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Contents

1 Progress summary

This annual progress report outlines activities under the Sustainable Intensification of Maize-Legume Based Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) program from July 2016 to June 2017. The program is being implemented in five core countries, namely Ethiopia, Kenya, Tanzania, Malawi and Mozambique, and in three spillover countries, Botswana, Uganda and Rwanda. The main objective of the project is to sustainably increase the productivity of selected maize-based farming systems in each target country in eastern and southern Africa by 30% (from the 2009 baseline average) by the year 2023. At the same time, the program is expected to reduce seasonal down-side production risks by 30%. 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.[1]

SIMLESA is envisaged to reach 650,000 small farming households in the five core countries by 2023. The second phase of the program (SIMLESA II) was launched in July 2014 with modified program objectives and exploring the scaling out of the evaluated technologies and livestock integration through various novel development partnerships.

The 2016 Adoption Monitoring Survey report estimated 61,889 farmers (43,000 males and 18,489 females adopted at least one sustainable intensification technology (use of improved varieties, minimum tillage, maize-legume intercropping, rotation and residue retention) bringing an estimated cumulative figure for 2016/17 season to 235,422 farmers, which is 91% of the target adoption figure. The expectation for the 2017/18 season is that targets will be exceeded with the implementation of the competitive grants scheme.

A well-attended SIMLESA regional conference with over 100 participants took place on 19 – 22 June 2017 in Arusha, Tanzania. The conference entitled '*Taking stock on Sustainable Intensification Research for Impact in Eastern and Southern Africa: Implications and Strategies for the Future' (See Annex 1)*. This was an opportunity to review what has been achieved by the impactful program to date and plan for a follow up program with even more benefits. Drawing from the results presented at the conference by NARS coordinators, the SIMLESA program has witnessed an average yield increase of 30-60% from conservation agriculture-based sustainable intensification technologies implemented both on-farm and on-station. This resonates very well with the program's aim of increasing productivity by at least 30%.

A total of 268 and 378 maize and legume Participatory Variety Selection (PVS) trials, respectively, were conducted where best performing varieties that met famers' preferences were identified and selected for scaling. The varieties were selected based on grain yield, maturity, drought tolerance, pest resistance and palatability. SIMLESA is working with 42 seed companies to produce and disseminate seed. During the period under review at total of at least 22, 000 tons of seed maize was made available by the seed companies to smallholder farmers across the five core SIMLESA countries.

In addition, 58 local innovation platforms have been strengthened and are functioning in the SIMLESA countries as farmer groups, partners and other key stakeholders share knowledge on good agricultural practices, market linkages and value chains. In 2016, the competitive grants scheme was initiated to competitively select 19 partners with different expertise mix (ICT, media, seed production and knowledge management) to drive the scaling out of sustainable intensification technologies. The 19 partners have since received resources and are now implementing the agreed scaling out activities.

The Monitoring, Evaluation and Learning Unit continued to articulate program performance in line with the 2015 Mid Term Review recommendation to look at performance beyond numbers. The focus is now to get a clear understanding of how SIMLESA has impacted on the capacity and actions of national agencies, beyond numbers trained or reached.

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[1] *Partners 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).*

Lessons learned by CIMMYT and the benefits accrued to national partners from implementing such a complex multi-country program need to be measured and continued to be documented, especially at this stage of the program.

During the period under review, one PhD student and two MSc students from Mozambique supported by SIMLESA completed their studies. A cumulative total of 65 masters (42) and doctorate students (23) have been supported under SIMLESA and Australia Awards Scholarships. QAAFI, ARC and SIMLESA NARS partners conducted trainings on SIMLESA SMS platform and in Biometrics in Kenya and Tanzania. To ensure effective communication, the SIMLESA website was revamped and updated to reflect the breadth of program activities and achievements. In addition SIMLESA bulletins, briefs and flyers were produced during the period under review. Up to now, SIMLESA has produced 130 publications, 21 policy briefs and various communication products including national-level media coverage, national, regional and international conferences and participation by partners in meetings and field days.

The report articulates SIMLESA impacts, challenges and opportunities. Details of program activities are summarized in this report with numerous attachments which include; 'Voices from the Field' book *(Annex 2)*, SIMLESA Pre Partners Conference report *(Annex 3),* Competitive Grants Scheme (CGS) report *(Annex4)*, technical reports, bulletins, consolidated log frame update, Progress reports, among others, such as SIMLESA: The Africa Long Walk to Sustainability, Resilience and Climate Smart Systems *(Annex 5*), Monitoring, Evaluation and Learning report *(Annex 6)* and conference presentations. Program progress details are articulated in subsequent sections in this report.

