



Sustainable Intensification of maize-legume based Farming Systems for Food Security in Eastern and Southern Africa (SIMLESA)

Annual Report

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1. Progress summary

Food security is a major concern in the east and southern Africa region. While the food crisis has receded somewhat at the international level, within the region urban food prices remain relatively high. Among the food crops, maize is the main staple and legumes an important dietary protein source for the rural poor. Legumes are widely used as an intercrop in maize systems, and are also significant source of income for women. Seasonal variability causes wide swings in food crop yields, including maize and legumes. Rain-fed maize-legume cropping systems show considerable promise in boosting productivity and helping reverse the decline in soil fertility that is a fundamental cause of low smallholder productivity in the region.

During July –December 2009 consultations between ACIAR and stakeholders in the region and Australia led to the formulation of the **Sustainable Intensification of maize-legume based Farming Systems for Food Security in Eastern and Southern Africa-SIMLESA** program proposal and its approval in March 2010. ACIAR is supporting the A\$20 million program for 2010-2013 period which is being managed by the International Maize and Wheat Improvement Centre. The program is implemented by NARS in Ethiopia, Kenya, Tanzania, Malawi and Mozambique in collaboration with many partners. The program aims at increasing farm-level food security and productivity, in the context of climate risk and change, through the development of more resilient, profitable and sustainable farming systems.

The five program objectives are:

- to characterize maize-legume production and input and output value chain systems and impact pathways, and identify broad systemic constraints and options for field testing;
- to test and develop productive, resilient and sustainable smallholder maize-legume cropping systems and innovation systems for local scaling out;
- to increase the range of maize and legume varieties available for smallholders through accelerated breeding, regional testing and release, and availability of performance data;
- to support the development of regional and local innovations systems; and
- capacity building to increase the efficiency of agricultural research today and in the future

Key features of SIMLESA

- SIMLESA will adopt an integrated production and value chain approach to the complex maize-legume farming systems. Participatory research and development with farmers, extension agencies, NGOs, Universities and agribusiness along the value chains will be coordinated through local innovation systems. Improved technologies, varieties and value chains innovations will be tested through on-farm research, demonstrations and pilot interventions in input and produce marketing chains. Through ASARECA and existing networks, the program will foster gender mainstreaming; strengthening an M&E framework in NARS and spill over's of improved crop systems management practices, knowledge and germplasm to other countries in the region.
- The direct benefits of SIMLESA will include improved maize and legume productivity by 30% and reduced downside yield risk by 30% on approximately African 500,000 small farms within ten years. Benefits to Australia will be concentrated in rain fed summer cropping systems in Queensland and northern New South Wales. Strategic capacity building in the five main participating countries involves short-term training and postgraduate fellowships supported by AusAID..
- SIMLESA oversight will be provided by a Steering Committee comprising high level representatives from partner organizations with two independent co-chairs from Africa and Australia. A Project Management Committee composed of CIMMYT senior management is constituted to give guidance to program implementation and management

Update and highlights: January-June 2010

Partnership and Linkages

- Excellent progress has been made notably in terms of workplans and agreements signed with all partners except ASARECA and ARC/South Africa (for whom it is agreed that activities would commence in year 2) and the start up of field activities in Kenya, Tanzania, Ethiopia and Queensland
- CIMMYT, as Commissioned Organization executes the program with the NARS of the five principal countries in collaboration with its regional and international partners namely; the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), the International center for Research for the Semi-Arid Tropics (ICRISAT) and the Agricultural Research Council (ARC) of South Africa. Collaboration with the Department of Employment, Economic Development and Innovation Queensland and Murdoch.
- SIMLESA has established linkages with Drought Tolerant Maize for Africa (CIMMYT managed, BMGF funded) and with Tropical Legumes 2 (ICRISAT managed, BMGF funded) for the provision of advanced drought tolerant maize legume lines, respectively. Cooperation on national research teams and exchange of results with another project -N2Africa (Wageningen University, BMGF funded) have been discussed.
 - Local and national 'scaling out' linkages with agribusiness, extension and other large agricultural development programs are being identified (by a consultant) in order to foster local dissemination and adoption of technologies

