

# Bulletin

## SIMLESA Highlights

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A quarterly publication of Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) Program

### Calls to adopt SIMLESA approach in project implementation across Tanzania

"The Ministry, and specifically the Directorate of Research and Development, immensely commends SIMLESA's participatory approach and would like to recommend it to other research and development partners both at national and international levels. By any means, this approach won't ignore or omit farmer participation in variety dissemination, as was the case in the past. This participation exactly addresses the value chain approach that has been over emphasized by the Agricultural Sector Development Program that we are implementing in our country," stated Fidelis Myaka (director of Research and Development, Ministry of Agriculture, Food Security and Cooperatives, Tanzania) in a speech read on his behalf by Ruth B. Madulu, Agricultural Research Institute (ARI)-Mikocheni at the recently concluded Tanzania SIMLESA 2012 Progress Review and 2013 Planning Meeting in Arusha.

Myaka called on other projects in Tanzania to emulate the SIMLESA initiative in using the very successful participatory approach in project implementation. The approach includes the participatory variety selection trials, mother-baby trials, and on-farm maize and pigeon pea intercropping via conservation agriculture demonstrations and the Innovation Learning Platform (ILeP). ILeP brings together partners and collaborators from the public and private sectors, private seed companies, community-based organizations, farmer groups and associations, regulatory bodies, and agro-processors. "The different partners/collaborators ensure ownership of the participatory SIMLESA technology development and transfer process, faster promotion, dissemination and adoption of the released technologies, and also increase of impact to the beneficiaries," explained Myaka.

Mulugetta Mekuria, SIMLESA project leader, noted that there are challenges that still need to be overcome: obtaining scientific evidence that SIMLESA options are better than what farmers currently have; documenting and publication of the processes and results for dissemination; reaching farmers with SIMLESA technologies; and engaging other partners. He appealed to the Australian Centre for International Agricultural Research (ACIAR) to consider increasing funding to SIMLESA in Tanzania. "Our country requires additional funding to spill over the successes of SIMLESA to neighboring districts with similar agro-ecologies to districts implementing the project."



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International Maize and Wheat Improvement Center



Out of the seven agro-ecological zones, SIMLESA is being implemented in only two, covering five districts, namely, Karatu and Mbulu in the northern zone, and Gairo, Kilosa, and Mvomero in the eastern zone. Mekuria noted that expanding the initiative to other areas is bound to have a huge impact on food security in Tanzania considering the importance of the technologies and crops being promoted. "Maize is Tanzania's number one staple crop which is grown all over the country on more than two million hectares. The majority of Tanzanians derive their livelihoods on maize and it is now becoming the staple of choice even for those tribes which some years ago did not eat it. It is the number one food crop in each of the seven zones of the country. Maize is also one of the few national food security crops and also provides cash to a large population of the maize farming community."

According to Mekuria, the objectives of the meeting were to evaluate and review 2011/2012 season activities; identify major achievements and results by sites, objectives, and milestones; identify technical and operational constraints; suggest possible and feasible solutions; develop 2012/2013 plan of activities and budgets based on past season results; and formulate SIMLESA Tanzania calendar for 2013. The meeting was attended by scientists from Selian Agricultural Research



**Mulugetta Mekuria, SIMLESA Program Coordinator and Fred Kanampiu, CIMMYT Agronomist (center) keenly listen to Ruth B. Madulu, from the Agricultural Research Institute (ARI)-Mikocheni as she addresses the participants.**

Institute, ARI-Ilonga, CIMMYT and SIMLESA, International Crops Research Institute for Semi-Arid Tropics (ICRISAT), Cooperative for Assistance and Relief Everywhere (CARE), and ACIAR; farmers; ILeP stakeholders; Ministry of Agriculture, Agricultural Research Council of South Africa; the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA); seed companies; and private sector representatives from Tanzania.

## Innovation Platforms enhancing adoption of conservation agriculture in Mozambique

Following last year's innovation platforms forum held in Chimoio on 20<sup>th</sup> August last year, the Organization for Sustainable development of Agriculture and Rural Markets (AGRIMERC-ODS) embarked on up scaling of conservation agriculture (CA) activities in Manica and Sussundenga districts of Mozambique.

Maize and legumes which are the main focus of SIMLESA's activities remain the most important food crops for Mozambique's rural poor. The demand for maize in Mozambique is projected to increase by at least 40% over the next 10 years and the demand for legumes by 50%, according to the Ministry of Agriculture. Seasonal

variability causes wide fluctuations in food crop yields, including maize and legumes. Intensification of rainfed maize-legume cropping systems through various technologies including conservation agriculture offers considerable potential to boosting productivity and reverse soil fertility decline, one of the most important factors to low smallholder productivity in the region.

The primary objective of AGRIMERC under the agro dealer's development project implemented by the *International Fertilizer Development Centre* (IFDC) was to upscale conservation agriculture and other SIMLESA activities in Manica and Sussundenga districts and to strengthen linkages between agro-dealers and farmers not only for improved input access but also for accelerated technology transfer.