2 Achievements against project 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.

No.	Activity	Outputs/ milestones	Completion date	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-1 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 in progress to populate a web-based database of CA-based intensification options and will be accelerated for completion before end of program. SIMLESA website now up and running and is being continuously updated. Stock taking of SIMLESA 1 experiences have influenced the compilation of 8 policy briefs. These have been and continue to be shared widely *(Annex 7)* Currently, further work is ongoing to complete country synthesis reports.
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	Eight technical briefs published on SIMLESA website. Results of 2016 Adoption Survey are being further analysed to see the implications of CA-based options on crop failure. A SIMLESA synthesis book is being drafted with proposed completion in 2018, More policy synthesis and national policy roundtable are planned for last quarter of 2017 in Ethiopia and Malawi and more in 2018.
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	Empirical results published in 2015 (in collaboration with Adoption Pathways Project) showing that by engaging a composite of SI technologies, there is 30-40% risk reduction in producing particularly in Malawi. More analysis for Ethiopia, Tanzania and Kenya are ongoing. Draft Report from PRA analysis in Mozambique are completed.

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. The 2016 Adoption Monitoring Survey gives an estimated figure of over 61,000 adopters and a cumulative figure of 235,422 farmers. Further analysis ongoing to identify and document best-fit adoption and impact pathways. Mozambique also conducted a Drought Risk Perception, Impact and Adaptation Measures study in 2016 using PRA tools.

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

No.	Activity	Outputs/ Milestones	Completion date	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	Number of on farm exploratory trials conducted and data analysed.	2014-2018, findings reported annually	Done and on-going. A total of 492 out of 327 targeted exploratory trials were established, characterized and evaluated and farmers have been using them since 2014. These trials include 116 in Ethiopia, 48 in Kenya, 231 in Tanzania, 51 in Malawi and 46 in Mozambique Results across the 5 countries have shown that CA based technologies are leading to an average yield increase of 30-60%. In Tanzania CA option (minimum soil disturbance, use of herbicide for weed control, water harvesting through ripping under intercropping of maize and common beans and use of fertilizers) has enabled timely planting, saved farmers' time by 50% and increased yield by 40%.

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 options every year	Number of improved maize legume and forage/fodder suitable for CA based system identified	2014-2018, findings reported annually	SIMLESA-2 initiated activities addressing maize-legume-livestock integration. The livestock initiatives were led by ILRI in Ethiopia and Tanzania. In Mozambique trials testing the inclusion of the forage grass Brachiaria spp. as intercrops for soil cover and forage purposes was initiated at Sussundenga Research Station. Bulking of seed is also underway at Sussundenga. Several trials incorporating Brachiaria were also incorporated in Eastern Kenya. ILRI conducted participatory evaluation of 11 grass and legume fodder options in Ethiopia including Brachiaria spp, Pennisatum spp (Napier and Desho grasses), cow pea and lablab-maize intercropping, lupine, Pigeon pea, Sesbania and Leucaena. In Tanzania a menu of forage innovations were identified through stakeholder-driven processes for different agro-ecologies in Mbulu and Karatu districts, which included accessions of Brachiara, Napier, Rhodes, and Dismodium; as well as by-product feeds, and feed conservation and processing practices. *(Annex 9)* 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 identified for scaling. Improved maize and legume varieties have been identified for different agro ecological zones. Farmers are being exposed so that they make informed decisions.
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	Country work plans were developed during the reporting period. Work is still in progress to define strategies to smart-sequence and integrate CA-based intensification options.

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	Long-term trials continued and were reorganized in some countries. In Mozambique new long term experiments addressing challenges with termites on soil cover provision were initiated while new initiatives on weed management were tested. Results from the long term experiments generally confirm on-farm findings on the improved yields under maize-legume rotation systems. The benefits of CA in terms of moisture conservation and consequently water productivity are apparent in most of the studies conducted in the five countries.
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	One trial which is still on-going was established at Chitala in which some 20 varieties were tested under CA and conventional tillage. More than 22,000 tonnes of suitable varieties of maize and legumes have been identified for CA-based systems for each of the participating countries. These have been channelled through at least 42 seed companies New variety on-station trials were established in Mozambique and Malawi to address diseases and pests in CA during the reporting period.
2.2.5	Testing and refining the value of existing seasonal climate forecasting (risk) 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.	2015-2018, adjusted annually	Done and on-going A collaborative work plan was developed for the strategic implementation of activities 2.2.5 and 2.2.6 across environmental gradients and time in Eastern and Southern Africa. These activities are aligned with Australian activities 2.2.7 and 2.2.8 for the benefit of both African and Australian farmers. One publication (Nyagumbo et al., 2017) based on modelling CA on six locations in Southern Africa highlights the advantages of mechanized CA on timely planting and thus opportunities for coping with climate variability induced dry spells

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

No.	Activity	Outputs/ milestones	Completion date	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	Completed but periodically revisited. Prioritisation of varieties has been completed for all participating countries, and have reviewed annually as planned e.g. in Tanzania 2 hybrids TZH 538 and TAN 600 were released by SATEC and TANSEED INTERNATIONAL respectively, (SIMLESA partners). VUMILIA K1 released by SARI were recommended for scaling out by partners.
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	SIMLESA is continuing to produce seed varieties which suit different environments. Tanzania some legume varieties were bred and released during the reporting period, i.e. Pigeon pea variety: Ilonga m 14-2, Ilonga m 14-1, Karatu 1 and Kiboko. Other promising lines in pipeline are ICEAP series 00056, 00936 and 576-1. Cowpea variety: Raha 1 and Raha Common beans: Jesca and Lyamungu 90