- CIMMYT and partners has assigned staff to SIMLESA; and CIMMYT has already recruited the soil scientist/systems agronomist for southern Africa and an agricultural economist/Value Chain analyst who started working as of 1 July.
- SIMLESA national planning workshops for the five NARS have been held and identified national research teams, workplans, and field research protocols for the 2010 season, and it was used as the basis for CIMMYT-NARI agreements and the transfer of funds..
- NARS partners in Ethiopia, Kenya and Tanzania have planted CA on-farm exploratory and PVS trials in two and one each of the selected maize-based farming systems, respectively. The planting season for Malawi and Mozambique is November-December and field experiments are at the planning stage. Discussions with farmers, stakeholders on site selection and community surveys are in progress while baseline surveys are planned for August –October 2010 period.
- Eight SIMLESA NARS scientists have has been identified for possible AUSAID and ACIAR PhD scholarships to commence in 2011. Regional CA training schedules have also been developed.
- Communication materials: a SIMLESA poster, brochures and brief/flyers have been prepared.

2. Achievements against Activities, Outputs and Milestones

2.1 Socio economics, Markets and Value chains: Objective 01

According to the log frame and agreed work plans only Output 1.1 **Initial characterization of ten maize-legume farming systems and selection of thirty research sites/communities**

(Activities 1.1.1 Exploratory visits to the target areas, selection of sites and community surveys within target countries was planned for implementation during the April-June 2010 period.

Ethiopia: SIMLESA Ethiopia Team planned 10 but selected **12 research communities** in the subhumid Bako and the Central Rift Valley farming systems. Secondary data collection is in progress (only about 50% completed). Exploratory CA and maize and legumes Participatory Variety Selection (PVS) trials are planted in the selected communities.

Kenya: In Western Kenya of Kakamega total of 14 farms in one community were selected. Due to delays in project start up and the earliness of the season field activities started late hence only one community instead of four from two sub systems was selected. In Central Kenya of Embu selection of both project and control sites in three study districts of Embu East, Meru South and Imenti South were accomplished in May, 2010 using ARCVIEW 3.2a mapping software and follow up visits were made to the selected sites by SIMLESA team members. Community surveys were then conducted in seven sub-locations distributed in the maize/beans and maize/pigeon peas farming system zones to obtain the first approximation of the socio-economic profile of farmers' assessment.

Tanzania

Activity 1.1.1: Exploratory visits and site selection completed and community survey not yet conducted. Activities undertaken at Ilonga include community and farmer selection and preparations for community survey. Team members have been involved in site selections, farming system characterization and collection of secondary data on the selected research communities and the farming systems

- In Karatu district: 2 communities (Kilimatembo and Rhotia) with six and five farmers each, respectively, were identified where CA exploratory trials and one participatory maize variety selection are being conducted.
- Mbulu District: 2 communities (Bargish and Masieda) with six farmers each
- Kilosa District: 3 communities (Vitonga, Milama and Makuyu) with ten farmers each
- Mvomero District: 3 communities (Msingisi, Kwipipa and Rubeho) with ten farmers each

Malawi Community visits for site selections were conducted in all six selected districts. In each district, one Extension Planning Area (EPA) was identified where SIMLESA activities will be implemented. Amongst EPA's selected were Mtunthama EPA in Kasungu district, Kapiri EPA in Mchinji district, Golomoti EPA in Dedza district, Nsipe EPA in Ntcheu district, Mpilisi EPA in Balaka district and Mitundu EPA in Lilongwe district.

Characterization of villages in selected district EPA's for identifying agribusiness and market opportunities was also conducted. The economist in the team and partners from Bunda College had a discussion on how to organize objective 1 activities, particularly the exploratory surveys and agri-business studies indicated on the log frame.

Mozambique. SIMLESA Team has developed a schedule to start the field work in July and August. Both survey instruments that incorporated comments from partners are finalized. Draft survey protocol and guideline are also completed and will be shared with partners soon. Background work to initiate both surveys and discussions with stakeholders on site selection are in progress. Both surveys will be launched August –October 2010 period.

