



Sustainable Intensification of Key Farming Systems in East and
Southern Africa:
Technical report, 01 April to 30 September 2012

Submitted to
United States Agency for International Development (USAID)

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This report produced by

It is published by



International Institute of Tropical Agriculture

International Institute of Tropical Agriculture
November 26, 2012



The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development (R4D) projects supported by the United States Agency for International Development (USAID) as part of the U.S. Government's Feed the Future (FtF) initiative.

Through action research and development (R&D) partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base. The three projects are led by the International Institute of Tropical Agriculture (IITA) in West Africa and East and Southern Africa, and the International Livestock Research Institute (ILRI) in the Ethiopian Highlands. The International Food Policy Research Institute (IFPRI) leads an associated project on monitoring, evaluation, and impact assessment.



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Introduction

The United States Agency for International Development (USAID) is supporting multi-stakeholder agricultural research projects to sustainably intensify key African farming systems as part of the US Government's 'Feed the Future' (FtF) initiative to address global hunger and food security issues in sub-Saharan Africa (SSA). It is also a way of bringing regional focus to the CGIAR Research Programs (CRPs) on Integrated Systems, especially CRPs 1.1 and 1.2.

Feed the Future-Tanzania focuses on reducing poverty and enhancing nutrition through key investments to improve availability and access to staple foods by enhancing the competitiveness of smallholders in rice, maize, and horticulture value chains; raising productivity through irrigation and rural roads; improving household nutrition; policy reforms; and developing national capacity for policy, planning and coordination, research and development, and monitoring and evaluation (US Government, 2010).

In Tanzania, the FtF investments are geographically focused in areas with high agricultural potential bordering chronically food insecure districts: Morogoro (rice); Manyara and Dodoma (maize); and Arusha, Kilimanjaro, Tanga, Zanzibar, Dar es Salaam, Morogoro, Iringa, and Mbeya (horticulture). Nutrition interventions are focused in areas with high chronic malnutrition such as Dodoma region. The FtF target areas are characterized by moderate to high levels of food insecurity and poverty but with high potential for growth due to proximity to transport corridors for market access and impact on nearby food insecure areas, lack of investment by other donors, good water resources and climatic conditions, opportunity for high impact on "productive" poor, prioritized by Government of Tanzania and private investors, and ability to achieve scalable high growth impact.

The International Institute of Tropical Agriculture (IITA) is the lead institute for developing and implementing the eastern and southern Africa project of the Africa RISING Program. This project primarily focuses on maize- and rice-based production systems in Tanzania, maize-based systems in Malawi and Zambia, but is intended to result in spill-over effects to other similar agroecological zones in eastern and southern Africa.

This project is expected to complement FtF investments in Tanzania, such as the NAFKA project, with research on best-bet management practices for sustainable intensification and diversification of maize- and rice based farming systems. It should also expand existing activities such as the project on Sustainable Intensification of Maize-Legume Cropping Systems for Food Security in Eastern and Southern Africa (SIMLESA). It will complement initiatives in maize and legume systems in eastern Zambia (SIMLEZA) supported by USAID-Zambia. The project, which started in October 2011 and is expected to be implemented over a total of five years, will also be engaged in some districts in Malawi.

Summary of progress during April to September 2012

The first year of Africa RISING was characterized by thorough planning and developing partnerships to build upon for the future while producing meaningful results.

1. Implementation of jumpstart projects

The reporting period was characterized by the implementation of 10 jumpstart projects. Approval of submissions following the call in February was given in early April. Sub-agreements were then signed with lead centers in the course of the month, and funds disbursed immediately thereafter. The duration of all sub-agreements was until 30 September (end of main agreement between USAID and IITA).

These short-duration projects were expected to produce tangible and reportable results within the given timeframe. IITA, as the implementing institution, contracted the Principal Investigating Institutions, which in turn sub-contracted the partnering institutions. This process caused some implementation delays, resulting in the need for no-cost extension for some studies in order to finalize data collection and analysis.

The main purpose of these small projects was to generate information that would inform the design process of, and/or provide tools for use in the longer-term project. The additional value was to forge partnerships in the future that were made a requirement in the call for proposals. The jumpstart projects were not meant to continue during subsequent years of Africa RISING implementation.