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	ILRI developed a plan. Few best bet forage/fodder species and utilization practices have been identified in Tanzania and Ethiopia In Ethiopia eleven forage species (both perennials and annuals) were screened through on-farm demonstration and participatory evaluation across seven districts of the SIMLESA sites. Adaptability, productivity, multi-functionality and suitability for integration in the cropping system were used as the main criteria for selection by farmers. In Tanzania, using similar stakeholder driven process, different forage menu were identified for two districts. These included grasses (Bracharia mulato II; Rhodes grass; Napier grass - KK1, KK2, ILRI 16837, and ILRI 16835); legumes (Desmodium, Lablab, Vicia, Mucuna, Cowpea) and intercrops (KK1/Vicia vilosa; KK2/Desmodium; Bracharia/Desmodium; ILRI16835/Vivia vilosa; ILRI 16837/Desmodium; Bracharia/ Lablab; KK2/Desmodium). The forage options identified were subsequently scaled out to over 4800 smallholder farmers across the two countries. Identification of best bet forage/fodder species needs to be scaled to other countries

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

No.	Activity	Outputs/ Milestones	Completion date	Comments
4.1.1	Formulation and advocacy of policy options to address institutional constraints for CA-based intensification options	Policy brief(s) and other advocacy materials on institutional innovations for CA based intensification. Policy workshops	June 2017 March 2016 June 2015; Dec 2016	Policy briefs used to influence action on CA-based intensification options. During the reporting period 8 policy briefs were produced. *(Annex 8*) This brings the total number of briefs to a cumulative figure of 21.

4.3.1	Annual competitive and commissioned grants to bring in new partners to scale-out CA-based intensification options in each of the SIMLESA countries (grants protocol includes a commitment to data collection for comparative research into scaling out models)	CA-based sustainable intensification (SI) portfolios scaled-out by new partners. Inclusive methods and tools applied, and thousands of marginalised households, women and youth applying SIMLESA portfolios. Essentials of research-in development strengthened by the systematisation and application of scaling science to guide efficient extension of SI portfolios at scale. Linkages between research and scaling organisations strengthened; innovative partnerships formed and contributing to sustainability of SIMLESA benefits at the landscape. Increased capacity to innovate, catalysed by CGS funding, new knowledge, and skills (i.e. novel concepts and tools simplifying research products for inclusive sharing). *AIPs* further strengthened, esp. through diversification of scaling and sustainability concepts from organisations from outside traditional (R&D) partnerships. Emerging lessons for sustainable scaling, critical for guiding future funding modalities and ***policy*** on targeting diversity of needs at national level.	2016-2018	The competitive grants scheme for scaling out was developed in consultation with ACIAR. Twelve partners were competitively selected in 2016, while seven were commissioned in Ethiopia. Ethiopia – 7 zonal extension offices Kenya – a university, seed co. media and church org. Malawi – a farmer org. and a radio-focused company Mozambique – a business-focused NGO, farmer org, an ICT-focused College. Tanzania – an ext. NGO, a seed company and a farmer org/ network of farmer groups Initial trends show around 150,000 men~ and women-headed households have been verifiably reached. Due to delays in initiating the programme, Ethiopia will only have one year of CGS implementation. However, there is much more scale and intensity of work, which is likely to result in comparable outcomes to Kenya, Mozambique and Tanzania. Short nature of this scheme (like others) means documentation will be curtailed, esp. upon completion unless a follow-up research activity is provided for fuller lessons. ME&L only will not provide inner lessons. These also need to emanate from emic project reflections. This is critical for medium- to long-term research agenda and policy.
4.4.1	Develop SMS-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 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.	SMS services established in at least three SIMLESA countries	2016	Tanzania, Kenya and Mozambique were identified as high potential countries for SMS services. National teams for local management of message content and delivery were formed in conjunction with local CGS partners. System upgrades were facilitated by QAAFI partners based on national team feedback. Subscriber numbers have increased by more than 100% in both Tanzania and Mozambique. 2466 messages were sent in June 2017. Strategic partnerships are being pursued with CGS partners in Malawi and Ethiopia to share SIMLESA messages through local automated voice and message services. *(Annex 10)*

4.4.2	Development of gender sensitive, user-friendly leaflets (visuals, local language) on specific CA-based intensification practices, for farmers, agronomists and agribusinesses	Developed user-friendly informative leaflets for different stakeholders.	2017	Leaflets have been developed and tested under other CIMMYT Projects (CCAFS). Project partners were in 2016 consulted, for development to further strengthen leaflets that contain specific CA-based intensification practices information, and disseminate them widely
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	Done and on-going. Communication within SIMLESA is being fostered through regular meetings and workshops, including the annual meeting for all project participants (most recently Arusha, June 2017)