2. Objective 2: To test and develop productive, resilient and sustainable smallholder maize-legume cropping systems and innovation systems for local scaling out

Highlights:

Objective 02 Field Exploratory trials :Systems agronomy-CA,

Below are the specific outputs and activities of objective 01 implemented by the three countries of Eastern Africa.

Ethiopia: (see annex 1)

Activity 2.1.1 Two maize varieties (Melkassa-2 & BH-543) and 6 legume varieties (Nasir, Awash-M elka, Dimtu, Awash -1, Cheri, and Tibe) with complementary management options were identified for agronomic experiments

2.2.1 Initial innovation systems have been formed in each agro ecology and one platform will be organized by each center (Bako, Awassa & Melkassa) by September 2010

2.3.2 Define 5-6 farmer groups/ host households and fields for exploratory trials: A total of 45 farmers and households who can host the on-farm CA and other agronomic trials were identified for both agro-ecologies of Ethiopia. This specific activity is about 100% completed

2.3.3 Initial soil samples and cropping history recorded in exploratory trials sites. Soil samples were taken from all experimental fields. Cropping history, land use systems and cropping history of the study areas were recorded during site selection and planting time (90% completed);

2.3.4. Exploratory trials established . A total of 42 on-farm CA and maize-haricot bean/soya bean have been established on-farmers fields in both agro ecologies of Ethiopia

2.4.4 Establish researcher-managed trials. The researcher managed on station trials each with 8 treatments (CA, conventional, rotation and maize-pulse intercropping) are established at 3 centers (Bako, Melkassa and Awassa)

Kenya (Annex 2)

Embu

To address the food insecurity problems, field activities were established in semi-arid regions of eastern Kenya to identify options for sustainable intensification of maize-legume farming systems, from exploring conservation agriculture (CA) principles. The studies were participatory, implemented by partners who were identified and the project objectives discussed with them. Four trial sites, two in the main maize/beans and the same number in the maize/pigeon-pea zones were selected and six farmers per site identified and sensitized to host the on-farm exploratory trials. Two researcher managed trial sites (one per zone) were identified and one of them in maize/beans zone fenced off and terraced to control grazing and soil erosion. Soil samples were collected from the sites/farms and were partially analysed to determine the initial farm/site soil conditions.

Kakamega:

Validation trial was planted in mid March, 2010 in Siaya district, western Kenya. Participating farmers were members of Liganwa women's group. A total of 14 farms were established (13 belonged to members of the women's group while one farm was established within Agricultural Training Centre (ATC, Siaya). There were two sets of validation trials:

Type 1: testing of various soil organic matter (SOM) improvement options by employing conservation agriculture methodology, and

Type 2: testing of various maize varieties/germplasms for suitability in the region using "Mother-Baby" methodology. Treatments for Type 1 trial were:

1. Conventional practice: farmer's tillage practice, no herbicide used, Stover not retained, maize intercropped with either common beans or soya beans,
2. Conservation agriculture: minimum tillage practice, herbicide used, stover retained, maize intercropped with either common beans or soya beans,
3. Conservation agriculture: minimum tillage practice, herbicide used, stover retained, maize intercropped with either rhizobia inoculated common beans or rhizobia inoculated soya beans,
4. Conservation agriculture: minimum tillage practice, herbicide used, stover retained, maize intercropped with desmodium and either common beans or soya beans,

Type 2 trial was undertaken by another set of seven farmers and tested five maize varieties: H513, WH505, PH1, PH4 and DH04. Each variety was planted both as sole crop and as intercrop with either common beans or soya beans.

In both trials, each experimental unit measured 17m x 15m. Maize was planted at a spacing of 75cm x 25 cm, one plant per station. Beans (variety KK 8) and soya beans (variety SB 25) were planted at a spacing of 75 cm x 20 cm, two plants per station. One row of desmodium (cv. green leaf) was drilled between maize and beans (or soya) rows. Fertilizer was applied to maize at the rate of 57 kg P and 80 kg N per ha at the time of planting and top-dressing, respectively. Glyphosate was sprayed immediately after sowing. Confidor solution was poured into ant-hills to kill ants. Two rain gauges were installed in two farms for rainfall data collection. Resource Project Kenya (NGO) will take active role in dissemination. Data already collected for crop modeling include rainfall at the site for the last three months. Maximum/minimum temperatures and radiation for the last 30 years have been obtained from Meteorological Weather Station located within KARI-Kakamega. Soil sampling has been done two times from three layers (0-15 cm, 15-30cm and 30-60cm) on seven farms undertaking Type 1 trials. Soils are being analyzed for N, P, K, organic carbon and pH. Soil bulk density, gravimetric soil water percentage, plant tissue for nutrient analysis and farming history data are being collected. APSIM will be employed for crop modeling and simulation.

