

From trial plots to mega fields: How Conservation Agriculture-based Sustainable Intensification can become the new normal in Ethiopia

Summary and key facts



Conservation agriculture-based sustainable Intensification (CASI) has been proven to enhance crop productivity and reduce farm downside risk in Ethiopia



There are a number of tested, verified and profitable CASI technologies for farmers across the varying agro-ecologies in Ethiopia. However, these technologies are not being adopted by the number of farmers needed to have a significant impact on national food security



CASI technologies promotion moves through innovative approaches of financing stakeholders on a competitive basis for enhanced technology dissemination

What is the problem?

Productive farming technologies are not reaching enough farmers to improve food security

To strengthen Ethiopia's food security and sovereignty will require the majority of smallholder farmers to use resilient and modern farming practices to overcome the increasing challenges of climate shocks and population growth. Conservation Agriculture-based Sustainable Intensification (CASI) technologies, including minimal soil disturbance, crop rotation and intercropping bundled with improved crop varieties resistant to disease and heat, fertilizers has proven to improve the resilience and productivity of Ethiopian farming systems. However, these practices are not widely used by the smallholder farmers that would most benefit from them.

The development of new technologies to improve food production, like CASI practices, are not an end in themselves unless the target beneficiaries are properly reached. The low adoption of better

technologies results from lack of effective scaling methods to bring them to the farmers. Scaling methods, such as training and support programs, are needed to disseminate improved practices, crop varieties and inputs to highest number of farmers in widespread geographical locations. Given complex technologies and differing farmer needs, a number of approaches are needed to be employed as far as the extension approach are concerned.

Scaling is enabling farmers in different locations to identify their problems, trial a range of recommended technologies and make informed decisions about improving their livelihoods. Despite the existence of improved technologies, their low use in Ethiopia shows there is a problem in how they are promoted and disseminated to farmers.

What solutions were identified from research?

A multipronged approach to scaling improves the reach of Conservation Agriculture-based Sustainable Intensification

In a move to tackle the pressing issues of degrading soil fertility, continuous monocropping and drought, Ethiopia has participated in Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) project since 2010. At the beginning, experiments were conducted on CASI practices across the varying agroecologies in the country under the objectives of enhancing the understanding of CASI practices for maize-legume cropping systems; testing and adapting CASI-based intensification options; increasing the range of maize, legume and fodder/forage varieties available to smallholder farmers and developing local and regional innovation systems and scaling out modalities.

In the beginning, selected farmers hosted long term trials in their fields. Around the long-term trials, agricultural innovation platforms (AIPs) were established to enhance technology evaluation and dissemination. Farmers, local agricultural development agents and agricultural experts, farmers' cooperative union, seed enterprise and researchers formed the AIP forums. The notable part was working through the agricultural extension structure (district offices), with backstopping from SIMLESA researchers.

The AIPs were an important strategic approach as they facilitated CASI learning and information sharing for stakeholders. Some of the AIPs evolved into or merged with more structured societies such cooperatives to facilitate:

- i. Collective purchasing or acquisition of inputs, fertilizer, improved crop varieties

- ii. Collective selling of produce especially grain and produce
- iii. Skills acquisition, including use of CASI mechanization, marketing and training

Agronomic experiments were used to demonstrate CASI technologies from long term conservation agriculture trials in representative agroecologies in collaboration with multi-stakeholders from agricultural extension, farmers cooperatives in most of the cases though seed enterprises and non-government institutions joined in some of the places. The demonstrations were complemented by field days, exchanged visits to multiply the information dissemination. Later the approach was changed when the Competitive Grant Scheme (CGS) came into operation. In Ethiopia the scheme followed a unique approach, utilizing a modified version by funding a highly organized Ethiopian government led extension system to introduce and scale out CASI technologies. The budget introduced was to bring together multiple-stakeholder from research, seed production and extension. That is the grant was provided on expression of interest (EOI) from regional agricultural development offices at zone level, which were closely working with the research centers hosting SIMLESA program.