Through this partnership established between SIMLESA and AGRIMERC-ODS, the program went into action in Manica and Sussundenga districts in Manica province in Vanduzi and Munhinga administrative posts in accordance with SIMLESA program objectives i.e. to characterize maize-legume production and input and output value chain systems and impact pathways (*objective 1*) and to test and develop productive, resilient and sustainable smallholder maize-legume



**Farmers in one of the awareness meetings conducted in the area.**

cropping systems and innovation systems for local scaling out (*objective 2*). Field demonstrations were established in various communities namely Macadera, Pina and Chitundo in Pungue Sul and Chichirae Chimbua in Munhinga.

To achieve these objectives, AGRIMERC has built stronger linkages with existing stakeholders using experiences generated through IFDC with partnerships involving Agricultural Trading Company (ECA), Seed Companies, Fertilizer Companies (Greenbelt and Mozfert), Vanduzi and Sussundenga Traders. The partnerships also involve maize marketing warehouses installed by Development and Trading Agriculture Company (DECA, a maize milling and trading company) and Commercial Agricultural Promotion Company (APAC) working through Awake Farmers of Manica (SWAMA), all seeking to improve maize grain marketing for commercial flour production.

Selection of Munhinga and Pungue Sul administrative posts was mainly driven by their potential to contribute to food security while at the same time the use of improved maize and legume varieties lags far behind its potential, low public and private sector investment in input and output value chains including seed systems and low returns to investments

Since October 2012, a total of six villages have been selected in the above communities using criteria developed in the SIMLESA out scaling protocol on which 36 CA out scaling demonstrations were established and to date around 1,200 farmers are benefiting.

To achieve these activities AGRIMERC in collaboration with IIAM started with awareness meetings conducted in five communities using guidelines in the SIMLESA out scaling protocol and in total 230 persons participated (95 women and 104 men). The farmers selected hybrid and open pollinated maize varieties and some newly released cowpea and soybean varieties. Established demonstrations were composed of a simple paired design with a conventional farmer practice system side by side either to a CA maize and CA legume rotation plots (*Option A*) or a CA maize-legume intercrop plot (*Option B*).



Seeds on show at one of the field days organized by the Local Innovation Platform.

In addition to the above the AGRIMERC program also superimposed fertilizer response trials on the CA demonstrations and established a total of 12 trials in the two districts funded entirely by AGRIMERC. The fertilizer formulations tested originate from IFDC. Typical layouts on these trials are as illustrated in Figures 1 and 2.

Major achievements of the program thus include the setting up of additional 36 out scaling demonstrations in the two districts over and above the initial core SIMLESA sites established in 2010. According to AGRIMERC reports, farmers in general have identified options for systems intensification and diversification that reduce management costs in their usual farming systems using CA. Furthermore, the participation of agro-dealers in the program helped to increase awareness among this group of the need for interventions facilitating improved seed and fertilizer delivery to farmers. The AGRIMERC program makes one good example of the synergy that can be achieved through effective linkages and partnerships towards up scaling SIMLESA activities. Similar such initiatives have been established in many other communities such as Macate and Mavonde through IDEAA, UCAMA in Zembe and Marera, Cáritas in Messica and Dombe, ISPM in Matsinho and TLC in Angonia.

Major challenges faced included late mobilization of farmer, risk averseness of agro-dealers and lack of credit for farmers to purchase inputs.

Maize conventional tillage 12:24:12	
Maize no-till 12:24:12	Legume no-till 12:24:12
Maize no-till 21:20:0 + S + Zn + B	Legume no-till 6:16:31 + S + Zn + B

Figure 1. A typical layout of a CA SIMLESA + IFDC Additional Fertilizer response trial plot installed on farmers' fields in Manica and Sussundenga districts

Maize control no fertilizer	Soybean control no fertilizer
Maize 12:24:12	Soybean 12:24:12 + inoculum
Maize 23:21:0+4S	Soybean SSP + inoculum
Maize 21:20:0 + S + Zn + B	Soybean 6:16:31 + S + Zn + B+ inoculum

Figure 2. A schematic layout of out scaling trials combining the SIMLESA plus the IFDC fertilizer response treatments established on 28 locations in Manica and Sussundenga.

## SIMLESA-Kenya: achievements and future goals

The Kenya Annual Review and Planning Meeting (ARPM) was held during 5-6 November 2012 at the Kenya Agricultural Research Institute (KARI). The meeting was attended by 33 participants from the Queensland Alliance for Agriculture and Food Innovation (QAAFI), KARI, Ministry of Agriculture, Agriculture Research Council (ARC-SA), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Royal Tropical Institute, Resource Projects Kenya (local NGO), and FRESHCO Seeds (local private seed company). Present were also Stephen Njoka (KARI-Embu) and Francis Muyekho (KARI-Kakamega), who chaired some of the sessions. Joseph Mureithi, KARI deputy director and SIMLESA program steering committee member for Kenya, welcomed all participants and informed them on the adoption of a new value chain innovation platform, bringing major stakeholders on board to address farmers' constraints and promote commercialization of agriculture. Ephraim Mukisira then officially opened the meeting by summarizing the outcomes of the KARI Biannual Conference.

