

Objectives of the project

The main objective of the DeSIRA project is to improve climate change adaptation of agricultural and food systems in Malawi through research and uptake of integrated technological innovations. The project aims to develop climate-resilient integrated technological innovations, to enhance understanding of the opportunities and constraints for uptake of these innovations by farmers, and to inform policy makers and scaling partners about the potential of these technologies to contribute to climate resilience and sustainability.



Photo: CGIAR joint On-station experimental fields at Chitedze-Kandiyani Research station, Lilongwe. Photo credit: Gbenga Akinwale, CIP

Background

The smallholder farmers' agri-food system in Malawi faces persistent and new biophysical and socio-economic constraints resulting in low productivity and high production risks. These constraints endanger the food and nutrition security and income of smallholder farmers and the socio-economic growth of the country. These constraints are combined with a progressive degradation of natural resources putting at high risk the future of agriculture and food systems in the country.

This situation is aggravated by climate change, and science-based strategies to increase resilience against climatic shocks are urgently needed. There is limited partnership and coordination among the various players involved in technology generation and dissemination. This has led to development of fragmented technologies which cannot address efficiently the diversity of challenges faced by farmers. Through close collaboration at various levels (e.g. from on-farm participatory research to district innovation platforms, to national planning and dissemination workshops, to interactions with government departments) the DeSIRA project is supporting socio-economic assessments alongside technology generation to deliver technology options that are suitable for dissemination to farmers.

The theory of change to achieve the objectives

Innovations were developed and tested to increase productivity and resilience of agri-food systems. Risks related to the systems will be reduced through adoption of the appropriate management options, dealing more effectively with pest and disease pressure, developing technologies to mitigate the effects of climate change and its related environmental degradation and through improved post-harvest management. Insights in pathways to adoption of technological innovation were gained through joint identification of the main challenges faced by smallholder farmers together with stakeholders and using approaches of participatory design and evaluation of the tested innovations in innovation platforms.

The economic performance or profitability of climate-smart integrated technologies were analysed using agronomic data on input use and crop yields from the on-farm trials as well as market survey data on prevailing prices of inputs and outputs. Regular surveys of the participating farmers were conducted during the period of on-farm/demonstration trials to gather data on a range of agronomic and economic variables. Discounted partial budget and marginal analysis were used to estimate a multioutput, multiperiod profit function. Similarly, farmer participatory technology evaluation was carried out to evaluate farmers' perceptions and acceptability of the integrated technology options in order to have a better understanding of their adoption potential by farmers.

The project also analyzed the gap between technology awareness and adoption in Malawi and identified the conditions needed for increased technology uptake. Information that is generated is being shared with policy makers and scaling partners through an interactive process throughout the project. Using this multidisciplinary approach, the project maximizes the probability that technological innovations developed will be appropriate to address the existing diverse, changing, and complex challenges, and be taken up by smallholder farmers. This, in turn, will result in enhanced climate change adaptation and mitigation of agricultural and food systems in Malawi and improved productivity, reduced risks, reduced environmental degradation and ultimately improved food security, nutrition, and income.

