



Briefing Paper

Farmer-centric Scaling of Agroecology Innovations Boosts Crop Productivity and Increases Adoption in Central Tanzania

Executive Summary

The ResComm project, "Enabling a Resilient and Prosperous Community through Participatory Agroecological Practices in Central Tanzania," has significantly enhanced agricultural productivity and resilience among smallholder farmers. Using a lead farmer-centric approach across eight community learning sites, the project promoted integrated agroecological practices, including improved crop varieties, intercropping, tie ridges, and *Fanya juu/chini** soil conservation techniques.

Between 2021 and 2023, over 650 farmers directly adopted these innovations, benefiting over 7,300 indirectly, with an additional 400 adopting them in 2024. Yields of pigeonpea and sorghum increased by up to 2–3 times, and adoption rates in participating villages reached 60–90%.

The project also empowered women, who made up 45% of beneficiaries, and delivered environmental and economic benefits, including increased income and

reduced land degradation. ResComm demonstrates the potential for scaling sustainable practices across similar regions, fostering agricultural transformation, improved livelihoods, and climate resilience.

Problem Statement

Farmers in the central semi-arid region of Tanzania commonly own small land holdings between 0.2 and 0.8 hectares and produce sorghum, maize, groundnut, sunflower, cowpea and pearl millet. The productivity of these crops is often below one ton per hectare.

Before the start of the project, farmers used improved crop varieties to some extent and also practiced manuring and tie ridges only in selected villages.

Adaptation of integrated farm intensification practices such as intercropping, improved varieties, tie ridges, and soil and water conservation were very limited. The project promoted the use of integrated and agroecology-based farm practices to increase crop productivity and build community resilience.

Methodology Used

The project implemented a farmer-managed agroecological approach in eight community learning sites through a lead farmer who plays a pivotal role in fostering peer-to-peer learning and practice of improved agroecological practices. The lead farmer-centric technology scaling is backed with intensive knowledge and skill refresher training to ensure a farmer-led agroecological management approach.

A lead farmer in each of the eight learning sites established a community of farmer learning groups who implemented the best agroecological practices and gradually expanded to new villages and new farmers through iterative field learnings and exchanges during field visits and field day events.

From 2021 to 2023, more than 650 farmers used integrated agroecological practices, such as improved crop varieties of sorghum and pigeonpea, intercropping of sorghum and pigeonpea, tie ridges, and *fanya juu /chini* practices. Indirectly, more than 7,300 farmers benefited from the implementation of agroecological practices. An additional 400 farmers are implementing the practices in 2024.

Analysis and Discussion

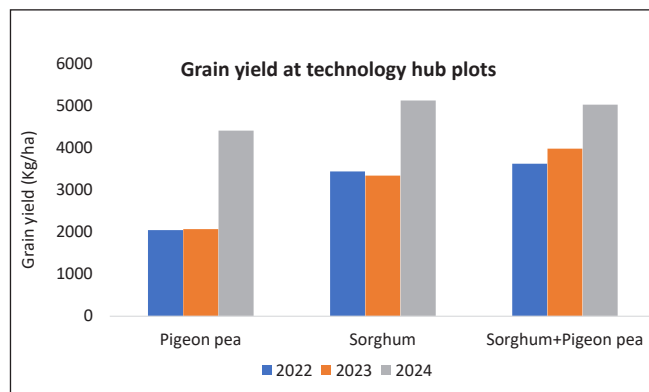
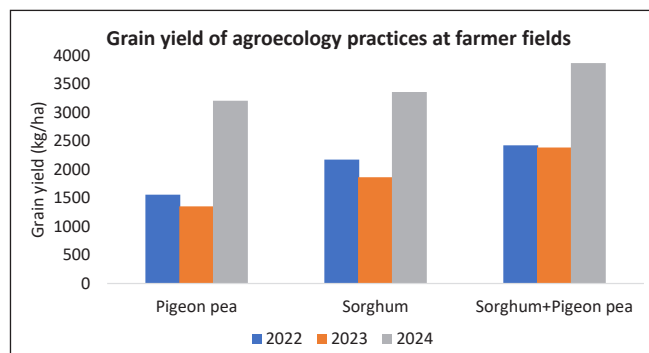
Impact: This approach resulted in an increase in the yield of sorghum and pigeonpea by 1.5 to 2 times over the baseline (1 ton per hectare) under unfavorable climate conditions and more than 3 times with good weather in the season. The increase in the yield of the technology hub fields is 2 to 5 times compared to the baseline yields of the crops.