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

No.	Activity	Outputs/ Milestones	Completion date	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	65 students have been trained in SIMLESA (Phases 1 and 2); 42 MSc level, and 23 PhDs. Technical training is being provided in socio-economic research and in systems agronomy. Farmer trainings were continued during the reporting period to increase efficiency at farm level.
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	Country-specific training needs have been identified and short courses were done in 2016/17 at country level. In Tanzania, ARC conducted short course training on Statistical Guidelines and Statistical Consultation at Moshi Cooperative University (MoCU), during 13-17 February 2017. 18 researchers (10 M and 8 F) were trained. Each participant was able to analyse his/her data from the SIMLESA on station and on-farm trials. (Annex 11)

3 Impacts

SIMLESA, through the adoption of conservation agriculture-based based technologies (particularly the use of improved seeds and better agronomic practices), has impacted positively on smallholder farmers in its sites by increasing maize yield from an average of 1.5 t/ha to about 4 t/ha among project farmers. Legumes have witnessed a yield increase from less than 1 t/ha to about 2 t/ha. Taking these results to scale will therefore impact food security and livelihoods in a large way. This has led to improved food and income security at household level. Field activities were complemented by strong institutional and human capacity building activities embedded in SIMLESA. Researcher, extension and partner staff benefited from long (23 PhD and 42 MSc degrees) and short term courses as well as provision of agriculture equipment (hardware). This has led to improved performance at farm level by virtue of using more efficient and effective methods of farming. Among conservation agriculture-based practices, crop diversification with legumes has brought dual impacts by enhancing productivity, and reducing the downside risk in maize production on plots planted to improved maize and/or chemical fertilizer.

Besides improving both food and income security at household level, SIMLESA has also managed to strengthen the family fabric by facilitating the participation of women and youth in sustainable intensification technologies. A study of youth's perception and participation in agriculture in Central Mozambique, done between October 24 and November 14, 2016 confirmed an improvement in youth participation by at least 15% compared to the 2010 baseline.

At least 42 seed companies benefited in the development and marketing of their varieties via SIMLESA. In Tanzania, SATEC, a seed company, developed and released the maize hybrid TZH538 which is the best variety chosen by farmers, and is being scaled out together with other best agronomic practices. As a result, SATEC is benefiting from increased sales of this variety.

In addition, the SIMLESA approach involving engagement of local partners and backstopping by CG partners has been institutionalized in most of the countries while other key regional development partners have also taken on the approach. The SIMLESA approach and principles have been embraced widely among governments, donors and other stakeholders in ESA to test and scale SI portfolios comprising climate smart agriculture (CSA) *(Annex 13)* options, evidences and benefits, for example,. APPSA in Mozambique, SIMLEZA in Zambia, SAPP in Malawi, among others.

How has SIMLESA technology packages and approaches been institutionalized?

Through projects and work of national agricultural institutions: SIMLESA's approach of working with national research organizations in each country has contributed to the project's results being recognized and used by institutions in the project countries. For example in Malawi the SIMLESA technologies involving maize and legume varieties have been taken up by the IFAD funded Sustainable Agricultural Production Programme (SAPP) focussing on sustainable intensification based CA systems and improved maize and legume seed access and the World Bank funded Agricultural Productivity Programme for Southern Africa (APPSA). In Malawi, a CA guide building on SIMLESA's CA-based research results has been produced for use by scientists, extensionists and farmers. In Mozambique the SIMLESA framework has been taken up and replicated in related projects such as APPSA and others supported by AGRA. In Kenya, the Kenya Agricultural and Livestock research organization (KALRO) has also domesticated SIMLESA manuals. In Ethiopia the government has already requested SIMLESA to support the development of policy briefs based on SIMLESA's findings that will be used to institutionalize this approach for scaling purposes. In Kenya the recently released Climate Smart Agriculture strategy (http://canafrica.com/wp-content/uploads/2017/05/) aligns well with SIMLESA's current and future initiatives.

In Ethiopia a project funded by the Norwegian Development agency and focused on upscaling CA practices is being implemented using CA options tested under SIMLESA research. In addition, seven farmer training centres in Ethiopia have also embraced the SIMLESA portfolios. The SIMLESA technology packages and work framework has also been adopted by several organizations in southern Africa such as the USAID SIMLEZA project in Zambia, IFAD SAPP project in Malawi and Tanzanian ministry of agriculture is also using SIMLESA principles in its official R&D country strategy.

In Rwanda the Innovation Platforms approach was extensively applied at scale to disseminate various sustainable intensification technologies while in the Eastern Cape province of South Africa the Agricultural Research Council is also applying the SIMLESA framework. Capacity building initiatives in SIMLESA spread all the way from the farmers to technocrats within the implementing NARS institutions. Trainings were tailor made to suit skills gaps in each country. Linkages with advanced research institutes in Australia and well recognised regional institutions such as the Agricultural Research Council facilitated most of these trainings.