In Ethiopia, the Ministry of Agriculture has a well-organized extension system and has high extension agent to farmer ratio (1:600) that disseminated CASI working closely with farming communities. The CGS was instrumental in scaling out CASI practices, messages and technologies.

Scaling approaches used in SIMLESA-Ethiopia since 2010

Approach	Methods	Who controls/ leads	Target group/ members	Financial Source	Benefit
AIP	Stakeholder meetings/ workshop, field visit, demonstrations	Farmers Cooperatives or CBOs leader, DAs	Farmer groups, cooperative union, and Extension workers and researchers	SIMLESA and Stakeholders	Group leaning, Innovation, low transaction costs, economies of scale
Extension visit	Demonstrations, structured training, Farmer groups, farm visits	Public extension	farmers	Government	Improved awareness and demand for the new technology
Mass communication	Print media (esp. leaflets), television	Government	Farmers, agri. officials	Government, SIMLESA	Mass reach

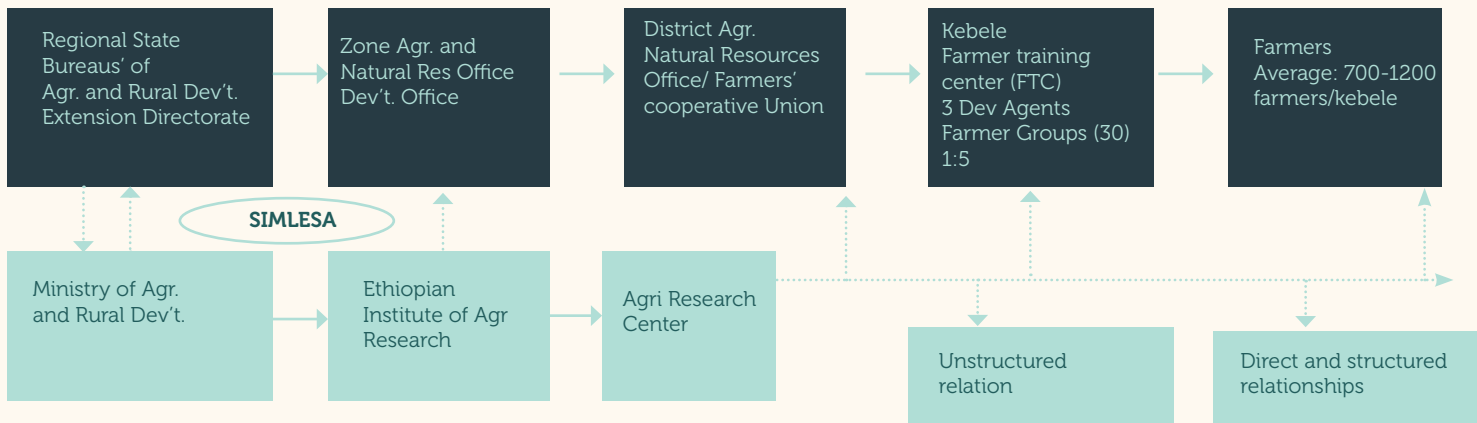
Farmers reached through scaling:

From 2010-16, nearly 500,000 farmers were reached through scaling out before the CGS began. As shown in Table 4, media and farmer field days were the main source of exposure to farmers. This figure constitutes 3% of smallholder farmers in the country and 9.6% of major maize and legumes producing smallholder farms in the project area.

Between 2012 and 2017, an estimated 47,400 farmers adopted SIMLESA technologies (39,843 men and 7,594 women). The adoption

seems stepwise where 30% used maize legume intercropping, 10% used herbicide and 4% used intercropping and minimum tillage. Among those farmers trialing CASI technologies at least 56% of the participants adopted one component including minimum tillage and crop rotation. When we look at improved maize legume adoption, farmers were influenced heavily by other farmers to adopt. Yet, the share of adopter farmers those involved in scaling out program was significant in the adoption.

Structure of the major extension system in Ethiopia



What are the opportunities for policy action?

Use multiple approaches to scale CASI, foster coordination between extension and private sector



Engage experts in the development of extension manuals for CASI. By producing quality learning materials, the benefits of CASI will be mainstreamed into the extension message and go into scale in target production areas.