The ESA Project Chief Scientist assisted the project in monitoring the activities, beginning with the participation in the planning phases and later in some participant training sessions. Mid-term reporting on progress was required from each study as a means of monitoring progress.

All principal investigators (PI) of the jumpstart projects were requested to identify indicators relevant for the project they were leading from a list of FtF indicators provided to the project coordinator. They also had to indicate numeric targets for each indicator. The consolidated targets were submitted to USAID in August to be entered in the FtF Monitoring System.

The following list, which shows the primary results achieved are of technological nature or contribute to the information and knowledge base of project staff and/or target group:

- 1) Inventory of best bets of ISFM technologies which have been tested and recommended for use by smallholders with description and performance evaluation and accompanying dissemination/training materials;
- 2) Land degradation hotspots and soil health constraints identified;
- 3) Availability of inputs to farmers to implement IFSM best bets evaluated;
- 4) Major reasons for postharvest losses of maize identified;
- 5) Improved postharvest technologies for grains and milk demonstrated;
- 6) Value chain of grain legumes analyzed;
- 7) Breeder/basic/certified seeds produced and made available of improved bean, maize, pigeon pea, soybean, cowpea, and groundnut varieties;
- 8) Socio-economic and bio-physical factors influencing success of Evergreen Agriculture evaluated and documented;
- 9) Models for tree seed and seedlings analyzed;
- 10) Prevalence of different mycotoxins and their severity in maize and cassava in Tanzania determined (final lab results still pending);
- 11) Baseline data on vegetable production and market constraints collected;
- 12) Safety of vegetables in the Tanzanian market assessed (microbes, pesticides, heavy metals), final lab results still pending;
- 13) Pest and disease incidence and severity of solanaceous vegetables assessed;
- 14) Two videos produced on labor saving agronomic practices in rice systems;
- 15) Rotary weeders for use in rice tested and improved; and

- 16) Craftsmen trained on manufacturing and repairing of mechanical weeders for rice systems.

Annex 1 provides an overview of the jumpstart projects, the partnerships involved, and the main outputs obtained by September 2012. As mentioned above, six projects are yet to present final results. All jumpstart project reports are uploaded here: <http://cgspace.cgiar.org/handle/10568/16501>.

In addition to the jumpstart projects, a grant of US\$120 000 was given to the Michigan State University for the project “*Agroecological intensification in Malawi and Tanzania through action research with women and men farmers.*” This is not short-duration jumpstart project but will be part of Africa RISING’s longer-term activities.

The project builds on a long-term research experience in Malawi; whereby, diversifying crops has shown the great potential to boost the production of nutrient-enriched grains for use by smallholder farmers. The purpose of this component in Malawi is to enhance farmer knowledge and support sustainable intensification pathways for productivity gains in maize-legume diversified systems. The main objective is to set up a research approach that systematically assesses sustainable intensification best-bet options that appropriately respond to the needs of resource-poor farmers, particularly female headed households.

2. Site selection for longer-term research activities

Concurrently with the implementation of the jumpstart projects, IITA project staff, in collaboration with IFPRI, worked on the selection of future intervention and control sites in Tanzania. This process is on-going, and is being strengthened to identify sites that are sufficiently representative of the broader FtF target regions and farming systems therein. This will allow for scaling of the achievements from these sites. Consideration is also being made of the need to consolidate achievements from different institutions supported under the FtF initiative, which necessitates co-location at similar sites. Yet the sites must be selected to allow impact evaluation of Africa RISING that is scientifically validated. Finding balance among these considerations has guided action site selection in Tanzania.

First, the Tanzanian maize- and rice-based mega sites were selected in consideration of the country’s policy, the Agricultural Sector Development Strategy. Then three action districts (Kongwa in Dodoma Region, Kiteto in Manyara Region, and Kilombero in Morogoro Region) were selected based on the presence of NAFKA in these areas. NAFKA Staples Value Chain Activity is a USAID contractor for FtF-Tanzania. The fourth action district, Babati in Manyara Region, was selected based on the potential partnership involvement, as well as provision of agroecological gradients that would allow targeting of technologies to the different agroecological zones.