Through Private Sector Engagement: Some of the institutional efforts involve the private sector. In Mozambique for example a scaling partner AGRIMERC has now effectively linked scaling farmers to maize markets thereby providing incentives and creating a demand for the cropping technologies, an outcome of the Competitive Grant Scheme now with 13 organisations using and promoting SIMLESA Portfolios/ approaches across the region and 7 zonal offices of Ethiopia Extension system using, promoting SIMLESA approaches.

Through Regional Initiatives: A major institutionalization effort was a Policy Forum in October 2015 held at Entebbe, Uganda involving Ministry of Agriculture representatives from seven countries in East and Southern Africa. This led to the Entebbe declaration of 2015 ratified by representatives of the seven countries. The resolutions focused on the need to open cross border trade, seed sector harmonization, institutionalise the sustainable intensification of agriculture as a basic agricultural development approach.

The institutionalization of the SIMLESA approach by several research and development players in ESA paves the way for sustainability of both the technologies and the approach as an effective research, development and scaling strategy in the region. The SIMLESA approach led to significant contributions to the research and development capacity of NARS partners through empowering them to manage large scale projects such as SIMLESA. Institutionalizing CA-based sustainable intensification in the agricultural production systems require interventions at different tiers addressing the technologies, farmer engagement approaches as well as input and output market interventions. As a result, institutionalizing SIMLESA's experience in the national systems requires exploiting synergies among researchers, extension, farmers and development partners.

3.1 Scientific impacts

The 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 resonated well with the CIMMYT50 years (1966-2016) celebration theme in September 2016.

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 demonstrations, continued to be easily understood by small-scale farmers. These have provided data that has been statistically analysed, producing 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 through the 2015/16 Adoption Monitoring Survey. This is a way of monitoring the efficiency of SIMLESA scaling out strategies and impact pathways as a vehicle for assessing viable options for transforming the lives of the smallholder farmers. The results produced across the five countries have been shared to inform the current SI adoption rates. There are a number of success stories which have been documented during the period under review. This is part of evidence of SIMLESA impact on the communities through improved food, nutritional and livelihood security.

In line with the program design, SIMLESA continued to embark on an extensive experimentation drive to assess the longer-term benefits of conservation agriculture compared to conventional farming systems. It has been concluded that CA-based SI offers sound options that can easily be implemented by farmers so long as information (extension) and market institutions work well. It is against this background that the general

recommendation was made to scale up 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. Key among out scaled CA based technologies include:

- Good agronomic practices (recommended planting configurations, timely planting and weeding, use of fertility ameliorants and disease and pest control)
- Use of improved maize and legume varieties
- Use of legume rotations or intercrops in CA based maize systems
- Use of herbicides such as glyphosate where available for improved weed control as a labour saving strategy

The launch and roll out of the Competitive Grant Scheme during the reporting period is one of such deliberate efforts of reaching out to more farmers. The latest compilation of SIMLESA's scientific contribution was reported by the Program Leader (ACIAR Seminar Canberra, 29-30 November 2016). SIMLESA's science outputs to date include- 130 publications, 89 posters 21 policy briefs and various communication products including national level media coverages national, regional and international conferences participation by partners. An improved SIMLESA website is serving as a source of material and documents generated by the program.

3.2 Capacity impacts

During the period under review, SIMLESA continued to deliberately direct its efforts on trainings in conservation agriculture principles and technologies; sustainable and climate responsive agriculture production systems; intensification of crop-livestock systems via introduction and scaling of best bet feed/fodder production technology; agricultural production systems simulations; risk management and systems modelling acknowledging the socioeconomic 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. This is in line with the concept of sustainability which is embedded in the program design. 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 Innovation Platforms (IP) meetings.

The program prioritized capacity building of researchers and extension practitioners as shown by the number of people who enrolled at different levels to improve their academic and professional qualifications 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 sharing, which, as evidenced by stories of change has led to increased yields of both maize and legumes thereby resulting in improved food security in SIMLESA operational sites.

Through the 58 IPs across SIMLESA countries including spillover countries, links were formed with agro dealers facilitating improvement of market systems for farmers thereby boosting their incomes and widening market opportunities. Efforts were being made for the IPs 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 seed companies across the SIMLESA countries continued to bring huge benefits in terms of expertise tor NARS as implementers and program participants (farmers) in modern agronomic practices.

3.3 Community impacts

SIMLESA aims to reach out as many communities so that there is more coverage as far as modern and scientifically proven farming technologies are concerned. This, 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 achieved cumulative of 235,422 adopting[2] farmers against a target of 258,493 farmers accounting for a 91% achievement. The mostly adopted technologies across the five countries is maize-legume intercropping and use of improved seeds. 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.

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 M&E&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 MEL focal person in Malawi had been tasked to gather information to comprehensively inform this initiative.

In Mozambique, farmers are enjoying technical assistance through village based agents and agro dealers who become the public extension support promoters. It means that VBAs will be an easy way for dissemination of extension messages to farmers.

