SIMLESA Rwanda Country Report July 2016 – June 2017

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

During the year 2016/2017, participatory survey, using focus group discussion method, was undertaken in all the three project sites: Gashora, Bugesera District, Runda, Kamonyi District and Cyuve, Musanze. It was noted that CA, defined as minimum tillage, mulching, appropriate use of inputs/fertilizers and maize-bean rotation was a feasible option in Rwanda. Farmer were impressed by the capacity of CA to control soil water erosion on steep slope, to improve infiltration of water in the water lodging places and finally to improve soil conditions and positive impact on crop conditions, including pest resistance. However, it was observed that the introduction of CA implies additional need of inputs in terms of cost of mulching materials and additional work in terms of frequent weeding tours. Fortunately, at the third season the work and inputs reduced as mulch biomass become available and weeds diminish or disappear as a result of soil properties improvement. As consequence of advantages and challenges of CA, farmers conditioned the large adoption of CA by availability of biomass for mulching, to mind-set change (mobilisation and training), mechanization and mechanical or chemical weeds control. This is very normal as the entry point of CA is that it reduces the labour thereby allowing saving time for other off-farm activities.

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

In Rwanda, the period of July 2016 to July 2017 covers two growing seasons. The first season beginning in September 2016 is locally termed 2017A and the second starting in February 2017 is termed 2017B. During this period, on-farm demonstration trials continued on the project sites of Gashora, Runda, and Cyuve located in Bugesera, Kamonyi and Musanze Districts respectively. In Bugesera, during 2017A, six farmers practiced maize while six other practiced bean. The same number of farmers practiced also the rotation maize-bean in Kamonyi. In Musanze, the project worked with three farmers who grew maize. In 2017 B, the project worked with the same numbers of farmers in all sites who practiced the rotation maize-bean. The objective of the demonstration trials was to test the technical feasibility of CA. The main factors were Conservation Agriculture (CA) and Tillage Agriculture (TA) blocks. The secondary factors were manure (t1), manure + fertilizers (t2) and Manure+ fertilizers + bio fertilizers (t3).

Results showed that, in Kamonyi the effect of inputs was significant for both maize and bean. The best treatment was t3 followed by t2 and followed by t1. There was no significant difference between CA and TA for t3 and t2. However, t1 in TA was significantly superior to t1 in CA. In Bugesera, there was no difference between treatments for bean. For maize, the results were similar to those of Kamonyi. In Musanze, there was no differences between treatments in both blocks and for both crops. In conclusion, in Kamonyi, CA requires fertilizers for both bean and maize. In Bugesera, CA is possible without fertilizer for bean; for maize, it requires fertilizers. In Musanze, CA is feasible without fertilizers for both maize and bean. The difference in crops responses per site and per crop could be explained by soil fertility and crop nutrient requirement factors.

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

During the period of July 2016 to June 2017 SIMLESA Rwanda used maize hybrid seeds from seed companies. The bean Varieties used were obtained from Harvest Plus, a CIAT project collaborating with RAB.

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

During the period of July 2016 to June 2017, five AIPs, conducted quarterly meetings. Issues were related to drought and diseases especially for maize crop and how small irrigation scale can benefit to the farmers working

in all the AIPs. Maize was attacked by army warms and pesticides were distributed freely to farmers for the first application. The second and third applications doses were purchased by farmers' groups under the AIPs coordination.

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

During the report period, at least 8 trainings were conducted, including two for field technicians and 2 for farmers. Eight field technicians were trained including 3 women and 5 men. A number of 25 farmers were trained including 15 women and 10 men. The foci of the training for the technician was (1) to understand the principles of CA and to know how to put them into local context (2) to help them to understand the trials protocols (3) to master the monitoring and evaluation techniques to be used during the farmer field day operations. The training of farmers has the same objectives but with different training approach. Farmers' trainings were associated with field visits. During the field visits, farmers were invited to compare the performance of the crops on a field divided into CA and TA blocks. Each block was subdivided in three sub plots corresponding to the three treatments and placed side by side. Farmers were invited to compare themselves the same treatment under CA and TA and to make general comments about barriers and drivers of Adoption.

Cross cutting considerations

While one of the CA entry point is the labour saving, it has been observed that this advantage occurs at least at the third growing season. It is at this period, that the positive impact of no tillage, mulching, crop rotation and correct use of other inputs become evident on soil properties and effectively reduce the labour. In between CA involves investment cost in terms of much collection and application and frequent hand weeding. This labour cost prior to improvement of soil properties may constitute a barrier to CA adoption by small and less endowed farmers. The solution is small mechanisation and integration of CA with other mulching generating systems such as Agroforestry (hedgerows along contour lines).

Another phenomenon observed is the trend that CA systems tend to be equal to TA in biomass production and inferior in grain production. This means that during the vegetative period, both CA and TA have the same look. But when it comes to evaluate crop yields CA become inferior. This is observed much with maize but could be the case for bean also (data being analysed). Therefore, there is need of doing more research to understand the impact of the introduction of CA on nutrient and water use efficiency, soil organic matter dynamics, control of weeds and crop disease and the interactions between them. More precisely, research is required to understand the dynamics of key soil macro-nutrients involved in the grain formation mechanism such as N, P and K. For instance, Isotopic techniques (Nitrogen-15 and Carbon-13) can be effectively used to track carbon, water and nutrient movement and their dynamics under CA in diverse agroecosystems (http://www-naweb.iaea.org/nafa/swmn/topic-conservation-agriculture.html).

To ensure sustainability of SIMLESA activities, the team of Rwanda has integrated these activities in the Rwanda Agriculture Board (RAB) activities. The implication is that they are owned by the Rwanda research and extension institute. This means that the breeding of maize and bean varieties will be continued by the RAB maize and bean programs whiles other activities related to agronomy and capacity building will be continued by relevant RAB programs.

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