livestock "production" and new sources of income.

Response: It is expected that ILRI studies would contribute to this subject and lessons from ZimCLIFS and other crop-livestock projects implemented elsewhere

9.5 The biophysical and participatory research methodologies used in identifying and refining the recommended practices should be documented in the scientific literature and/or in program reports) as information sources for future programs of an analogous nature. ***(Agree)***

Recommendation 10: Objective 3

10.1 Seed production for legumes (both grain and fodder) should be given a high priority, and a plan should be developed as soon as possible on where and how delivery of legume seed to farmers can be scaled-up before the end of the program. This plan should be based on other successful legume seed production programs in the region.

Response: Work plans to implement a legumes seed production scheme are being developed in collaboration with TL3/ICRISAT scientists

Recommendation 11: Objective 4

11.1 The CGS and the Objective 4 team members should prepare a comprehensive scaling-out plan that harnesses appropriate program elements and associated activities of public, business and NGO organizations that support scaling-out. Particular focus in the plan should be given to gender, M&E and communication. ***(Agree)***

11.2 AIPs should be regarded not only as a mechanism for adoption of SI systems, but also should be monitored and recorded, for learning and improvement, and provide lessons for good practice options as public good knowledge contribution. A key part of this would be providing information on the likely benefits and risks with respect to gender from introducing various SI practices. ***(Agree)***

11.3 Although the AIPs will continue to be an important vehicle for scaling-out, in some situations national extension systems, agri-business and NGOs have the capacity to take a meaningful role in the scaling-out process. Data, evidence and lessons (including do's and don'ts) from AIPs need to be gathered, analysed and reported so that they can inform scaling-out efforts through all channels.

Responses: SIMLESA Innovation Systems staff, ACIAR and KARLO developed a guideline that is being used by partners. Additional tools are almost ready for use and will be discussed at the mini ARPM.

Recommendation 12: Objective 5

12.1 Capacity building should continue its current commitments for post-graduate students but focus new training on improving the broad range of skills that will be required to directly support scaling-out of the SI technologies/practices in each location/country. The priority skill sets will likely range at least from AIP facilitation and governance, to agronomy, systems analysis, communication and extension. ***(Agree)***

Response: ARC is identified as SIMLESA capacity building partner and will continue to support demand driven on the job training activities. QAAFI's support in capacity building in the areas of SMS applications for scaling out SIMLESA practices will be further strengthened.