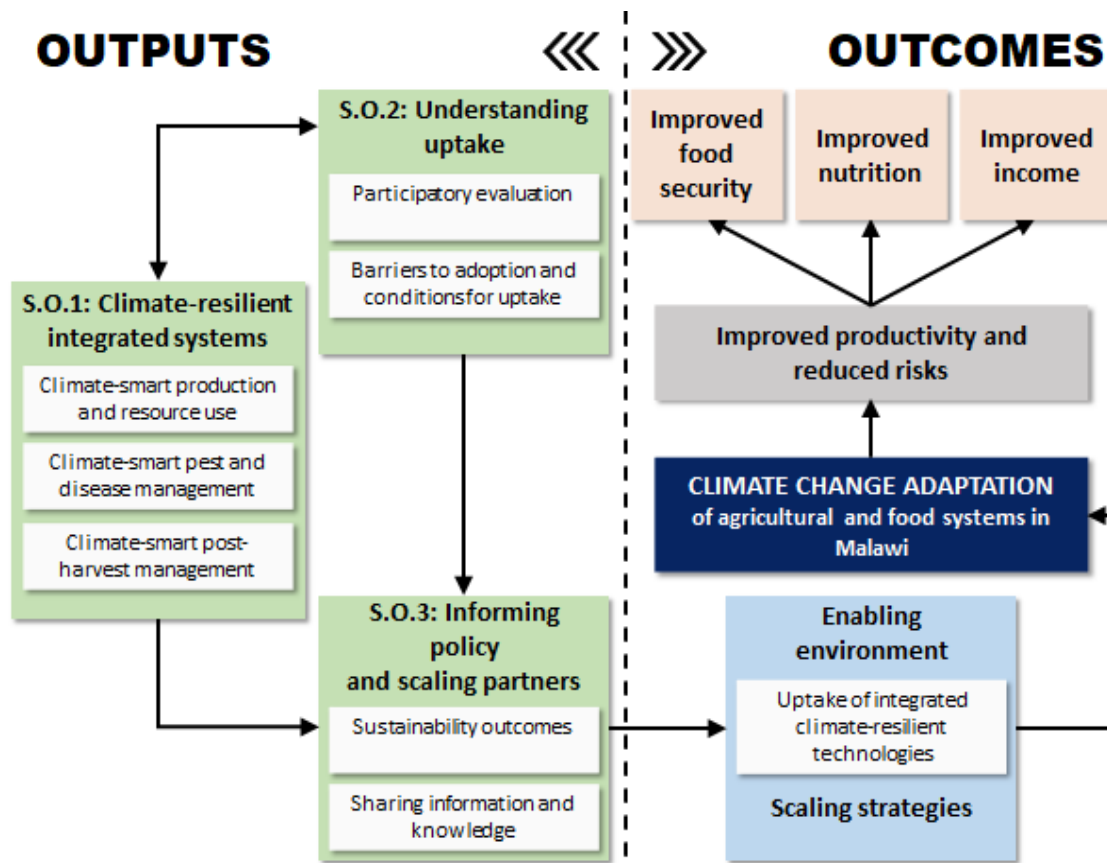


Figure: Theory of Change depicting the pathway from expected outputs to intermediary and final expected outcomes.

Main activities

Field research were conducted and consisted of a combination of on-station and on- farm experiments. The technologies include innovations that are already available in Malawi but need fine-tuning through farmer participation, innovations which have been proven effective on-station but need validation on-farm, combinations of existing component technologies into integrated options, and innovations which have proven effective in other countries but need validation under the conditions prevailing in Malawi.

Through the on-farm experimentation, the technologies were evaluated by relevant stakeholders from district innovation platforms. This allowed for joint learning by research, extension, and private sector partners in the district on the effectiveness and relevance of the technologies. This process also strengthens the capacity of these actors at District level to continue supporting the farming communities to access and use the most preferred technologies.

Socio-economic research methods includes desk review to synthesize existing knowledge on barriers to adoption of technologies, modelling based on a nationally representative panel, farm risk models to assess the risk and returns associated with crops and technology packages, participatory workshops and focus groups to identify the impact pathways and the relevant indicators to be used, socio-economic surveys, participatory workshops and focus groups to assess the empirical relevance of impact pathways. The results of the agronomic and socio-economic assessments will result in a dataset that can form the basis for official release of technologies by the Agricultural Technology Clearance Committee in Malawi.

Once released, the technologies can be further promoted and scaled out through different extension channels. Tailored communications outputs such as research and policy seminars, working papers and policy briefs, and high-level events supplemented by media coverage are aimed at influencing policy makers, civil society, development partners and other key stakeholders. Capacity building will result in PhD qualification in banana virology for a Malawian scientist.