Africa RISING research action sites, even when co-located with NAFKA, were selected based on development domains whose data were readily available. The district wards would be stratified according to cropped areas from AFRICOVER, followed by rainfall and elevation, and then villages within the target wards (action sites) would be selected randomly. Counterfactuals are in the process of being selected, driven by the avoidance of spillover and contamination, but situated in sites with similar characteristics to the action sites. Presently, selection of the counterfactuals from neighboring districts is being considered as the statistically optimal choice. These neighboring districts are Hanang and Mbulu for Babati, and Mvomero for Kilombero research action sites.

In Malawi, sites have been pre-selected by Michigan State University based on their existing action sites. These will be revised using the guidelines and criteria set out by IFPRI for site characterization.

No initiative has yet been taken to identify sites in Zambia. The USAID Activity Manager informed that interventions in Zambia (Eastern Province) will be discussed in early 2013, together with the USAID mission in Zambia.



Babati



Babati



Kongwa/Kiteto

3. Program research framework development

Through a participatory and consultative approach with experts, a conceptual framework to guide the design and implementation of the program as a whole, was developed (Figure 1).

A taskforce established by the USAID Activity Manager included selected persons from within and outside Africa RISING. The changing team worked on a draft program research framework generic enough to be applicable across the three regions in Africa. It was gradually shared with more scientists for review and inputs. In July, the process culminated in two workshops held in Ibadan, Nigeria to further advance the existing draft.

The first meeting was led by IITA and attended by scientists from the two lead centers (IITA and ILRI) and prepared a near to final draft of the research framework. The follow-up meeting involved a larger number of CGIAR partners to fine tune the draft and to receive broad approval. Colleagues who are also involved in the development of the CGIAR Research Program on Humid Tropics (CRP 1.2) provided great input and assured that the process would also inform that program as it had to go through a similar exercise.

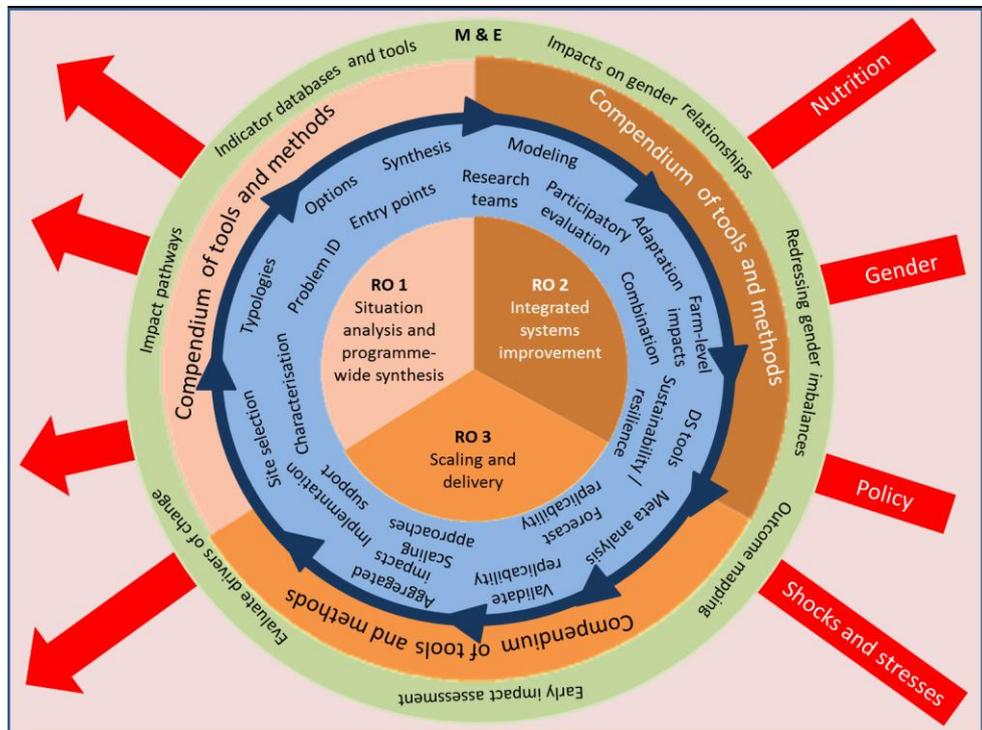


Figure 1: Schematic representation of the program's research framework, indicating the four research outputs (RO), the various tools that could be used to address the outputs, and the components of the M&E framework. Also indicated are the themes that apply across all ROs (red arrows).

