



Australian Government
Australian Centre for
International Agricultural Research



ACIAR POLICY BRIEF

Research findings with policy implications

Achieving sustainable agricultural intensification in Eastern and Southern Africa: What is needed?

SUMMARY

The twin goals of achieving food and nutrition security in Eastern and Southern Africa remains urgent. These goals are particularly challenging now because they must be achieved at a time of unprecedented global changes including climate change and dwindling land and water resources. The solutions to these problems can come from either increasing food production by bringing more land into agriculture or implementing a long-term strategy of increasing yields on existing agricultural land while protecting the natural resource base and environmental services.

The first choice of simply bringing more land into agricultural production may look straightforward on the surface but is problematic because the supply of suitable land has dwindled in many parts of the world. Secondly, the need to protect the capacity of (mostly) fragile ecosystems and biodiversity further limits the supply of new agricultural land. Therefore, choosing the path of 'sustainable intensification' of agriculture provides the most balanced approach that promises to increase crop yields without impacting too negatively on the environment and the resource base upon which agriculture depends. Yet the technological and agronomic improvements needed to achieve sustainable agricultural intensification are not easy for many farmers to implement due to knowledge, labour and resource constraints. This brief report on what is needed to promote diffusion of farming practices that can contribute to sustainable agricultural intensification.

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BACKGROUND

To achieve sustainable agricultural intensification will require widespread adoption of production practices that enhance crop yields and contribute to reducing the environmental risks. Among others the most cited farm management practices which contributed to sustainable agricultural intensification are soil-conserving tillage methods, crop diversification and adopting stress tolerant but high yielding crop varieties.

The benefits of sustainable agricultural intensification are clearly apparent but the practice requires major policy reorientation. Part of this reorientation will require that both at the farmers' level and at the level of investments in natural resources management and high standards of agronomy. Practices such as soil and water conservation and integrated soil fertility management are crucial for sustainable intensification. This should then be accompanied by concomitant and strong investments in agricultural input and output value chains.

KEY FACTS AND FIGURES

- Food insecurity and malnutrition are still harsh realities for many African citizens with 49% living on less than \$1.25 per day.
- Agricultural yields in Africa are some of the lowest in the world. For example, maize yields average 2 tonnes/ha compared to an average of 19 tonnes per ha among the world's top ten performers in maize production.
- The need for a sustainable agricultural intensification can help meet these challenges and as a result avoid some pitfalls of resource and environmental degradation is urgent.
- The Sustainable Intensification of Maize and Legume Systems in Eastern and Southern Africa (SIMLESA) project was designed to test conservation agriculture based practices in the region based on the principles of conservation tillage, soil surface cover, crop diversification through new stress tolerant maize and legume crop mixes.
- Research done under SIMLESA and adjunct projects that dealt with analysing technology adoption pathways, smallholder mechanization using small machines and crop-livestock intensification has confirmed that for many rural households, food security requires enhancing maize productivity through use of improved varieties, integrating legumes for cash and food and applying targeted sustainable intensification practices such as minimized tillage, continuous soil covers and maize-legume diversification as a package.

WHAT NEEDS TO BE DONE?

In this brief, we summarize four areas in which research under SIMLESA and related projects have shown that the achievement of sustainable agricultural intensification at the farm level will require the confluence of several factors in addition the achieving widespread adoption of composite of multiple sustainable agricultural intensification practices. The following are a summary of four broad policy messages that have been generated from SIMLESA research:

The need to support integrated approaches to technology development, extension and adoption

Research under SIMLESA and related projects has shown that the best outcomes in terms of crop income were related to simultaneous adoption of combinations of sustainable agricultural intensification practices. In the example shown in Figure 1 it is apparent that crop incomes are more than twice in Ethiopia when combinations of practices are adopted compared to when only one practice was present. Figure 1 illustrates that when the number of practices in a combination of sustainable agricultural intensification increases, income from such plots is higher compared to the case where the number of practices were only a few. For example, when the only improvement on a farm or plot was crop diversification with maize-legume intercroops or rotations, crop income is about \$100/ha. This increases nearly threefold when the crop diversification is combined with minimum tillage practice and by adopting improved varieties on the same plot. The lesson is that promotion of better agronomic practices and crop varieties should be done as a package in designing future research, developing extension messages and in prioritizing policies to support adoption of sustainable agricultural intensification. In each case, specific packages suitable for particular locations and groups of farmers should be researched, disseminated and supported.