He discussed the current needs of Kenyan farmers and stressed that "there is need to commercialize the farming business in Kenya in order to empower local farmers." Besides commercialization, more effort needs to be invested in the SIMLESA initiative. Maize, as the foundation staple in the Kenyan diet, should be promoted together with legumes supplying proteins to the farmers' families. While the population is rapidly increasing, farm sizes are declining; hence there is a pressing need to increase productivity levels while using the same land



**Fred Kanampiu chairing Objective 2 (Agronomy) - break away session at the meeting.**

area. To realize the program's impact within the current time constraints, the program aims to assist 50,000 farmers in both Eastern and Western Kenya.

Later on, Mekuria Mulugetta, SIMLESA program leader, provided a detailed background of SIMLESA objectives. He emphasized SIMLESA's focus on building KARI's organizational capacity, reminded the participants of the recently published baseline survey report for Kenya, and thanked AusAID for their continuing financial support of the SIMLESA-Ethiopia Expansion program for the next two years. As part of the meeting, the participants travelled to Tanzania, Kenya, and Ethiopia to observe field experiments conducted by SIMLESA, ICRISAT, and national Partners.



## Conservation agriculture: the future of farming in western Kenya



**George Ayaga, deputy center director of KARI-Kakamega and SIMLESA western Kenya coordinator, addresses visitors during the field day in Bungoma.**

Longer periods of drought and erratic and below-average rainfall in western Kenya have been making farming increasingly difficult over the years. In combination with declining soil fertility and deep-rooted practices of low-farm input application, agricultural productivity in the region has been on steep decline, leaving many farmers desperately staring at famine. However, with introduction of conservation agriculture (CA) via the Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) initiative in 2010, Kenyan farmers regained hope.

SIMLESA activities are implemented in western and eastern regions by the Kenya Agricultural Research Institute (KARI) with technical support from CIMMYT and financial assistance from the Australian Centre for International Agricultural Research (ACIAR). Over the last two years, SIMLESA has been conducting on-farm trials using CA techniques: minimum tillage, crop residue management, intercropping/crop rotation (with maize and beans or desmodium), and participatory variety selection trials. Members of Tumaini Farmers Field School, Bungoma County, western Kenya, have been using these techniques. "We were in a desperate situation. Maize for us is not only our staple crop; it is also a major cash crop. But yields have been dwindling to levels where they could not sustain our food requirements," stated Geoffrey Wanjala, the group chairman. "However, conservation agriculture has brought fortunes. With soils regaining fertility and farmers adopting good agricultural practices, yields have started increasing.

Conservation agriculture has also come with low farming costs, as we do not have to invest in time consuming, labor intensive, and costly ploughing and weeding activities. We have decided to adopt the conservation agriculture because of these benefits." The success of the trials encouraged KARI and CIMMYT to organize a farmers' field day to demonstrate the performance of CA technologies.



**A trial plot of maize intercropped with desmodium.**

The field day was held in Kanduyi Division, Bungoma South District, Bungoma County, on 17 August 2012, and attracted farmers from other SIMLESA districts in eastern Kenya and over 20 exhibitors, including Kyeni Innovation Learning Platform (ILePs), Ministry of Agriculture, Ministry of Livestock Development, seed and fertilizer companies, World Agroforestry Centre (ICRAF), agro-dealers, and community-based organizations in agriculture, energy, and health.

John Achieng, KARI-agronomist, reiterated KARI's and CIMMYT's commitment to developing resilient farming systems that can guarantee good yields even when faced with vagaries of climate change and degraded soils. "KARI will continue to develop new and improved technologies for enhanced agricultural productivity and improved livelihoods," said Achieng. George Ayaga, deputy center director of KARI-Kakamega and SIMLESA western Kenya coordinator, lauded the partnerships in implementing SIMLESA, particularly ILePs, noting that they managed to reduce competition among stakeholders, thus enhancing collaboration and reducing implementation costs for partner organizations.

"Together you can approach farmers with holistic packages to agricultural production and ensure competitiveness of the agricultural products," he added. Ayaga also noted that field days were critical in showcasing the best technologies, taking the technologies from the station to farmers' fields, and involving farmers in the research process through their feedback. Alponkina Nyagah, Kyeni ILePs chairlady, stated that SIMLESA's work on CA will be crucial for hunger reduction in Kenya.

## Young scientists from South Sudan on study tour to Kenya

A delegation of young scientists from the Ministry of Agriculture and Forestry, Republic of South Sudan visited Kenya from 25<sup>th</sup> November to 8<sup>th</sup> December, 2012, to gain hands on experience on maize research.

The visit was a follow up to a training course on Crop management, Conservation agriculture and Seed production during 9-12 October, 2012 in Juba, South Sudan. The course was sponsored by the Sustainable Intensification of Maize and Legumes Cropping System for Food Security in Eastern and Southern Africa (SIMLESA) and facilitated by Fred Kanampiu, CIMMYT Agronomist and Dan Makumbi, CIMMYT Maize Breeder. The course attracted 20 male and 6 female participants from Ministry of Agriculture and Forestry in Equatorial States (Western, Central and Eastern) of South Sudan. Topics covered included: Agronomic management of field trials, principles of conservation agriculture, introductory maize breeding, seed production, and on-farm variety testing.