In the course of the development of the research framework, the project purpose, objectives, and outcomes have been modified and are detailed below.

Program purpose

The program's purpose is to provide pathways out of hunger and poverty for smallholder families through sustainably intensified farming systems that sufficiently improve food, nutrition, and income security, particularly for women and children; and conserve and/or enhance the natural resource base.

Research objectives

- 1) Identify and evaluate demand-driven options for sustainable intensification that contributes to rural poverty alleviation, improved nutrition, and equity and ecosystem stability
- 2) Evaluate, document, and share experiences with approaches for delivering and integrating innovation for sustainable intensification in a way that will promote their uptake beyond the Africa RISING action research sites.

Development objectives

- 1) Create opportunities for smallholder farm households, within Africa RISING action research sites, to move out of poverty and improve their nutritional status – especially of young children and mothers – while maintaining or improving ecosystem stability
- 2) Facilitate partner-led dissemination of integrated innovations for sustainable intensification beyond the Africa RISING action research sites

Research outcomes

- 1) Integrated innovations increase production and/or improve productivity in a sustainable manner for the most relevant farm typologies within the Africa RISING research sites.
- 2) The aggregated impact of these farming practices at the household level contributes to an improved understanding of ecosystem stability at the landscape level.
- 3) Wider dissemination of integrated innovations for SI leads to similar impacts beyond the Africa RISING action research sites.

Development outcomes

- 1) Wider adoption of innovations identified and tested by the program's outputs within the Africa RISING action research sites enhances livelihoods through increased agricultural output, income diversity, reduced vulnerability to adverse environmental and economic challenges and improved nutrition and welfare; especially of young children and mothers.
- 2) The development community initiates programs, based on the knowledge tools and innovations developed and promoted by Africa RISING, that are directed at developmental goals that are consistent with the Africa RISING program purpose.

4. Project staff recruitment and office establishment

In May, an experienced system agronomist was recruited on a consultancy basis as the Project Chief Scientist. He will assist in the implementation of the jumpstart projects and monitor their progress in Year 1 of the Project. After this period, he has been offered a regular contract for three years effective 1 October 2012. In addition, an administrator and a driver have been contracted as consultants and regular two-year contracts offered for Years 2 and 3 of Africa RISING.

The project office is hosted by the World Vegetable Center (AVRDC) in Tengeru, Arusha, Tanzania, one of Africa RISING implementing partners. Currently, there are four offices and a meeting room available. All the necessary office equipment has been

purchased and delivered. One vehicle for administrative purposes and three vehicles for field work have also been purchased while four motorcycles have been ordered.

5. Setting up the program and project management structure and preparing of program document

During the reporting period, the management structure at program and project levels has been developed and implemented. The project Steering Committee (SC) was put in place and the first meeting will be held on 6 October in continuation of the annual review and planning workshop in Arusha. In July, a meeting of the Program Coordination Team took place in Ibadan, Nigeria during the research framework development workshop.

A program document that describes the context in which Africa RISING is operating, its purpose, objectives and outcomes, our guiding principles and conceptual framework has been developed. It also contains the research design with research hypotheses, outputs and activities, the M&E plan, the program communication strategy and the program management structure. The document is accessible at http://africa-rising.wikispaces.com/program_framework.

6. Preparation of annual review and planning workshop

The annual review and planning workshop initially scheduled for September 2012 was postponed to 1-5 October in Arusha to allow key donor staff to attend. It will be organized in three parts: (1) review of jumpstart projects and identification of research topics for Year 2; (2) field visit to future action area in Babati district; and (3) presentation of review and plans to a larger stakeholder group. By end of the reporting period, all preparations for the workshop have been finalized. The outcomes will be reported in the next technical report.