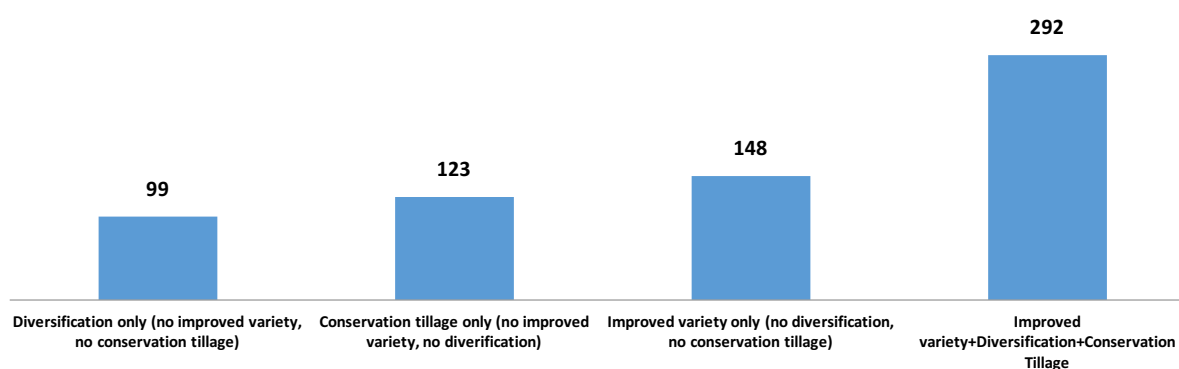


Figure 1. Adoption of sustainable practices in Ethiopia: impacts on income (\$/ha)

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The need to increase investments in extension services with minimum targets

Sustainable agricultural intensification requires that farmers' agronomic and resource management skills are improved by/through strong, consistent and high quality extension services. One of the research reviews done as a part of the SIMLESA found that there were 33 frontline extension workers for every 10,000 farmers which were not enough to have an effective reach to the farmers. The availability of extension services had some of the strongest effects in predicting the adoption of better agronomic practices. An example of this effect was an eight-percentage point increase in the adoption of CA-related practices in Tanzania (and similarly a 13-percentage point increase in Malawi, see Figure 2). The proposal from this set of research was that agricultural policies related to extension and information delivery to farmers should focus on increasing both the amount of agricultural information available to farmers, make these messages as site specific as possible and ensure they are delivered with regular frequency to ensure they are up to date. This goal may require involving a diverse array of actors in providing extension services.

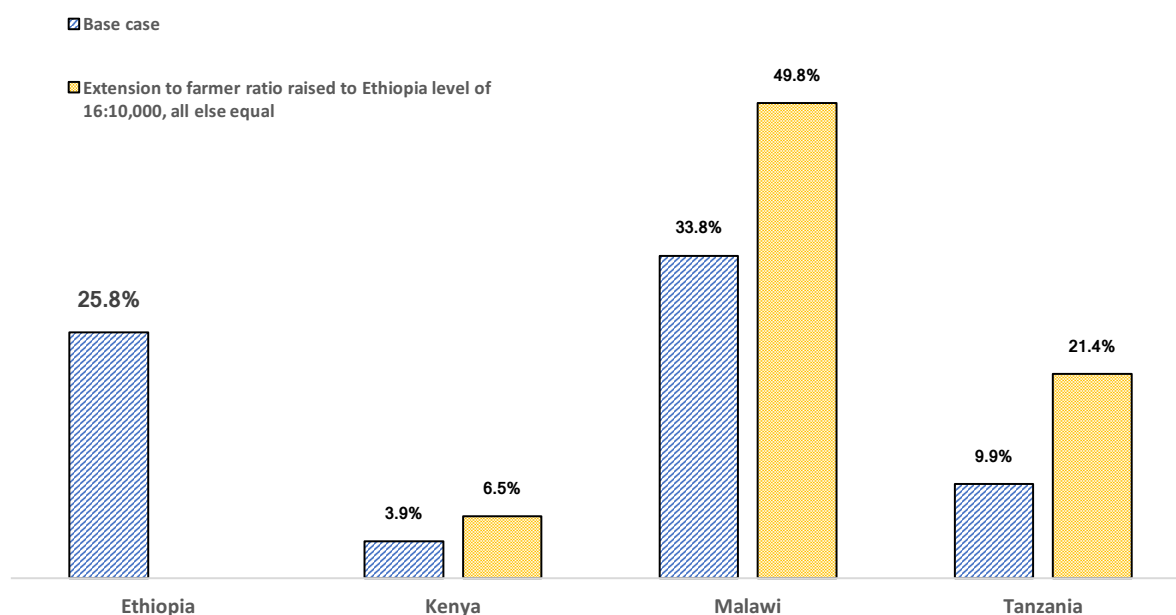


Figure 2. Effects of increasing extension personnel on adoption of CA-based SI practices.