The delegation, comprising of Harrison Henry Boying and Samuel Ohitai Kamal both of Department of Research and Training, Nancy Marcelino Laku, Department of Extension and Rebecca Naidin Atanasio, Department of Horticulture visited centers and areas where CIMMYT is undertaking maize research in collaboration with the Kenya Agricultural Research Institute (KARI): Kiboko, and Embu in eastern Kenya, and Kibos, Kakamega, and Alupe in western Kenya.

The tour kicked off with a courtesy call to Wilfred Mwangi, CIMMYT Regional Liaison Officer, who encouraged them to get as much technologies as possible from Kenya. Expressing their gratitude to be hosted by SIMLESA in Kenya, they pointed out that it was a great opportunity to gain experiences in agronomy and seed systems considering that South Sudan lacked seed quality control with majority of the seed merchants not being professionals. They noted that South Sudan could gain a lot with CIMMYT extending its operations into the country.

As for now, South Sudan is spillover countries of SIMLESA, the others being Uganda, Rwanda, Zambia and Botswana. The main target countries are Ethiopia, Kenya, Tanzania, Malawi and Mozambique. Wilfred and Dan presented each of the four scientists with a laptop.

The team then visited KARI-Kiboko where CIMMYT is implementing four major projects: Drought Tolerant Maize for Africa (DTMA) Project; Combining Breeding and Biotechnology to Develop Drought Tolerant Maize for Africa (WEMA) project; Improved Maize for African Soils (IMAS) Project; and Developing Maize Resistant to Stem Borer and Storage Insect Pests for Eastern and Southern Africa (IRMA III Conventional) Project.

Besides the theoretical lessons, the young scientists also had practical sessions at the station that involved: Layout by using Alpha lattice design; application of fertilizers and Regent pesticides; tapping of shoot bulking/pollination; covering of tassels; collection of pollen and pollination; and Fieldbook training.

From Kiboko, the team visited KARI-Embu where they met Alfred Micheni, SIMLESA site Coordinator for eastern Kenya who briefed them on the Center and SIMLESA activities in the region. In western, the team was received by Dr. Francis Muyekho, the Center Director, KARI-Kakamega who also briefed them on the Center and activities carried out by KARI and CIMMYT. Other centers visited included Alupe and Kibos.

The visitors were indeed very grateful for the study tour. "The visit was fruitful and impressive. We acquired a lot from the field trips and practical sessions carried out in the farms. We were so impressed by CIMMYT work in Kenya that we would like our government to at least establish a research center in South Sudan for trials and general promotion of new technologies to local farmers, especially on maize which has recently become one of the main staple food crops in South Sudan," stated Samuel Ohitai.



Dan Makumbi, CIMMYT Breeder(left) and Wilfred Mwangi (in specs), Regional Liaison Officer, with the visitors: (from left: Rebecca Naidin Atanasio, Department of Horticulture, Nancy Marcelino Laku; Department of Extension, Samuel Ohitai Kamal and Harrison Henry Boying, both from the Department of Research & training.



Nancy Marcelino Laku receives a laptop from Wilfred Mwangi.

## Lessons from the field as SIMLESA's third season unfolds in Mozambique

During 9-13 January 2013, CIMMYT's Southern Africa Regional Agronomist, Isaiah Nyagumbo and IIAM Agronomist Custodio Jorge, accompanied by extension personnel from each respective site, embarked on a mission to examine progress on SIMLESA trials planted this third season. The visit enabled a quick scan on conservation agriculture on-station trials at ISPM, the exploratory trials in Sussundenga Sede, Rotanda, Gorongosa and Manica.

At ISPM, all trials were established successfully despite the persistent rains received in December. Weeds were proving to be a challenge despite the repeated weeding runs under the conditions. Generally the quality of trials were much better this season compared to the last. ISPM Agronomist and Queensland University PhD student Nascimento Nhathumbo was busy collecting soil samples for APSIM modeling and applying residues on the newly established trials. Despite this effort on the main long term trial, previous crop residues from last season were nowhere to be seen on the CA plots, thanks to the termites! Despite this setback the maize crop was generally looking good. Discussions also centered around the need to effectively collect relevant data for APSIM modeling.

In Sussundenga and Rotanda communities, crops were generally doing well during this wet spell. The rotation and intercropping treatments had a better looking maize crop on most trials visited suggesting these treatments were beginning to show their superiority over sole continuous maize treatments, something that was not so apparent in the last season. In the animal traction systems at Rotanda, farmers were happy for the first time with the way the animal traction direct seeder had resulted in better germination on the trials, thanks to the training of extension staff supervising the planting. Using a string, crop rows had also been straightened to give uniform plant populations between treatments. Data collection into the field books had also improved considerably in Rotanda. The team emphasized the need to ensure datasheets are completed timely to ensure reliable data is captured. The major challenge was mainly the termites while lack of alternative biomass sources also caused serious challenges to residue cover provision under CA.

"Termites and livestock have eaten all our crop residues here" complained farmer Taurai in Rotanda.