3.3.1 Economic impacts

SIMLESA has brought increased use of CA-based SI-options technology in the project communities which has 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. For example, the increase in maize and legume production in Tanzania by 30-40% and reduction in labor by 50% brought huge economic benefits to the farmers in that country. 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, 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.

In Malawi, CA maize-legume intercropping and CA maize legume rotation have 50% probability of producing 2 t/ha of maize grain compared to the conventional practice in both the low potential and high potential areas, respectively. In all five countries, crop variety and species diversification is the commonest risk-adaptation strategy employed. In the low potential regions of southern Africa, minimum tillage alternatives combined with stress tolerant maize varieties is the dominant strategy for coping with climate risk.

In Ethiopia, farmers in the SIMLESA sites received alternative options to integrate improved forages in the cropping system and farmers witnessed increased quality feed resources availability, which ultimately has a positive impact on livestock productivity and income of farmers. Credit and saving associations are engaged for the farmers to access credits and engage in market oriented fattening and dairy production practices. 1 PhD (Tanzania) and 3 Masters (Ethiopia) students from local universities are currently engaged in generating evidences of socioeconomic benefits of the forage interventions in SIMLESA sites.

[2] An adopter is a farmer who has used an SI technology for more than one year on 25% of his/her cultivated land.

3.3.2 Social impacts

SIMLESA's research implementation focuses on social inclusion and equality by way of hosting exploratory trials which promote the participation of men, women and youth, thereby making everyone an important participant in household farming activities. This is in line with the program design requirements where gender mainstreaming is at the core.

The approach has also led to improved family cohesion giving women opportunities to contribute to household decision-making. 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 intensification options beyond SIMLESA. Therefore, building their capacity remains crucial. The recent Arusha (Tanzania) meeting of June 2017 observed that SIMLESA can still do more on the social front, particularly facilitating more involvement of women and youths in adoption of SI technologies.

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.

3.3.3 Environmental impacts

Climate change is expected to negatively impact agricultural production in SIMLESA countries. Drought and heat stress are becoming important constraints to crop production, demanding that newly developed climate-smart varieties replace those currently grown by farmers. Improved agricultural technologies, agronomic practices and climate-smart national policies are essential to offset projected yield declines. SIMLESA research results are part of a toolkit to help mitigate against this plethora of environmental factors. The Mozambique study on drought risk perception, impact and adaptation measures recommends investment in projects that can enhance productivity i.e. water harvesting for irrigation, conservation agriculture, use of drought tolerant hybrid varieties in the face of climate change.

SIMLESA places environmental concerns as key to its agricultural development interventions because sustainable farming practices are critical to long-term profitability. In Tanzania, the conservation agriculture package on farm and on station has shown great impact in terms of moisture conservation while its impact on soil temperature regulation has been observed in Kenya. Under a long-term trial in Kenya, CA reduces the rate of loss of carbon relative to conventional tillage system which essentially means a reduction in rates of greenhouse gas emissions. In both Tanzania and Kenya, an increased penetration resistance, an indication of hardpan development at plough depth, is observed under conventional tillage at 15-30cm. Besides improvements in soil structure, benefits of CA on soil health that include an increase in soil macro-, meso- and micro-fauna diversity and abundance are demonstrated. Also, while no effects on mineral nitrogen are observed in some cases (depends on site factors including soils generic supply potentials), elevated mineral nitrogen that can potentially be leached has been observed under conventional tillage and not under CA at SIMLESA site in KALRO Kakamega.

Through its research activities, SIMLESA continues to promote 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 research focus towards 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. *(Annex 12)*

3.4 Communication and dissemination activities

Communication and knowledge sharing are an integral part of SIMLESA Phase II. So far, a strong culture and awareness of its value exists among program partners. The aim of the communication and dissemination activities will therefore be to leverage the program achievements to strengthen the uptake of best-bet technologies identified for scaling from Phase I research.

The communications unit is capitalizing on lessons learned and experiences gained from the previous phase while also being responsive to how communications and knowledge sharing will facilitate achieving the research and development objectives of the program. Major areas of the communications unit include:

- Communicating with and for actors on the ground for the scaling out of technologies and practices
- Knowledge sharing for policy influence to scale up SIMLESA program outcomes
- Communicating about the program, the science, and results throughout the program lifecycle
- Communications for donor relations

Various communication channels and tools were used: radio, video, television, website, posters, and flyers. These were used for the different program audiences who had different communication needs and contexts in the program countries. Some of the communication and dissemination activities that worked exceptionally well in Phase I that continued in Phase II were annual learning events, review and planning meetings, and publishing success stories about the program on the SIMLESA website:

1. http://simlesa.cimmyt.org/smallholders-benefit-from-sustainable-intensification-in-mozambique/
2. http://simlesa.cimmyt.org/transforming-farming-through-conservation-agriculture-in-malawi/

CIMMYT website http://www.cimmyt.org/growing-more-with-less-improving-productivity-resilience-and-sustainability-in-africa/

Two issues of the SIMLESA Bulletin *(Annex 14)* have been published during the reporting period. In Kenya, one thesis, nine journal papers and eight conference papers have been published by SIMLESA – Kenya researchers. Communication is therefore critical at all levels of the program and was fostered using multiple and innovative techniques.