Key achievements (December 2022)

Over the past three years, 47 climate smart integrated technology options were co-designed, tested and validated by scientists, farmers, and other stakeholders through on-station and on-farm experimentations across various agroecological zones in Malawi. Out of the 47 integrated technology options, seventeen (17) technologies which include climate smart crop varieties, production systems, soil fertility management and management practices are at the final stage of evaluation and validation. The 17 integrated technologies will be proposed for national release in the fourth



*Photo: Integrated soil fertility and crop management options for sustainable intensification of maize -cowpea cropping systems in Makoka research station.
Photo credit: Gbenga Akinwale, CIP*

year of the project; however, the number of technologies to be released by the end of the project is expected to increase as many technologies are still undergoing validation at the on-farm level. The project also conducted farmers' technology acceptability and cost benefit analysis studies to generate information on the economic scenario and potential acceptability of the integrated technologies.

Three (3) District Innovation Platforms were established across five agroecological zones to foster effective interactions and engagement between scientists, farmers, and all the relevant stakeholders in the development and testing of various integrated technology options.

One PhD student was enrolled at the University of Liege, Belgium to characterise the prevalence, diversity, and impact of banana viruses in Malawi. While five MSc students are conducting their thesis research under the project. A total of 81 research technicians and Innovation Platform members were trained on field experimental design, field layout, and data collection.

A total of 652 farmers (246 men and 406 women) were involved in the hosting and testing of the on-farm experimentation across the target districts. While a total of 57 policy marker and scaling partners

have been reached and informed about the potential of the technological options mostly through meetings and the district innovation platforms.

Organization

Led by the International Potato Center, this project is further strengthening the CGIAR country collaboration in Malawi. Under the EU-funded KULIMA program, the CGIAR collaboration focuses on capacity building and seed systems in the context of a large and innovative Farmer Field School program. The collaboration in the DeSIRA project focuses on the integration of research activities among eight CGIAR Centers, two European partners and national research partners. The project provides an opportunity for the CGIAR to work as one at country level and to demonstrate their relevance in both research and extension to address this century's agricultural challenges in a holistic and integrated manner.

Implementing organizations

The applicant and lead implementer is the International Potato Center (CIP).

Funded co-applicants are:

- ✓ International Center for Tropical Agriculture (CIAT),
- ✓ International Maize and Wheat Improvement Center (CIMMYT),
- ✓ World Agroforestry Centre (ICRAF),
- ✓ International Crops Research Institute for the Semi-Arid Tropics (ICRISAT),
- ✓ International Institute of Tropical Agriculture (IITA),
- ✓ World-Fish Center (WFC),
- ✓ International Food Policy Research Institute (IFPRI),
- ✓ University of Liège (ULiège).

Other main stakeholders

The project works in close collaboration with the following stakeholders:

- ✓ Department of Agricultural Research Services (DARS),
- ✓ Department of Agriculture Extension Services (DAES),
- ✓ Department of Fisheries (DoF),
- ✓ District Agricultural Development Offices (DADOs),
- ✓ Lilongwe University of Agriculture and Natural Resources (LUANAR).

On-farm research is conducted in collaboration with five NGOs led by Self Help Africa (SHA) under the already running KULIMA program. These NGOs are backstopping Farmer Field School groups which are the main entry point for participatory field research in the DeSIRA project.

Location

The project is implemented in the following districts in Malawi: Mzimba, Chitipa, Karonga, Nkhata Bay, Nkhatakota, Kasungu, Salima, Mulanje, Thyolo, Mangochi, Zomba and Chiradzulu.

Funding and co-funding

EU	€ 6,000,000
co-funding from the implementing partners	€ 315,790
Total budget	€ 6,315,790

Duration

The project duration is 5 years from December 2019 to December 2024.

Website

<https://www.ifpri.org/project/developing-smart-innovations-through-research-agriculture-desira-project>



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