Lessons and implementing issues

Despite the short duration, the jumpstart projects were a very good way to get useful results in a short time and allowed the project and program to develop a clear vision of what would be possible to achieve in the longer-term. The scientists involved showed goodwill and made a big effort to complete the tasks within the short time given. This demonstrates the scientists' interest and enthusiasm for the project.

Annex 2 gives an overview on the preliminary technical lessons from these projects. The final reports from the partners have not yet been received.

From an administrative point of view, the jumpstart projects were also challenging for IITA and for the sub-grantees (timely signing of contracts and related fund disbursement, particularly at the sub-sub-grant level). In addition, budget allocation to some of the CGIAR partners was below the Center's set minimum for acceptance of project participation. Nevertheless, the expectation of a longer-term involvement in an innovative and ambitious project such as Africa RISING made the centers concerned to engage in the jumpstarts. The multitude of partnerships necessarily leads to smaller portions of funds for each partner. In the future, this might discourage partners' cardinal to the success of the project.

The individual projects led to the establishment of solid partnerships. There was good interaction within jumpstart projects but not much between the different jumpstarts due to their quest for early wins. Research team building, development, and implementation of a joined research agenda for the project as a whole will be a challenge for Year 2.

The time given by the donor to develop a rigorous research framework has provided the opportunity for Africa RISING taking the leadership in research on sustainable intensification. The agreement to use Randomized Controlled Trials (RCTs) where relevant can make Africa RISING a pioneer in the application of this rather rigorous concept in sustainable intensification. The guidance received from the USAID Activity Manger in scientific planning and decision making has been very helpful and appreciated.

The process of action site characterization and final selection is very challenging. It is very difficult to strike the balance among the needs for representativeness in view of scaling of activities in East and Southern Africa, the requirement in Tanzania to align with the government priorities, and to co-locate with other USAID investment sites, and the agronomic and logistical conditions that would allow working on sustainable intensification. The unavailability of a resident M&E specialist from IFPRI added to the difficulties and delays in identifying intervention and control sites. It is highly important that IFPRI provides this capacity as soon as possible, and to assist in the design of baseline surveys and the construction of household typologies as described by the activities under Research Output 1 (RO1). With support from the IITA Regional Office in Tanzania, IFPRI is in the process of identifying a suitable candidate.

Division of responsibilities for M&E, particularly for baseline survey (between IFPRI and other project staff) has not been clear until the M&E workshop in September. This workshop should have been held much earlier but IFPRI colleagues felt that the M&E plan can only be concretized when it is clear what type of research is being done and where. We are now facing the situation that certain activities of RO1 have to be done simultaneously with the activities of RO2 if the coming planting season is not to be lost. Ideally, RO1 should have been finalized first.

Valuable time elapsed until the taskforce charged to draft the research framework circulated a first version. The change in leadership was not conducive to the fulfillment of the task. The process could have been finalized earlier if responsibility to organize the preparation of the document had been given to the two project coordinators from ILRI and IITA. In the case of this regional project, racing against time (start of the rainy season in most parts of the project action sites in November) could have been largely avoided.

The identification of relevant indicators for reporting under the FtF Information System represented another difficulty. Partners implementing jumpstart projects did not see the indicators established to measure progress and achievement of the FtF initiative, which are applicable to agricultural research projects. Some did not select indicators and targets against which they would report in September. Others now increasingly consider Africa RISING a development project. As a result, the targets submitted in August were not too realistic but rather conservative estimates. USAID/FtF should develop science output indicators for Africa RISING and similar research projects.

Special events

The project was visited by Drs Eric Witte and Jerry Glover from USAID Bureau of Food Security, Washington from 17-22 June. The delegation met with IITA staff based in Tanzania, the Director of Research in the Ministry of Agriculture, Food Security and Cooperatives, the Director General of the Tanzanian Commission for Science and Technology, in addition to current and potential project partners.

A field trip was undertaken to visit project and other partner sites. Of particular value was a meeting with the representative of NAFKA and a visit to their action site in Dakawa to lay the ground for the required future cooperation. The delegation was accompanied by a representative of the USAID Mission in Tanzania, the project systems agronomist, and the project coordinator. The visit ended with a de-briefing session at the USAID Mission in Dar es Salaam. Dr Hobgood stressed that all FtF activities in Tanzania should be seen as one single program. He appreciated the intention of Africa RISING to work closely with NAFKA and to co-locate sites.