To achieve the program's aim and overall objective, communications, and knowledge sharing, as well as 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 – including national agriculture research systems, farmers and farmer organizations and the global research community.

During Phase I and II, the program generated news bulletins and technical reports such as semi-annual and annual reports, brochures, videos, country overview reports, and policy briefs (www.simlesa.cimmyt.org/ also and technical briefs. For example, the program produced eight technical briefs in 2016 (Annex section). 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. Partnering with the Queensland Alliance for Agriculture and Food Innovation (QAAFI), the SIMLESA program produced the following publications: Voices from the Field and eight policy briefs.

In the local learning platforms, farmer-to-farmer sharing and learning were supported and facilitated by non-governmental organizations, public extension, seed companies, agro-dealers and business development service providers, based on the promotion of core messages on conservation agriculture-based sustainable intensification, and farming systems improvement. However, in Ethiopia, the planned annual field days could not be conducted due to the unrest in the country and the state of emergency.

The program participated in different events to create awareness on CA-based sustainable intensification practices and to build the program's visibility. Program leader Mulugetta Mekuria attended the AGRAF Conference. A SIMLESA exhibition was mounted as part of a side event at the meeting.

In another development, 18 SIMLESA scientists gathered in Harare, Zimbabwe, to participate in the Relevance of Climate Smart Agriculture (CSA) to SIMLESA Future assessment event. The meeting, also doubled up as a brainstorming event for the project's ex ante exercise as a run-up to a potential five-year follow up program. The assessment assessed CSA approaches and their relevance (if any) to future activity in Eastern and Southern Africa. It may be used as one input of many to future design activity but that is beyond the scope of the current assessment exercise.

During the five-day course of the meeting, participants, including representatives of NARS from five SIMLESA countries, two consultants from ACIAR, local and international development partners reviewed the research achievements of SIMLESA phase I and the current phase II, while at the same time exploring options against CSA-related activities in SIMLESA during program implementation, and scalable options for smallholder farmers.

Over 100 people representing different governments, research institutions, development agencies and private sector gathered in Arusha, Tanzania, and participated in a conference "Taking stock on sustainable intensification research for impact in Eastern and Southern Africa: Implications and strategies for the future''. Over the four-day event, delegates discussed the challenges ahead. A plenary session summarized key messages: What are the new challenges? How can the SIMLESA program development model help address them? This conference was an opportunity to review what has been achieved and plan for the next phase of an even more impactful program.

Communication were also achieved through regular meetings of the members of the innovation platforms in the target communities. Mozambique and Tanzania piloted SMS to reach out to farmers and other agribusinesses. 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.

Up to now (phase I and II), SIMLESA has produced 130 publications, 89 posters, 21 policy briefs and various communication products including national-level media coverage, national, regional and international conferences and participation by partners. The impact of SIMLESA work was demonstrated through national leaders, such as government ministers mentioned conservation agriculture-based sustainable intensification in the mainstream media, such as radio and television.

As part of the 2015 SIMLESA Mid Term Review recommendations on communications, a revised SIMLESA communications work plan *(Annex 15*) was produced. From now until program end in June 2018, SIMLESA's communications unit will gear up and *inter alia* implement the 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 sustainable intensification technologies/practices. Extra efforts will be made to ensure that the SIMLESA website is continually updated to include the breadth of outputs and data coming from the program. A SIMLESA program brief was also produced during the period under review *(Annex 16)*

4 Training activities

Orientation of Competitive Grants Scheme (CGS) partners in all five SIMLESA countries, farmer training, survey and data collection were some of the major activities carried out during the period under review. CGS orientation workshops were carried out in all five main countries of SIMLESA by the program leader, objective 4 leader and ME&L specialist. A total of 19 CGS partners attended these country workshops in the last quarter of 2016. The main thrust of the workshop was to develop operational plans with partners with SMART indicators and expected outputs. Program monitoring visits were conducted in all the SIMLESA countries by ME&L specialist and the management team. Monitoring and evaluations frameworks for CGS were developed during the reporting period.

Gender data collection training of enumerators was conducted during the reporting period. The training included participatory development of data collection tools and pre-testing of questionnaires and qualitative guides. On average, ten enumerators were trained in each country. Data were collected in the last quarter of 2016, analyzed and a number of publications were developed. The main objective of the gender study was to apply a gender lens to two research questions: i. Where and how can maize and legumes be scaled for sustainable intensification of maize-based farming system? ii. What would be potential impacts be in the medium term, across food systems in SIMLESA countries? Survey methodology used included a rapid assessment approach and integration of Gender into agricultural value chains analytical framework. Focus group discussions and key informant interviews were carried in the Arusha and Morogoro regions of Tanzania, Balaka and Kasungu districts of Malawi and Kakamenga & Embu districts of Kenya. Survey products include numerous articles which were developed:

1: "The Situation of Women in Agribusiness Sector in Africa", Development in Practice, in press.

