CIMMYT

SIMLESA
Sustainable intensification of maize and legume cropping systems for food security in eastern and southern africa

IIAM
Instituto de Investigação Agrária de Moçambique

Australian Government
Australian Centre for International Agricultural Research

Sustainable Intensification Based on Conservation Agriculture: The Business Case

Summary and key facts

Experts predict maize and legume yield losses of up to 25% due to increasing frequency of droughts and higher temperatures

Sustainable intensification, raising yields and protecting and improving the environment is an urgent imperative

Conservation agriculture combined with a package of good agronomy, offer several benefits that contribute to yield increases of up to 38%

Sustainable intensification practices are adaptable to diverse agroecology's and social conditions

What is the problem?

Developing resilience through paradigm shifts in smallholder farming systems

Climate change and variability present major challenges to agricultural production and rural livelihoods in Mozambique. In recent years, drought, flooding and in-season dry spells have impacted negatively on the country's agriculture. The impact of climate change on farmers' output has seen a reduction or loss of production and productivity during bad seasons.

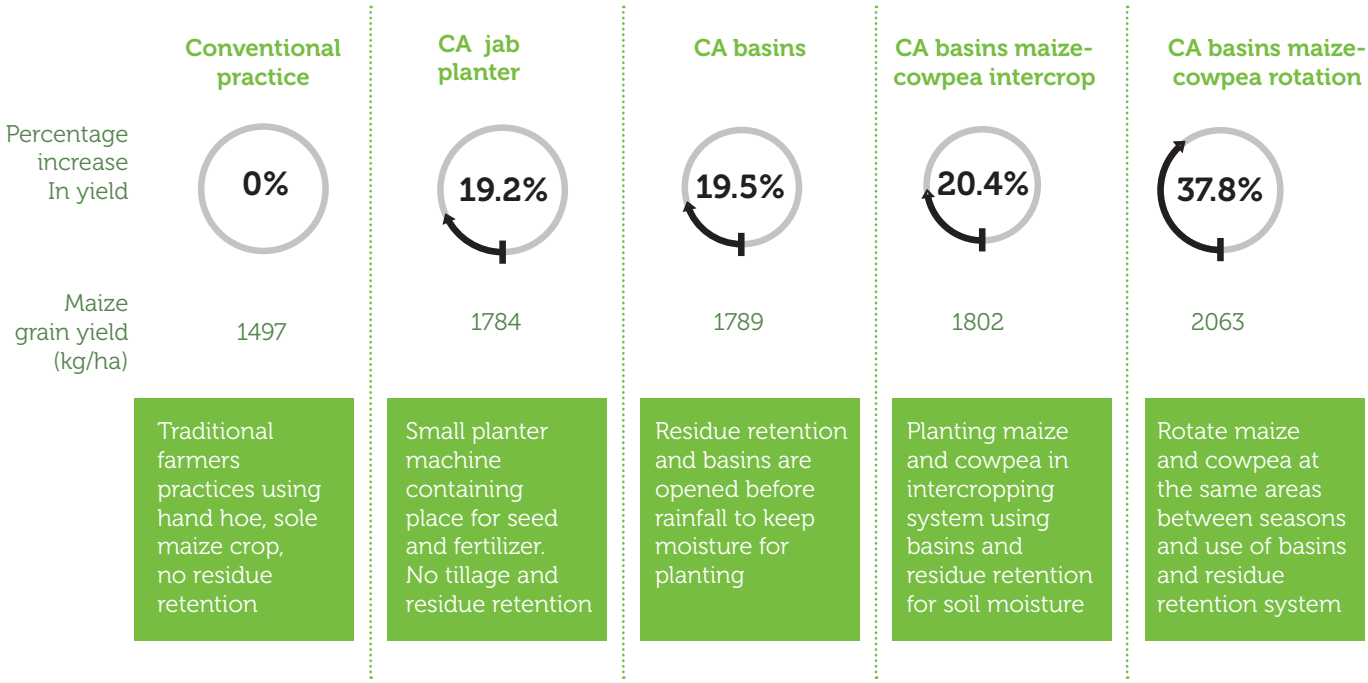
Climate change threats require paradigm shift in agriculture. The need for Sustainable intensification, raising productivity while conserving and even improving natural resources, such as water and land, is well-recognized. Research shows practicing conservation agriculture contributes to sustainable intensification. Conservation Agriculture (CA) defined as minimal soil disturbance, crop residue retention and diversification through crop rotation and intercropping is seen as one of the approaches that can be used to address declining soil fertility and the adverse effects of climate change in southern Africa. While research to make CA practices locally adaptable is continuing there is evidence that shows these sets of practices can raise productivity and impact positively on soils in smallholder settings of Mozambique.

