

COUNTRY POLICY BRIEF ► **ENHANCING AGRICULTURAL RESILIENCE AND SUSTAINABILITY IN TANZANIA**

Building resilience to climate change: The promise of Conservation Agriculture-based Sustainable Intensification in Tanzania

Summary and key facts



Rainfall variability, erratic weather, soil erosion are main causes of poor harvests



The benefits of conservation farming include: Increased yields, reduced drudgery and labor savings



A range of public-private institutional innovations were employed with success; reaching over 50,350 farmers with conservation farming practices



Conservation farming must be institutionalized by integration into the mainstream work programs of national research and extension

What is the problem?

Unsustainable farming practices worsen food insecurity

Maize and legume intercropping is the preferred farming system in Tanzania; covering the majority of agricultural land. Despite its importance to the country's food security and smallholder livelihoods, unsustainable practices are holding the sector back. Among the major causes of low productivity are drought and low soil fertility. Drought for example causes major yield losses estimated at 246,820 tons per year. Soil erosion, caused by intensive farming leads to soil losses estimated to be 15.7t/ha/year in 2008 in Kondoia. In the Usambara Mountains, soil erosion has been estimated to vary from 72 t/ha/year to 120 t/ha/year. Soil losses of 28 to 72 t/ha/year have been observed in the arable lands on the slopes of Mount Kilimanjaro. Traditional farming practices have led to an annual loss of fertile soil by 25%, leading to low crop yields and siltation of water bodies, some of which are drying up or threatening to completely disappear.

PRODUCTIVITY	
MAIZE	
1.2 t/ha	4.5 tons/ha
Conventional Practices	CASI technologies
LEGUMES	
0.38 ton/ha	1.4 tons/ha
Conventional Practices	CASI technologies

What solutions were identified from research?

The benefits of Conservation Agriculture-based Sustainable Intensification (CASI)

A paradigm shift towards Conservation Agriculture-based Sustainable Intensification (CASI) is needed to maintain and improve crop yields as climate change worsens. This involves promoting practices that emphasize minimizing tillage, crop rotations and intercrops, and maintaining soil cover using crop residues. The Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA) project pioneered adaptive and farmer centric research on a basket of CASI practices and technologies from which farmers choose. Based on their socioeconomic and agroecological context. The CASI basket included optimal combinations of minimum soil disturbance through direct seeding, use of rip lines, herbicides, intercropping of maize and legumes, and soil cover.

Research undertaken over the last eight years indicates several benefits for farmers who have utilized any or all the combinations of the basket. Adoption of CASI increases resilience to climate change effects. CASI technologies and practices improve the soil organic matter content and in turn the soil's moisture retention capacity. This leads to higher maize and legume yields even under drought conditions. In 2011, which was a drought year, fields using CASI performed better implying the potential for CASI to lower the risk of yield loss during adverse weather.

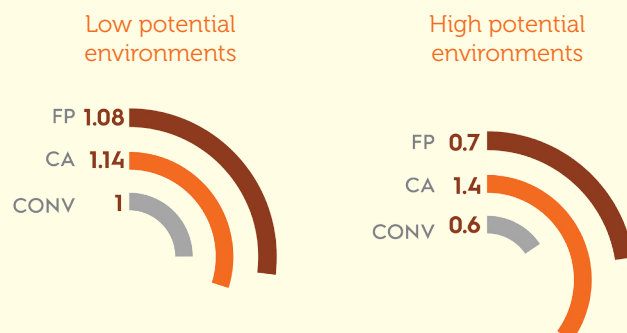
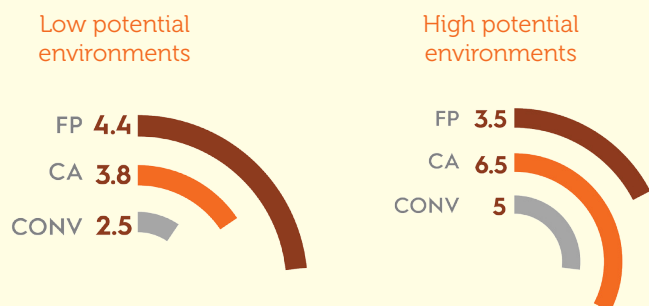
Yields increase several-fold when farmers adopt CASI practices. Farmer field level results from eight cropping seasons over a four-year period indicate a substantial increase in yields for farmers who adopt CASI compared to two other farming practices – conventional (CONV) and traditional farming (FP). Yields increased from 0.38 tons/ha to 1.5 tons/ha for pigeon pea and from 1.2 to 4.5 tons/ha for maize for farmers practicing CASI compared to non CASI practice.

Soil moisture and organic carbon content under CASI and conventional farming practices measured at crop flowering (4-season average).

Practice	Moisture (%)	Organic matter (%)
Conventional farming	20.69	2.55
CASI	22.23	3.23

Average maize yield t/ha for 8 seasons in low (a) and high (b) potential environments in Tanzania.

Average legumes yield t/ha for 8 seasons for low (a) and high (b) potential environments in Tanzania



FP: Farmers Practise CA: Conservation Agriculture Recommendation CONV: Conventional Recommendation

Opportunities for policy action

Invest in scaling modalities and training

Given its potential to address economy-wide challenges, we propose that CASI be institutionalized by becoming integrated in the regular program of work of TARI, the national extension system in the Ministry of Agriculture and Local Government Authority (LGA), maize and legume value chain service providers, development partners and other players in the agricultural development field.



Use of multiple scaling-out approaches

The SIMLESA project used multiple approaches to scale out CASI to more farmers in the project sites. These included use of host farmers to demonstrate the technologies at village level, farmer field days, farmer exchange visits, Agricultural Innovation Platforms, partnerships with change agents and use of mobile telephony (SMS). These approaches enabled the project to reach a total 61,034 farmers within the project period. Partnerships with change agents in civil society and private sector alone including the local NGO - RECODA¹, the national farmers' organization - MVITWATA² and private seed company – SUBA AGRO increased project coverage from 10 communities in 2010 to 142 communities by 2018 amounting to a total of 48,000 farmers.



Investing in short and long-term training to build a critical mass of researchers and trainers in CASI

CASI is knowledge intensive at all levels of extension, training and education. To ensure a critical mass of actors who are aware of CASI, academia should be brought on board and CASI training modules mainstreamed in agricultural educational curricular at all levels.



Institutionalizing CASI in Tanzania's agricultural production

This will require system innovations and investments in a suite of institutional arrangements that should be championed by all stakeholders with the Ministry of Agriculture providing leadership. Key actions may include mainstreaming CASI in the national agricultural investment plan as a budgeted program and integrating CASI in the agricultural educational curricular at all levels.

Why act now?

Low yields due to soil degradation will worsen food insecurity for many years to come if not addressed. Conservation agriculture-based sustainable intensification practices can be considered and institutionalized as one set of options to arrest this situation.

¹RECODA is Research, Community and Organizational Development Associates

²MVIWATA is Swahili acronym for National Networks of Farmers' Groups in Tanzania (Mtandao wa Vikundi vya Wakulima Tanzania)

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

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