Similar challenges were also raised in Gorongosa and Manica suggesting that managing residues in such termite prone environments will continue to be a challenge unless effective measures are found to manage them. Other challenges encountered in the field also included white grubs mostly prevalent on sole crop treatments and insect



**Technicians undergo training in data collection and record keeping.**

pests on early planted cowpea. The need to monitor and assess the infestations of these white grubs by treatment could generate some useful data, it was emphasized.

"Early planted cowpea will always suffer from pests unless sprayed effectively," said Domingos Dias the SIMLESA National Coordinator during a wrap up meeting. "But from the field the early planted cowpea on the trials have established good biomass and should yield well if the pests are controlled" responded Isaiah Nyagumbo. "So then what we need is establishing the optimum window for minimal pests

invasion but being timely enough to achieve good or high yields by not delaying planting too far" the team agreed. In cases where one wants to plant cowpeas early then it is important to ensure they have the right insecticides available to control any invading pests.

Much better crops than the previous season were also found in Manica where animal traction systems are being tested but challenges were mostly to do with late planting. Some of the planted trials had just germinated at the time of the visit.

The following were the key issues from the visits following:

- There is need to find solutions to residue cover provision for CA in termite prone environments. Chemical control methods may prove to be too expensive and ineffective under the Mozambican conditions
- Soil borne pests such as white grubs can result in depressed yields if wet conditions persist for long periods and seem to be more pronounced in sole crop or conventional treatments compared to rotation or intercrop plots.
- There is need to revisit the best time for planting cowpeas. Early planted cowpea produces good biomass but suffers extensively from pests while the late planted one may not be as vulnerable but could fail to yield effectively due to moisture stress if the season tails off too early.
- Late planting of trials on some sites still needs to be addressed to ensure farmers fully utilize the rainfall season as recommended
- Frequent monitoring of trials by research staff could be a strategy for ensuring good data collection.



**A healthy cowpea crop in one of the trial plots in Mozambique.**

## SIMLESA agronomists from Kenya visit Australia

Two SIMLESA agronomists from the Kenya Agricultural Research Institute (KARI) were in Australia during 3 – 22 December 2012 to gain hands on experience on undertaking research on Cropping Systems Research.

The exposure visit presented a rare opportunity to Dr. George Ayaga and Mr. Alfred Micheni from the KARI-Kakamega and KARI-Embu in western and eastern Kenya, respectively to work alongside experienced Australian scientists in data collection and management, field plot techniques, laboratory analyses using advanced equipment that enhance accuracy in data collection and measurements leading to the generation of reliable information. This has been pointed out before as one of the weak points in Cropping Systems Research in sub-Saharan Africa where the lack of robust data collection and management tools and equipment hamper the generation of plausible data sets and information.

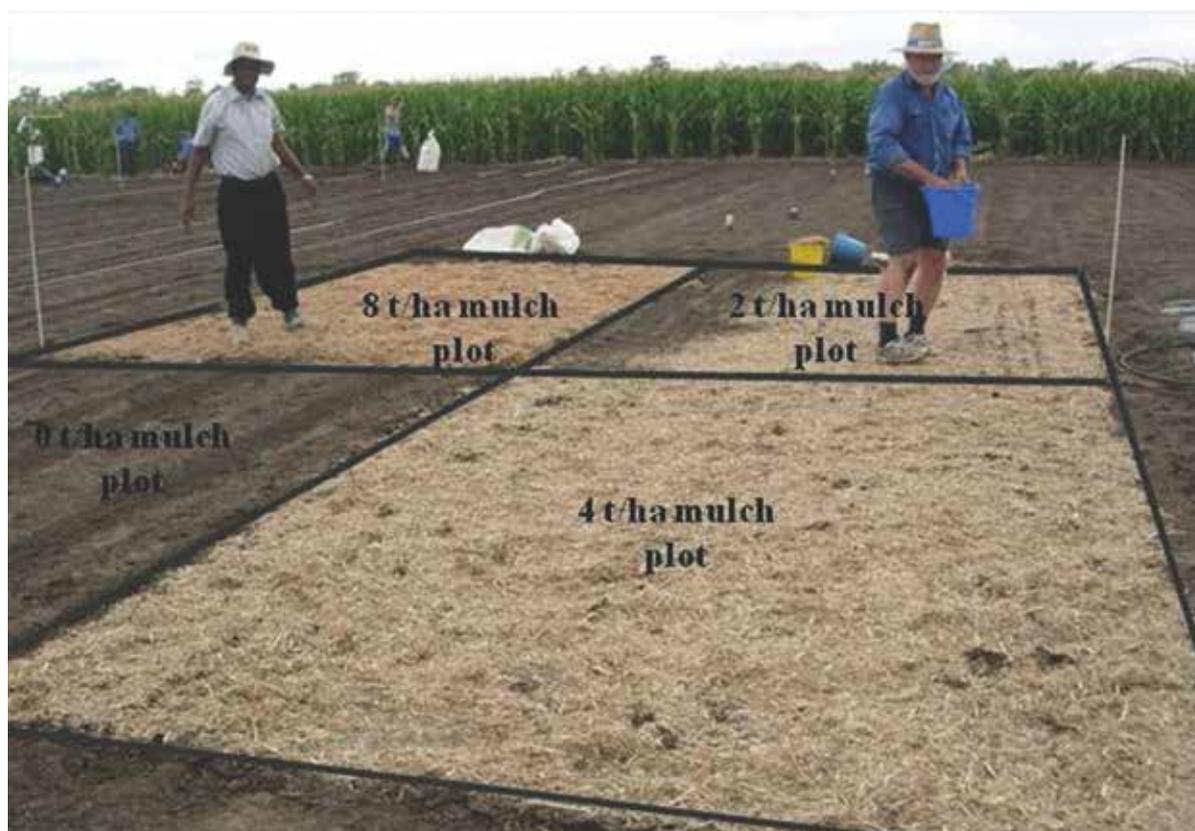
The exposure empowered the Kenyan agronomists to effectively work on field based operations, data collection and management in their respective stations. The challenge, according to George and Alfred would be the availability of similar equipment as in Australia to undertake comparative measurements. However having been introduced to the principles by the Australian scientists the Kenyans believe they have the capacity to improvise the available tools to generate data of a more improved quality than before.