The need to improve market access, lower costs of inputs and make inclusive finance available

High cost of inputs is a deterrent to the adoption of good agricultural practices and technologies. An example of the impact of costs on technology adoption relates to subsidies. The research has shown that input subsidies have powerful effects in the adoption of sustainable intensification agricultural practices. Setting input subsidy expenditures at levels comparable to those recently observed in Malawi, increased adoption by more than 100-percentage points in Ethiopia and Kenya, and by about 70% in Tanzania (Figure 3).

Taking account of the huge budgetary allocations to input subsidies and competing development needs, continued reliance on subsidies will be problematic in the long run despite their popularity and cost-reduction benefits to recipients. In order to achieve sustainability in cost reduction and enhance farmers' access to inputs, the following principles should be considered. In the short term, innovative implementation of smart(er) subsidies that make use of mobile money platforms and e-vouchers can be considered. In the medium term, improved targeting of subsidies (often called "smart" subsidies) can be built around reasonable conditional requirements. These requirements can be aligned with social goals such as verifiable adoption of resource and environmentally conserving practices on farmers' fields. Other options may include participating in community projects that promote environmental and resource conservation. In the long run, improving infrastructure networks into rural areas, supporting agribusiness finance will help improve input supply chains in ways that are likely to be more effective and long lasting. Given the policy makers concerns about rural poverty and weak purchasing power, considerations can be given of providing more general safety nets. Illustrating the importance of some form of safety nets, one research finding was that when farmers expected or received support from government, they were more likely to try out new technologies due to the insurance provided by such support. This finding suggests that providing safety nets can help build farmers' sense of safety to take risk and try new crop varieties and agricultural practices, knowing that there is a fall back option if the new practices do not go as well as they planned.

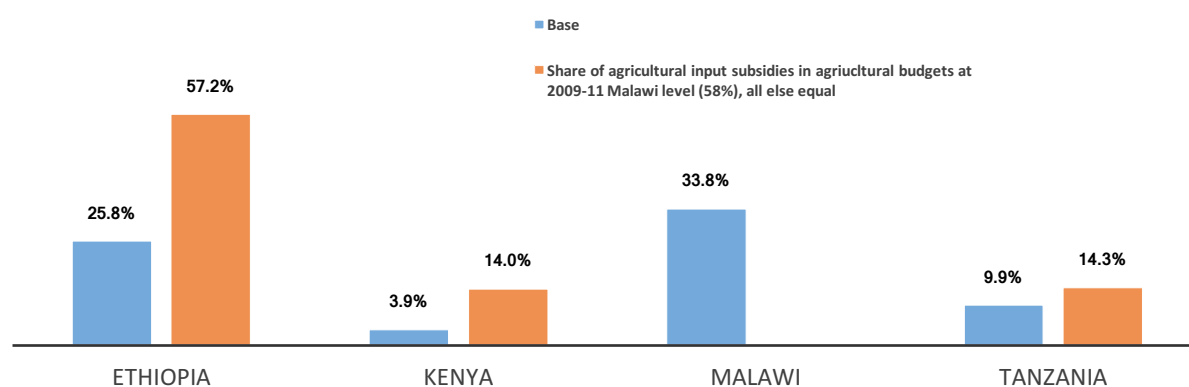


Figure 3. Impact of high subsidy expenditures on adoption of sustainable intensification practices

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The need to harness the power of ICT and mobile technologies for agricultural development

Arguably, the high mobile penetration in several countries in Africa means that mass communication with many communities that were previously off-grid can now occur. The widespread availability and use of mobile phones in this way presents exciting opportunities for information delivery to farmers. To explore this opportunity, the project created the SIMLESA-SMS platform. A number of valuable lessons have been learnt in the testing of SIMLESA-SMS. First, despite their great potential, the use of mobile phones beyond voice calls is not necessarily straightforward among rural mobile phone users. Due to low literacy levels in rural Africa and due to the fact that most phones owned by farmers are older feature phones, the use of voice messages may be the most feasible in many areas of rural Africa for the time being. For example, the agricultural transformation agency in Ethiopia overcame the limitations of text messages by providing an automated voice recording service in multiple languages for Ethiopian farmers. As at the time of writing, the service had 5 million subscribers. These mobile and ICT services, like traditional forms of extension will work best when they serve local community needs. While localizing these systems will likely be more costly, these extra costs may well be justified when weighed against the greater effectiveness of such systems.

FURTHER READINGS

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ACIAR'S CONTRIBUTION TO RESEARCH

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Contacts for further information

Paswel Marennya, (p.marennya@cgiar.org) CIMMYT P.O. Box 5689, Addis Ababa, Ethiopia.



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