Pigeonpea: The yield of the local variety treated with local management practices is approximately 0.8 tons per hectare. However, the yield of the improved variety implemented with tie ridges and *Fanya juu / chini* practices yields up to 2.5 to 4.4 tons per hectare.

Sorghum: The yield under local management practices is approximately 1.4 tons, while under improved agroecological practices, the yield increased to 3 to 5 tons per hectare.

Specifically, improved crop varieties of sorghum and pigeonpea increased yield by 115 to 123 % while the integrated application of *Fanya juu/chini* with improved variety increased yield by 200%. Tie ridges can increase yield by 30% compared to traditional practices.

With an appropriate land equivalent ratio, the intercropping of sorghum with pigeonpea has better economic and environmental benefits through cereal legume intensification.



Statistics in the documents are from field agronomy data collected over 3 years.

Contribution of grain yield of individual agroecological practices.

Crop	Agroecology practices	Grain yield (kg/ha)	Yield increase (%)
Farmer-managed agroecology practices in all farmer fields			
Pigeonpea	Local + Flat	823	
	Improved + Flat	1837	123
	Improved + FJ/FC	2480	201
Sorghum	Local + Flat	1398	
	Improved + FJ/FC	3002	115
Intercropping	Improved + FJ/FC	2894	107
Technology hub plots			
Pigeonpea	Improved + Flat	3381	
	Improved + Tie Ridge	4384	29.7
Sorghum	Improved + Flat	4142	
	Improved + Tie Ridge	5332	28.7
Intercropping	Improved + Flat	4129	
	Improved + Tie Ridge	5372	30.1

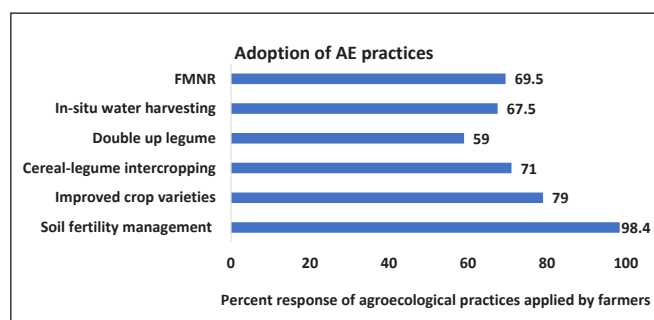
Learning

The spillover effect of the **lead farmer-managed scaling approach ensures faster dissemination and adoption of the practices**. An impact survey of participant and non-participant farmers across the eight learning villages demonstrated a 60 to 90 % adoption rate of different agroecological practices.

The promotion of high-yielding and resilient sorghum and pigeonpea crop varieties and the integration of soil and water management and landscape approaches have created **multiple economic and environmental benefits for farmers**. The sale of surplus crops, particularly pigeonpea, has provided families with additional income that can be reinvested into agricultural activities or other household needs.

The project has **reinforced climate-resilient agricultural practices** by promoting crop varieties that are better adapted to local conditions and integrated with soil moisture conservation practices. These improved varieties are not only higher-yielding but are also more resistant to the climatic stresses typical of the region, such as erratic rainfall and prolonged dry spells. The implementation of *Fanya juu /chini* soil and water conservation practices ensures that lands previously prone to land degradation and moisture deficit can now sustain crops, reducing the risk of crop failure due to adverse weather conditions. This integrated approach supports long-term agricultural sustainability in the face of climate variability.

One of the main characteristics of the agroecological interventions has been the active participation of female-headed households, representing more than 45% of the total beneficiaries. **Women's participation** in farm innovations, capacity building, and learning events has not only empowered them economically but also ensured their critical role in improving food security. Gender-sensitive training and capacity-building programs have further enhanced women's decision-making power in agricultural production, strengthening community resilience and promoting a more equitable distribution of benefits.



Next Steps

A successful scaling of agroecological practices to a broader landscape level requires a well-coordinated joint effort among the implementing partners including International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Livestock Research Institute (ILRI), Tanzania Agricultural Research Institute (TARI), and Tanzania Livestock Research Institute (TALIRI) who will be on the ground in collaboration with the Kongwa District Commission and the village governments with the involvement of the village chair, village extension officer, the sub-village leaders and ward leaders.