The Kenyan team was the third to participate in the exposure visit, an initiative of Queensland Alliance for Agricultural and Food Innovation (QAAFI), and the University of Queensland (UQ). The first and second teams to participate in the training were from Tanzania and Mozambique during the months of October and November 2012, respectively. Besides handling objective 2 components, the two doubles up as the SIMLESA project site coordinators in their respective sites.

The initiative facilitates two agronomists from each of the five SIMLESA countries to be attached to QAAFI for a period of three weeks to gain hands on experience



**Alfred Micheni (right) and John Dimes (second right) having a discussion with Mr Kelly (left) at his commercial farm in the Darling Down on the western slopes of the Great Dividing Range in southern Queensland, Australia.**



**Ayaga gets hands on experience on how to establish a mulch trial at Gatton Research Station, Australia.**

on Cropping Systems Research using various field, office and laboratory equipment used for various operations, including taking measurements for scientific purposes in agricultural research stations in Australia. This is geared towards achieving SIMLESA's objective 2 -to test and develop productive, resilient and sustainable smallholder maize-legume cropping systems and innovation systems for local scaling out; and objective 5 - Capacity building to increase the efficiency of agricultural research today and in the future.

Extensive exploration of the Embu data base was undertaken to acquaint the visitors with data management approaches, check on plausibility of the collected data in terms of quality, completeness and synthesis, analysis, aspects of modeling and making inferences on the obtained results. This exercise took 3 days during which the use of pivot tables for summarizing, analyzing, exploring and presenting data was discussed. Potential weaknesses in field based data collection and how these could be improved on to enhance the accuracy of data generation were explored and discussed. Comparison of the effects of different variables on select constant parameters were done and scientific implications of the results in the context of the larger SIMLESA project made. Additionally comparison between observed and modeled yield outputs by APSIM model were evaluated and possible reasons for variations discussed.

Alfred and George also participated in soil sampling for determination of gravimetric soil water. The activity was conducted at Gatton Research Station where a maize trial had been established to evaluate the influence of different mulch rates at two levels of soil moisture availability on soil moisture availability to plants, and the performance of a

maize crop. They also had a chance to get insights in weed management in a mulch trial. The mulch trial at Gatton Research Station had both broad and narrow leafed weeds controlled using pre- and post emergence herbicides. For example, pre-emergence herbicide, Stomp (440g/l) is applied at 3.4 l/ha on wet soil before germination of both weeds and crop. Starane, a selective post-emergence herbicide is then applied at 6 leaf maize stage to control broad leafed weeds.

The visiting agronomists promised to share the knowledge gained from Australia with their colleagues in Kenya to further improve on the performance of the field and laboratory operations in Kenya together with quality data.



**Alfred Micheni undertaking field soil sampling.**

## SIMLESA agronomists and technicians trained on APSIM

SIMLESA agronomists and technicians from national agricultural research systems in the target countries gathered in Harare, Zimbabwe in September 2012 for a training course on the Agricultural Production Systems Simulator (APSIM).

This was in response to the recently completed Mid-Term Review that emphasized the pivotal role of APSIM in achieving the project objectives, firstly by quantifying the climate risk reduction of conservation agriculture technology options being evaluated by SIMLESA and secondly, by assisting in technology targeting for scaling-out purposes, especially with regard to designing and expanding the on-farm technology testing.

A key first step towards this endeavour, according to John Dimes, Principal Scientist, Agri-Science Queensland Department of Agriculture, Fisheries and Forestry (DAFFQ), is establishing the model's capabilities and credentials



**John Dimes, Principle Scientist, DAFFQ and principle faicilitator during the APSIM training in Harare.**

for analysis applications in the target cropping systems. The workshop presented the first opportunity to accomplish this task by modeling the observed crop yield responses in on-station and on-farm trials that SIMLESA has generated in its first two years of operation.

"It was the first opportunity for the project agronomists from all partner countries to collectively review and reflect on the broad array of results generated by the project from on-station and on-farm trials being conducted across 10 agro-ecologies," stated Dimes who was also the

principal facilitator. "As such it was important in bringing together the agronomic expertise of the project and utilizing their combined skills and experience to assess progress in evaluating the conservation agriculture technology options for out-scaling to farmers across the target regions."