Tanzania (Annex 3)

Activity 2.1.1: Potential technologies listed: Northern zone: Maize-Pigeonpea intercropping. Maize variety Vumilia and pigeon pea variety Mali under CA and conventional methods.

Eastern zone: Maize- Pigeonpea intercropping. Maize variety Staha, TMV1 and Bora. Pigeonpea variety Mali and Tumia under CA technology of rotating pigeon and conventional practice.

Northern zone: Certified seeds for newly released maize variety (Vumilia K1) was not sufficient, instead SC 627 was used only for this season, Vumilia K1 will be used next season.

2.2.1. Identification of Innovation Systems: Innovation system members formed in Karatu and Mbulu Districts. The activity has not started in the Eastern zone

2.2.2. Regular discussions and field visits conducted with program partners and members of the innovation system: One discussion meeting conducted on farm

2.3.2 Farmer groups and 5-6 host households and fields for multi-year exploratory trials defined by farmers within each target community. In Karatu 11 farmers in two communities have been identified. Since the cropping calendar starts in Dec. – Jan, farmers have not yet been identified in Mbulu district

2.3.3 Minimum data set for field characterization defined and sites characterized: Soil, topography and cropping history data collected in Karatu and Mbulu Districts

2.3.4. Exploratory trials with at least two CA options compared to one conventionally tilled : Exploratory trials have been established in 11 farmers fields in Karatu. Only one CA option was appropriate for the selected communities.

2.3.5. Participatory evaluation of exploratory trials by farmer groups and members of the innovation platforms: One participatory evaluation conducted

2.4.4 Researcher-managed trials established under conditions representative of the agro-ecologies: Two researcher managed trials at Selian and Karatu have been initiated.

Objective 3: To increase the range of maize and legume varieties available for smallholders through accelerated breeding, regional testing and release, and availability of performance data.

Ethiopia (See Annex 1)

3.1.1 Identification of pre-release or newly released hybrids and OPVs: Five varieties per farming system with potential suitability for the targeted farming system are identified for pre-release in the target areas and planted for farmers' participatory variety selection (PVS). This activity is 100% completed.

3.1.2 Potential legume species and varieties for the target environment in the program countries analysed with TL II partners: Six potential legume species and varieties identified for PVS and intercropping compatibility with maize (60% completed)

3.1.3 Seed increase of pre-release and newly released maize hybrids and OPVs and legume species: Seeds of pre-release and newly released 12 maize hybrids and OPVs and 12 legume species and varieties with potential suitability for the targeted farming system are being increased at Awassa, Bako and Melkassa Research Centers (50% completed)

3.1.4 Farmer-participatory evaluation of pre-release and newly released maize hybrids and OPVs and legume species: 10 Maize hybrids and OPVs and 8 legume varieties of different species suitable for the targeted farming system were identified and planted on-farmers field in each farming system

3.2.1 Seed increase of elite inbred lines and legume varieties generated in various programs: A total of 200 maize inbred lines and 80 legume genotypes were planted for seed increase at different centers (about 85% of the plan accomplished)

Kenya (See annex2)

Embu: The Team at Embu did not plant any trials or demos because it was late for planting last season have planned for planting during the second season (September –October period)

3.1.1 Identified pre-released or newly released hybrids (KH500Q, KH500-21, Hybrids 208 and 209) and OPVs (KDV 1 and Embu Synthetic) suitable for the maize/bean and maize/pigeon pea cropping systems. Planted for seed increase inbred line parents of hybrid KH 500Q under the supervision of KEPHIS

3.1.2 Identified potential legume species and varieties (beans; Embean-14 and Embean-7) and (pigeon-peas; KARI Mbaazi-2, ICEAP 00554 and ICEAP 00557).