Conclusion

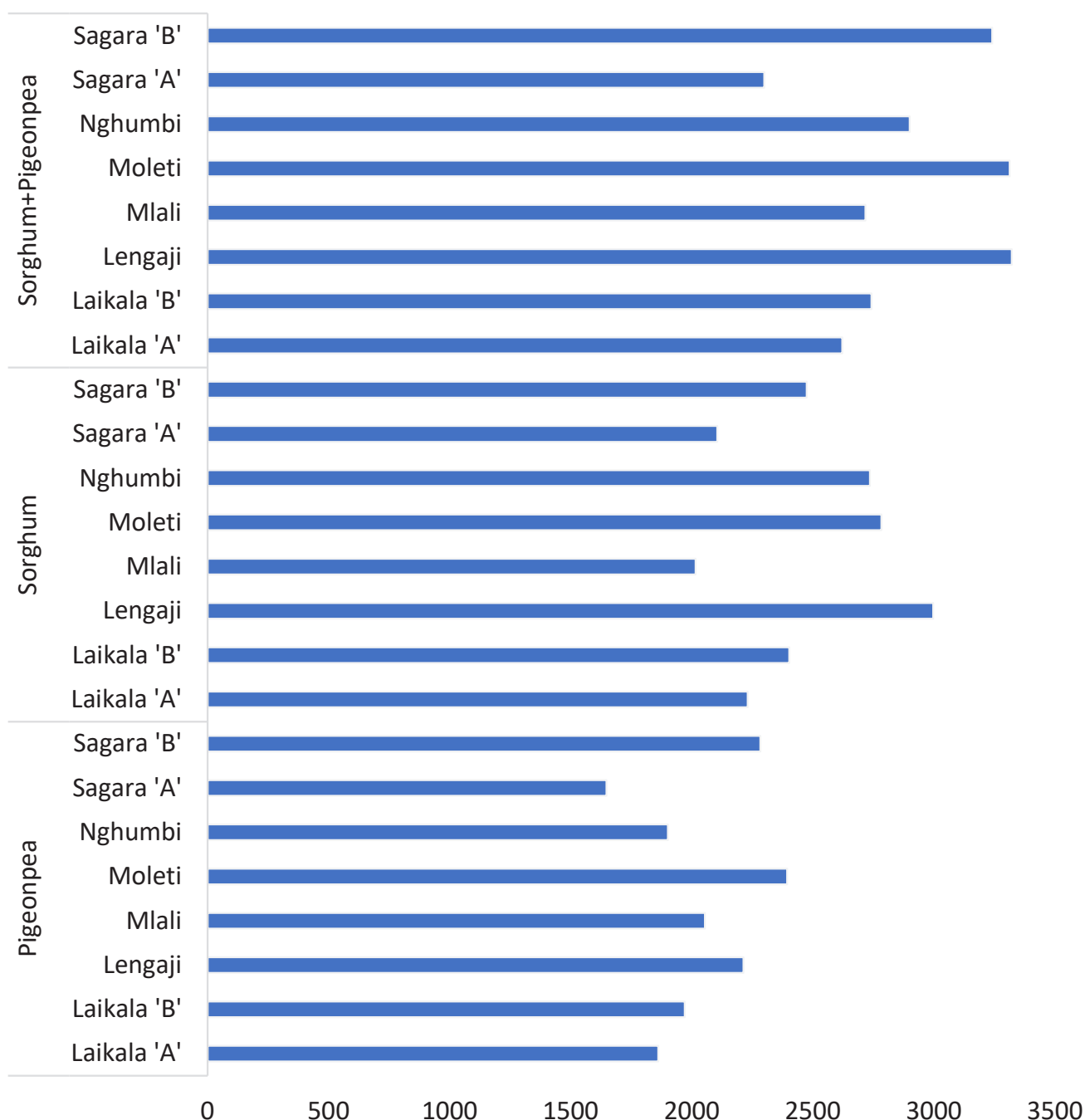
The success of the ResComm project scaling interventions in central Tanzania underscores its potential for broader expansion and scaling to similar geographies.

By scaling up the use of integrated farm innovations specifically and the farm-to-landscape approach for agroecological management practices in general, the project could transform agriculture across the region, leading to increased productivity, improved livelihoods, and improved climate resilience.

Furthermore, its gender-inclusive approach and focus on both short-term income generation and long-term environmental sustainability position it as a model for sustainable agricultural development in similar regions.



Grain yield (kg/ha) of sorghum, pigeonpea and intercropping across eight learning sites



*The Fanya Juu and Fanya Chini methods involve digging contours to harvest rainwater and prevent soil erosion. Fanya Chini ("throw it downwards" in Kiswahili) uses trenches and ridges downslope to block external runoff, protecting soil fertility. Fanya Juu ("throw it upwards") creates terrace bunds and ditches to retain rainwater within the farm, enhancing soil moisture for crops. Both methods help restore and regreen farmland.