A major objective of the workshop therefore was the evaluation of APSIM's predictive performance against the range of crop responses observed in the on-station and on-farm experimentation. This allowed a better understanding of the models capabilities and limitations to emerge, enabling the SIMLESA scientist to be more informed as to where and when the results of the model analysis can be relied upon as providing complementary and reliable results for interpretation of experimental results. A second was that the APSIM model was adequately calibrated and tested for applications in climate risk analysis for localized soil, cultivar and cropping system utilizing the full range of conservation agriculture practices (reduced or zero tillage, surface retained crop residues and legume intercrops and rotations). A third is that the skills of the agronomists will be further developed and enhanced so that they can apply the tool as part of their everyday research agenda.

SIMLESA field trials evaluate a range of conservation agriculture practices in maize-legume cropping systems across the five target countries through on-station and on-farm research. At least two agro-ecological regions (higher and lower yield potential) in each country have been selected for experimentation comparing conventional and conservation agriculture (reduced tillage, mulch, and herbicides) practices. On-station trials have been designed to evaluate the longer term benefits of conservation agriculture practices on soil health, crop productivity and climate risk reduction across the agro-ecologies. The on-farm trials are more participatory, been designed to explore farmer adaptations to the conservation agriculture practices and its relative profitability (utilizing large plot sizes to obtain reliable labor input data for instance) while comparing the effects of conservation agriculture technologies on crop yield with that of farmer practice. Notably, the farmer practice treatment is generally implemented with provided inputs of improved seed and fertilizer, and on-station trials mostly use fertilizer and improved variety recommendations relevant to the sites.



**Joe Eyre, one of the SIMLESA scientists taking readings from the TDR data logger at Gatton Research Station mulch trial.**

The workshop brought together 17 participants drawn from the Ethiopian Institute of Agricultural Research (EIAR); Kenyan Agricultural Research Institute (KARI); Agricultural Research and Technical Services (DARTS), Ministry of Agriculture and Food Security, Malawi; the Polytechnic Institute of Manica (ISPM); Mozambique's Agricultural Research Institute (IIAM); Ministry of Agriculture and Food Security (DRD) of Tanzania; CIMMYT; Agricultural Research Council of South Africa, Institute of Soil Climate and Water (ARC-ISCW). Ten of the 17 participants had under-gone introductory APSIM training in Addis Ababa in March 2011.

Topics covered during the training included: Re-familiarization with APSIM User Interface through maize cultivar evaluation exercise; Procedures for parameterization of local cultivar in APSIM; and Simulation of on-station experiments by country teams, including input of measured soil and crop management parameters into APSIM.

Dr Yash Chauhan, Senior Scientist with DAFFQ, active in Objective 3 outputs (Improved germplasm and GxExM characterization) and Mr Nascimento Salomão Nhantumbo, Agronomist and Lecturer with ISPM, Chimoio, active in Objective 2, assisted Dimes in conducting the training.

This was the second APSIM training workshop for SIMLESA agronomists. At the first workshop in Addis Ababa, March 2011, trainees were primarily exposed to the cropping system and user interface features and capabilities of APSIM. Preliminary longer term analysis applications were designed and conducted by the trainees and two model applications produced highly relevant results for analysis of conservation agriculture technologies in maize-legume systems: evaluation of the use of mulch to reduce risks associated with dry spells (Kakamega, Kenya); and use of legume rotations to improve soil organic carbon and maize yields (Chitedze, Malawi).

For the mulch analysis, model outputs showed that 2 t/ha of maize mulch reduced the impact of dry spells in about 10% of seasons in Kakamega, while reduced maize yields due to N immobilization associated with mulch decomposition was apparent in the remainder of seasons. Further analysis showed that an additional 10kg of fertilizer N/ha was required for the maize plus mulch treatment to achieve almost the same yield levels as maize without mulch in the large majority of seasons. For the rotation analysis, soil organic content levels and maize crop yields were higher in the continuous maize scenario (with high fertilizer inputs) compared to the soybean-maize rotation. The model results were explained thus: (i) the productivity of well-fertilized and high yielding maize crops contributed more organic inputs via its well grown root system compared to the much lower yielding soybean crop and (ii) with application of 92 kg N/ha to the maize crop following soybean, any benefits from biological nitrogen fixation in the legume phase were masked by the more than adequate N fertilizer inputs.

## SIMLESA Highlighted at AIFSC-Australia



During 29 November to December 1, 2012, the Australian International Food Security Center held an official launch under the theme during (IFSC) hosted an international conference Food Security in Africa under the theme: *Bridging Research and Practice*. The conference brought together Ministers of Agriculture from Africa, African Diplomats based in Australia, Director Generals of NARS from African countries and academics, major donors and CGIAR Center representatives. The objectives of the meeting were: to launch the AIFSC strategy; showcase

Australia's expertise in research for development and policy development for improved global food security; and showcase Australia's quality agriculture through a short social program.

SIMLESA Program Coordinator Mulugetta Mekuria was a key speaker where he gave a well-received presentation on "Towards sustainable & productive farming systems for Africa: experiences and lessons from SIMLESA".