Kakamega. Farmer participatory evaluation of pre-release and newly released maize hybrids under farmer representative and legume intercrop within CA conditions. Maize hybrids and legume (beans and soya beans) varieties suitable for the targeted farming system were identified Scientists and extension officers.

Generate widespread awareness among farmers about new maize, beans and soya bean varieties and management options part. Seven validation plots are established.

Tanzania (see annex3)

3.1.1 In Northern Zone 5 hybrids and 6 Composites were planted for evaluation and seven pre-released maize varieties identified.

3.1.2 Potential legume species and varieties for the target environment in the program countries analysed with TL II partners. Pigeon pea variety Mali identified

3.1.3 Seed increase of pre-release and newly released maize hybrids and OPVs and legume species: Breeder seed for maize variety "Vumilia" was produced. Seed of the parental lines of two hybrids Selian H 208, Selian H 308 was produced

3.1.4 Mother Trials: Mother trials established in Karatu district

3.1.4 Farmer-participatory evaluation of pre-release and newly released maize hybrids and OPVs and legume species and varieties under farmer-representative and legume-intercrop/CA conditions: Pre-released and newly released maize hybrids and OPVs legume species are in the field for farmer-participatory evaluation

4. Regional Institutional Innovation Objective 04

- ASARECA and SIMLESA held a joint meeting to discuss the roles and responsibilities of ASARECA in the project. It is expected that ASARECA will incorporate the SIMLESA Objective 04 activities into its work, plan and re-align budgets and personnel costs as indicated in the program document. Discussions to finalize the modalities are still underway.

5. Capacity Building - Objective 05

Capacity building activities/regional training -NARS systems agronomy and CA workshop are scheduled for

- 22-28 August 2010: Kenya
 - 27 sept-02 Oct 2010: Tanzania
 - 11-16 October 2010: Ethiopia
 - 17-23 Oct 2010: Mozambique
 - 31 Oct-06 Nov 2010: Malawi
- Daniel Rodriguez in working on the Regional APSIM modelling course
- Eight NARS scientists from Ethiopia, Kenya, Tanzania and Malawi have submitted applications for Ph.D fellowships under ACIAR and Australian Development Scholarships and selection of candidates for these very competitive awards is underway.
 - Possible arrangements and timing for an impact assessment, pathway/economic analysis training to be offered in collaboration with Dr. Debbie Templeton of ACIAR and Dr, Bekele Shiferaw was discussed. One possibility would be to have a combined basic training in survey sampling and analysis for economists from each of the five countries.

6. Linkages and Partnerships

- Local and national 'scaling out' linkages with agribusiness, extension and other large agricultural development programs are being identified by ACAIAR part time consultant (George Mburathi) in order to foster local dissemination and adoption of technologies and institutional varieties which will be identified during the first year.
- External 'research linkages' are being identified on key topics, e.g., livestock, post-harvest, weather insurance. SIMLESA and ACIAR have drafted a communications strategy which will be finalized after the whole-of-government strategy has been drafted
- SIMLESA was invited and has been represented at the FARA Annual General Assembly meeting 18-25 July 2010 in Ouagadougou.

Active consultations are being pursued with the following regional sister R&D programs in order to identify active collaborative linkages, as follows:

- Partnership program (AusAID). It is expected at least four Ph D students will undertake field research with SIMLESA. SIMLESA is facilitating the identification of candidates to commence early 2011. Short training courses are under consideration.
- Food security in West Africa through CORAF (CSIRO managed, AusAID funded). CSIRO invited two NARS scientists to attend the CORAF workshop in Senegal during April (unfortunately travel arrangements could not be finalized on time).
 - A joint ACIAR-CSIRO-AusAID farming systems innovations workshop is being planned for early 2011. Observers will be invited to program annual meetings. Opportunities for joint training will be explored.
 - Drought Tolerant Maize for Africa (CIMMYT managed, BMGF funded). Provision of advanced drought tolerant maize lines.
 - Tropical Legumes 2 (ICRISAT managed, BMGF funded). Provision of advanced legume lines.
 - N2Africa (Wageningen University, BMGF funded). Cooperation on national research teams and exchange of results.
 - The potential for further cost-effective linkages will be explored with other complementary