Use multipronged approaches to scaling CASI practices. Use of multiple extension methods - from individual mentoring to mass media messaging - can serve instrumental role in promoting effectively CASI technologies. Introduce incentives for farmers to practice CASI. Applying different approaches in CASI technology promotion such as investing in incentives, such as subsidized seed or fertilizers, can positively improve CASI adoption.



Improve local access to inputs through commercial subsidies. Improve the supply of herbicides for smallholder farmers in the local markets through tailored short term subsidies for agro dealers.



Legislation to restrict free grazing and promote crop residue retention. CASI requires a shift in crop livestock interaction in order to keep crop residues on the farm. This calls for certain social contract such as bylaws beyond awareness creation and training.



Boost the reach of Competitive Grant Schemes (CGS). The CGS should be mainstreamed into the extension system as an important innovation for these departments. It can be introduced at district level so extension workers and frontline experts utilize the approach in promotion of agricultural technology. Farmers training centers can be an appropriate platform for this.

Why act now?

Failure of smallholder farmers to adopt sustainable intensification of cropping systems will have devastating medium to long term effect on the ability of the country to obtain food security and sovereignty. The adoption of proven CASI based technologies is imperative since the soil degradation is pushing the country to point of no return and

threatening crop production. To make adoption of CASI technology a reality investing the technology promotion producing mass media (printed and audio visual), policy documents, and making CASI part the country's extension package is a critical endeavor.

References and sources

1. Bedru Beshir, Tadesse Berhanu, Legesse Hidoto, Feyera Merga, Goshime Muluneh, Yalfal Temesgen and Moti Jaleta (2019). Enhancing resilience and sustainability on african farms: Key findings and recommendations for Ethiopia. SIMLESA project country synthesis report. CIMMYT/EIAR. El Batan/Addis Ababa.
2. Abebe, Z., Birhanu T., Tadesse S., Degefa K. (2014). Conservation Agriculture: Maize-legume intensification for yield, profitability and soil fertility improvement in maize belt areas of Western Ethiopia. *International Journal of Plant and Soil Science*, 3(8), 969-985.
3. Abera Degefa. (2014). Effects of different soil management practices under maize-legume production system on soil, water, nutrient and yield in Bako, West Oromia, Ethiopia MSc Thesis.
4. Liben, F.M., Hassan S.J., Weyesa B.T., Wortmann C.S., Kim H.K., Kidane K.S., Yeda G.G., Beshir B. (2017). Conservation agriculture for maize and bean production in the Central Rift Valley of Ethiopia. *Agron. J.* 109,1–10.
5. Liben, F. M., Tadesse, B., Tola, Y. T., Wortmann, C. S., Kim, H. K., and Mupangwa, W. (2018). Conservation agriculture effects on crop productivity and soil properties in Ethiopia. *Agron. J.* 110, 758–767.
6. Merga, F., Kim H.K.. (2014). Potential of conservation agriculture-based maize-common bean system for increasing yield, soil moisture, and rainfall-use efficiency in Ethiopia. N.

Please also visit us at:

www.simlesa.cimmyt.org for more publications and data on Ethiopia and other SIMLESA program countries

Acknowledgements

Financed by the Australian Centre for International Agricultural Research (ACIAR), SIMLESA program was led by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with Ethiopian Institute of Agricultural Research (EIAR), numerous partners, including national agricultural research institutes in Kenya, Malawi, Mozambique, Tanzania, Rwanda and Uganda in collaboration with other CGIAR centers. Other regional and international partners include Queensland Alliance for Agriculture and Food Innovation (QAAFI) of the University of Queensland, Australia and the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), among others.

For further enquiries please contact

Bedru Beshir, SIMLESA country coordinator,
Email: bedrubeshir2009@gmail.com, phone: +251 911382489

Endeshaw Habte, SIMLESA Socio-economics,
Email: endhabte@gmail.com; phone: +251 921644376

Tadesse Birhanu, SIMLESA coordinator for agronomy,
Email: marsymoy@gmail.com, phone: +251 917 817610