2: "Gender and Equitable Benefit Sharing Mechanisms through Agricultural Innovation Platforms", submitted to Development in Practice.

3: Gender Analysis on Maize Value Chains, a Case Study of Tanzania (draft manuscript).

4: Gender Analysis on Legume Value Chains, a Case Study of Tanzania (draft manuscript).

CA based SI follow-up training sessions were carried out in all IP and farmer groups in five main countries as well as in Rwanda and Uganda spillover countries. A significant increase in yields and labour saving were reports from most IPs during the reporting period for instance in Musanze, Kamonyi and Bugesera districts of Rwanda as well as in Nakasongola and Lira districts of Uganda.(Details attached in M&E and 'Voices from the field' reports.

5 Intellectual property

Nothing reported on intellectual property during the period under review

6 Variations to future activities

There are no significant variations to the future activities except strengthening of the exit strategy, particularly on communication – how the world can access program outputs for sustainability and utilization since the program phases out in June 2018. SIMLESA needs to conclude its final year by demonstrating the impact of its work. It is critical that the significant achievements of the program are not lost after its conclusion. With this in mind, three specific points were made at the June 2017 conference on taking stock of program activities in Arusha, Tanzania:

Data: SIMLESA data are already being made available and accessible to all researchers on an open access platform. Socioeconomic data is now accessible via CIMMYT's DataVerse open-access repository. Using Dataverse as a repository is necessary but not sufficient; there is a need to explore opportunities to enhance awareness and use of the data.

Communications (i.e. Buzz): Communication of program findings needs to go beyond traditional academic channels and media (e.g. journal articles, books) and specifically share lessons learned through using different media outlets (social medial, TV, etc.). The level of expectation from ACIAR on communication is high, although there had been good policy briefs and reports developed so far. Communication needs to focus on the target audience, through twitter and other social media as well as mass media (newspapers, TV), among other activities.

Policy Engagements: SIMLESA outcomes need to be shared specifically with policy makers so that the program's lessons are incorporated into a wider policy environment. Efforts in all of these areas will help to increase adoption of sustainable intensification technologies promoted through SIMLESA. In considering these three points in relation to adoption efforts, a variety of specific messages will need to be developed for different audiences. Variations to personnel

7 Problems and opportunities

Most African farmers are suffering from the adverse effects of climatic risks and change since they rely on rainfed agriculture. In Southern Africa, particularly in Malawi and Mozambique, countries received normal to above normal rains during 2016/17 farming season. However, some parts of Ethiopia and Kenya in Eastern Africa, were affected by dry spells and drought. Maize Lethal Necrosis (MLN) and fall army worm affected farmers in eastern and southern Africa; details are articulated in book attached entitled 'Voices from the Field'.

There are huge opportunities for maize and legume value chains for both inputs and outputs in Africa. For example, suitable environment (policy, land and labour) and favourable weather can help produce a range of crops, particularly in high yielding ecological zones. There is a large pigeon pea market in India which can be utilized by farmers in Tanzania given improvements in production and good infrastructure. Climate smart agriculture and mechanization are critical components which are relevant to fully sustain small scale farmers in Eastern and Southern Africa.

With increasing income and an emerging middle class, the animal source protein demand is set to rise in east Africa in general, and in Ethiopia in particular (recent IFPRI report). Accordingly, smallholder farmers are interested to engage in milk production and fattening of animals for market (beef and small ruminants). Hence, demand for forage/fodder seeds for greater feed production on-farm is at rise, an opportunity for further intensification of crop-livestock production at the SIMLESA target countries.

8 Budget

CIMMYT headquarters to provide financial progress report.

LIST OF ANNEXES

ANNEXES – SIMLESA ANNUAL REPORT, JULY 2016 – JUNE 2017		
#	TITLE	Date Published
1	SIMLESA Arusha Conference report	June 2017
2	'Voices from the Field' book	June 2017
3	SIMLESA Pre Conference report	June 2017
4	Competitive Grant Scheme (CGS) report	June 2017
5	SIMLESA: The Africa Long Walk to Sustainability	June 2017
6	Monitoring, Evaluation and Learning Report	June 2016
7	Technical Briefs	December 2016
8	Policy Briefs	June 2017
9	ILRI progress report	June 2017
10	QAAFI progress report	June 2017
11	ARC progress report	June 2017
12	CIAT progress report	2015-2017
13	CSA Assessment	April 2017
14	SIMLESA Bulletins	September 2016 and June 2017
15	Communication work plan: 2016-2017	April 2016
16	SIMLESA project brief	June 2017
17	Semi Annual Report	December 2016
18	Country progress reports	June 2017
19	Journal articles	2017
20	ASARECA progress report	June 2017
21	Adoption monitoring reports	2016/17