What solutions were identified from research?

The evidence and why it is important

The SIMLESA project, implemented by a collaboration between the Mozambique Institute of Agricultural Research (IIAM) and International Maize and Wheat Improvement Center (CIMMYT), among other international collaborators, gained positive results testing Conservation Agriculture-based Sustainable Intensification (CASI) trials and demonstrations in many communities in the central region of Mozambique. CASI technologies and practices tested included the use of special equipment to minimize soil disturbance, mechanization to reduce labor, covering the soil all year, use of improved stress tolerant crop varieties, timely planting and crop.

CASI practices improve yield and productivity. Collaborative research found use of CA with an appropriate labor saving direct seeder, yielded an average of 12 - 27% more maize compared to conventional practices. Other practices such as basins yield about 15% more in central Mozambique. Over 6 years, maize yields increased from 19 to 38%, well above the 7% target set by the Ministry of Agriculture. All CA systems had significantly higher maize yields than conventional hand-hoe tillage systems (1497 kg ha-1). CA in maize-cowpea rotation had the highest yields (2063 kg ha-1). CASI practices increased maize, cowpea, and soybean yields by 37, 33 and 50 percent, respectively, in the low-potential areas (Sussundenga, Manica and Gorongosa) and maize yields by 46 percent in the high-potential areas (Angónia).



CASI practices improved income and saved labor.

The use of CASI technologies and practices is economically viable for smallholder farmers in Mozambique. SIMLESA research showed CASI significantly reduced labor required for farming activities. The use of CASI reduced labor by 15 to 28 person-days per hectare across 3 seasons in high and low potential areas. The labour and time saved for both men and women could be allocated to other household and off-farm activities for income generation.

CASI labor saving practices benefit women farmers.

Women undertake most of the physically grueling farming activities along with unpaid household chores making them stretched for time and often need to hire labor. As a result, CASI's labor-saving benefits can be especially beneficial for women. Practicing conservation agriculture reduced agricultural labor requirements by up to 28 person-days per hectare in SIMLESA trials all agro-ecologies.

Opportunities for policy action

Mainstream CASI in policy processes and maintain long term knowledge generation

Include proven CASI strategies at all levels of policy conversations

There continues to be several efforts at research and development of CA. The focus of SIMLESA on the full set of CA combined with sustainable intensification practices is unique. The time is right for the agricultural and broader development community to provide basic minimum standards and guidance on the key principles for development activities that seek to mainstream CA as one menu item for farmers to choose in sustainable intensification.

Policy conversations about CASI should not be done only at the higher levels. The inclusion of CASI at all levels, from ministerial levels to local extension departments, will facilitate the expansion and more use of by farmers. The main opportunities for action include continuing to support adaptive research beyond project areas and remain focused on extension delivery of CASI evidence

Support long term demonstrations for farmer capacity building on CASI.

The most important beneficiaries of CASI evidence and information are farmers. Therefore, evidence must be presented in a way that farmers can objectively observe and learn from. At the core is to increase the amount of evidence available as the basis for scaling CASI to more farmers or locations. With an evidence base that is accumulating, multi-locational, replicable and current, it will be much easier to mainstream CASI as an important part of sustainable agricultural intensification.

Invest in long term research sites to create a "live" knowledge base on CASI

The reported evidence on yield, labor saving and soil impacts have been amply demonstrated but on limited scale. Nevertheless, the basic principles underpinning CA and how to integrate it successfully in stallholder farming remains new. Thus, the existing evidence base needs to be beefed up further. This can be done by continued refinement and testing under more socioeconomic, agro-ecological and policy circumstances. This can be achieved by budgeting for research activities within existing climate change programs. Any research funds thus made available should be used for multi-locational trials or expand the research areas where CASI has been implemented.

Why act now?

There is a considerable evidence base for CASI in terms of yield and environmental benefits. However, this evidence base need to be beefed up, regularly updated and then communicated to farmers. If these research results are not utilized, there will be missed opportunities to progress towards sustainable intensification. Any evidence-based action must be taken start this progress towards sustainable intensification.

References and Sources

1. Dias, Domingos J.B., Eduardo P. Mulima, Maria da Luz Q. Cadeado, Custodio J.F. Jorge and Jose D. dos Santos Chiocho, (2019). Enhancing Resilience and Sustainability on African Farms: Key Findings and Recommendations for Mozambique. SIMLESA Project Country Synthesis Report. CIMMYT/IIAM. El Batan/Maputo.

Please also visit us at:

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

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