7. Project Coordination, management and governance

- Funds have been disbursed to all NARS partners (Kenya, Tanzania, Ethiopia; Malawi and Mozambique). Funds for ICRISAT, QEEDI, Murdoch University have been transferred. Transfer of funds is pending on the on going discussion to refine the roles of ASARECA and signing of the RGA.
- To facilitate signing of the RGAs and the timely commencement of program activities, the Program Coordinator had to make several trips to Ethiopia, Kenya, Tanzania, Malawi, Mozambique, Entebbe- ASARECA and South Africa.

- Late May, the Coordinator visited Malawi and held discussions with Deputy Director of DARS and raised the issue of national coordination as the current staff member is expected to leave for Ph.D training early 2011. The Department is having an internal discussion on the subject.
- The Coordinator has been receiving administrative support from CIMMYT-Kenya and CIMMYT-Zimbabwe Office while recruiting of a program officer is underway .
- The management of the relationship between the commissioned organization (CIMMYT) and the NARS is critical. Key elements will be research support and mentoring from international scientists, monitoring of the quality of implementation and assessment of deliverables.
- The interim Program Management Committee (PMC) met in February. The next meeting is tentatively scheduled for early September. It is expected that the PMC meetings will provide support to the Coordinator.
- The program document makes provision for monitoring the impact of exchange rate variations from the standard of US 0.85c/A \$. Noting that the initial program payment was made at approx US 92c/A\$, it is proposed that the surplus be accrued by CIMMYT rather than disbursed.
- Suggestions for the African co-chair of the Steering Committee were invited in the February interim PMC. Preferably from outside SIMLESA countries. Dr. Wilf Mwangi has offered some suggestions.
- In summary, the priority area of risk management is the monitoring and assessment of partners' delivery against workplans, including NARS; and the integration of partners' efforts, notably at the national level.

Project Coordination and Monitoring

- Since the approval and the signing the program document 15 March-June 2010 period , the PC has been actively involved in the negotiations and buy- ins and subsequent and signing the RGAs by partner institutions. The support received from the PMC members and Wilfred Mwangi is highly appreciated
- SIMLESA Agronomist (Fred Kanampiu and the Coordinator visited Embu and Kagamega in February 2010 and Arusha in the Northern Zone, Ilonga in Eastern Zone of Tanzania during 18-24 April 2010 period.
- The Malawi and Mozambique SIMLESA inception and launch workshops were held 10-15 May at Lilongwe and Chimoio, respectively. The Principal Secretary of Agriculture and Food Security of Malawi and the Governor of Manica province of Mozambique officially opened the workshops in Malawi and Mozambique
- The project coordinator, the Ethiopia SIMLEA leader, SIMLESA agronomist, CIMMYT- Ethiopia maize breeder and ACIAR , Outside Linkage, Scaling Out Consultant(George Mburtahi) visited Bako, Awassa and Melkassa research sites and on-farm trials (13-18 June 2010). The visiting team had useful discussions and interactions with the respective teams. It was agreed to have a mid-season visit of the field activities with a possible media coverage for first week of September

- On 16-18 June 2010, PMC Chair Dr. Bekele Shiferaw and the PC also paid a visit to ASARECA head quarters at Entebbe, Uganda and held discussions with the Deputy Executive Director(The Executive Director was unavailable due to personal problems during our visit).
- Dr. Fred Kananmpiu and George Mburtahi visited Embu zone in Central Kenya and Arusha in Tanzania the weeks of 21 June and 13 July.
- The following CA Training workshops being organized by Fred and Isaiah are scheduled for:
 - 22-28 August 2010: Kenya NARS systems agronomy and CA workshop
 - 27 sept-02 Oct 2010: Tanzania
 - 11-16 October 2010: Ethiopia
 - 17-23 Oct 2010: Mozambique
 - 31 Oct-06 Nov 2010: Malawi