Hon. Bob Carr, Minister, Australian Ministry of Foreign Affairs and Trade, in his opening remarks confirmed Australia's commitment to enhance food security initiatives in Africa.

A high level African delegation led by The Hon. Professor Peter Mwanza, Minister of Agriculture, Irrigation and Water Development, Malawi also visited the SIMLESA-Australia research activities at the University of Queensland, Gatton Research Station and research projects being undertaken by SIMLESA PhD students.

## SIMLESA program impresses in Ethiopia

The third national annual review and planning meeting of the SIMLESA program for Ethiopia was conducted at the Southern Agricultural Research Institute (SARI), Hawasa, Ethiopia during 25-27 February 2013. The meeting whose main objective was to review SIMLESA-Ethiopia achievements in 2012 and develop implementation plan for 2013 was attended

by more than 60 participants drawn from the Ethiopian Institute of Agricultural Research (EIAR), Regional Agricultural Research Institutes, Ministry of Agriculture, seed companies, CIMMYT, ACIAR and other partners.

Dr. Nigusse Dana, the Director General, SARI, in his welcoming remarks emphasized the importance of conservation agriculture in replenishing soil fertility, increasing farm-level productivity, and hence, improving food security. He also indicated that the SIMLESA program is a timely project in view of the current climate risks and declining soil fertility. Moreover, the program is in line with the current Ethiopian Government agricultural development plan. Dr. Dana reiterated SARI's and the Southern Ethiopian Regional Government's commitment to implementation of SIMLESA program.

In his opening address, Dr. Aduugna Wakjira, Deputy Director General, EIAR stated, "This program has come at the most opportune time when our crop production system is being affected by different production constraints, especially posed by climatic change and



variability." He pointed out that the maize-legume cropping systems are among the most common practices in the agricultural production system of Ethiopia. As almost the whole farming system of Ethiopia is characterized by mixed crop-livestock farming system, the consideration that the Ethiopian expansion component of SIMLESA gave to livestock sector is gratefully appreciated. In these contexts, the SIMLESA program is of critical importance to explore and understand the whole farming system and make use of the information as a base for current and future research and development intervention. Dr. Wakjira also promised the full support of EIAR in implementing the program.

Dr. Russel Haines who attended the meeting on behalf Dr. John Dixon, ACIAR Research Program Manager and SIMLESA PSC member, appreciated the enthusiasm and the good work being done by the Ethiopian partners. He requested the effort to continue more strongly to show visible impacts on the life of small holder farmers. In addition to maize and legume crops, due attention should be given to widely adopt best bet forage crop species/ varieties to sufficiently cater for the livestock component

of the system. He further indicated that ACIAR and AusAID are highly committed working closely with African partners in the areas of agricultural research and development.

Dr. Mulugetta Mekuria, SIMLESA program coordinator emphasized that the participants need to critically review and evaluate the activities implemented during the cropping season of 2012 against what has been planned and the milestones set for the year. Mr. Mekonnen Sime, the national coordinator of SIMLESA Ethiopia briefly highlighted the achievements made through the implementation of the program activities in 2012. He stressed that with the additional funds obtained AusAID to implement the expansion component of SIMLESA, three additional draught prone farming systems were covered in 2012.

Key recommendations from the meeting included: Strong linkages among different objectives; further strengthening of the innovation platforms to bring onboard all actors in the input-output value chain systems; and the urgent need to publish the huge dataset/information generated over the last three years.

### Upcoming events

- **10-22 February 2013** Technical Regional SIMLESA Malawi and Mozambique Field Tours
- **11-15 March 2013** International SIMLESA Field tours in Malawi & Mozambique
- **18-22 March 2013** SIMLESA Annual Partners & PSC Meetings

### About the Bulletin

This bulletin is a quarterly publication of the Sustainable Intensification of Maize-Legume based Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) Program, funded by Australian Centre for International Agricultural Research (ACIAR), and managed by the International Maize and Wheat Improvement Centre (CIMMYT).

It is implemented by the National Agricultural Research Systems (NARS) of Ethiopia, Kenya, Tanzania, Malawi and Mozambique in collaboration with the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), International Crops Research Institute for Semi-Arid Tropics (ICRISAT), the Agricultural Research Council of South Africa (ARC), the Queensland Alliance for Agriculture and Food Innovation (QAAFI) in association with Queensland Department of Employment, Economic Development and Innovation, (QDEEDI) Queensland, and Murdoch University in Western Australia. SIMLESA aims to improve the livelihoods of smallholder farmers in drought-prone areas of Eastern and Southern Africa, through intensification of maize-legume cropping systems.

SIMLESA focuses on five countries in Africa—Ethiopia, Kenya, Malawi, Mozambique, Tanzania—and Australia, with spillovers anticipated in neighboring countries. The sustainable intensification of maize-legume cropping systems, while reducing yield variability, requires an integrated approach to the complex production and marketing system for these crops. Through participatory research and development

with farmers, extension agencies, non-governmental organizations, universities and agribusinesses along the value chains, the program aims to improve maize and legume productivity by 30% and to reduce the expected downside yield risk by 30% on approximately 500,000 farms within 10 years.