Figure 2. Project visit by Drs Eric Witte and Jerry Glover from USAID Bureau of Food Security, Washington from 17-22 June

Success story

See Annex 3

Annex 1. Overview of jumpstart projects

Lead	Collaborators	Title	Action areas	Summary of outputs	Budget (US\$)
IITA: Joseph Rusike	ICRISAT, CIAT, MSU, SUA, ARI - Selian & Ilonga, Bunda College, NSFAM - Malawi, ZARI - Msekera, SIMLEZA	Value chain analysis of grain legumes	Tanzania (Dodoma, Manyara, Morogoro); Malawi (Balaka, Dedza, Lilongwe, Machinga, Mangochi, Mchinji, Ntcheu); Zambia (Eastern Province)	<ol style="list-style-type: none"> 1. Production and marketing of grain legumes mapped and quantified 2. End-use markets, structure, and dynamics of grain legume value chains mapped; opportunities and constraints identified 3. Best-bet system components of intensification technologies mapped and catalogued 4. Key actors, networks, and points of leverage to support sustainable intensification identified 5. Key stakeholders for innovation platforms galvanized and strategies developed to improve performance of value chains 	169 447
CIMMYT: Tadele Tefera	IITA, SARI, SUA, Min. Agriculture, World Vision	Improved postharvest technologies	Manyara, Dodoma, Arusha in Tanzania	<ol style="list-style-type: none"> 1. Identified postharvest grain losses factors (specifically to insects) 2. Trained 20 artisans on improved postharvest technologies, especially increasing local silo capacities 3. Trained 218 farmers/households in novel processing and preservation of locally produced grains, legumes and horticultural produce 4. Conducted farmer sensitization on postharvest technologies using on-farm demonstrations and field days 	173 000
ICRAF: Anthony Kimaro	USDAM (IRA), SUA, ARI-Hombolo	Scaling-up of Evergreen Agriculture	Manyara (Kondoa, Mbulu districts); Ntcheu and Kasungu districts of Malawi	<ol style="list-style-type: none"> 1. Synthesis of existing knowledge on factors influencing success of EGA 2. Documented biophysical factors underpinning success of EGA 3. Analysis of capacity and models of sustainable tree seed and seedling supply systems 4. Analysis of capacity of farmers to practice EGA and use weather information 	172 000
CIAT: Patrick Mutuo	IITA, ICRISAT, CIMMYT, ICRAF, ARI-Ilonga, ZARI, Bunda College (Malawi)	Catalogue of tested crop, soil and water management options*	Tanzania (Manyara, Dodoma, Morogoro, Southern Highlands); Malawi (Balaka, Dedza, Lilongwe, Machinga); Zambia	<ol style="list-style-type: none"> 1. Documented best-bet options and initiatives that have been implemented in the ESA project countries aimed at SI 2. Identified methods and training materials for SI 	249 014

			(Central & Eastern provinces)	<ol style="list-style-type: none"> 3. Provided evidence of land degradation from on-going potential partner activities, like those of AfSIS 4. Identified four main drivers of adoption of SI technologies access to agricultural inputs 	
IITA: Fen Beed	SUA, TFDA, TPRI, Cesope, MinAFSC, IFA-Tulln (Austria)	Mycotoxins in maize, cassava*	Kondoa, Dodoma, Kongwa, Mpwapwa, Manyara districts of Tanzania	<ol style="list-style-type: none"> 1. Identified linkages between mycotoxin prevalence with region and farmer practices 2. Awareness raised: key mycotoxins communicated to stakeholders 3. Hotspots requiring immediate intervention identified 4. Survey and analytical methods optimized 	170 439
CIAT: Jean-Claude Rubyogo	CIMMYT, ICRISAT, IITA, DGP-CRSP, Tanzania - Directorate of Crop development, Malawi - Department of Agricultural Research and Technical Services (DARS), Zambia Seed Control and Certification Services (SCCI)	Identifying efficient seed systems, practices, models*	Tanzania, Zambia, Malawi	<ol style="list-style-type: none"> 1. Evidence-based report on how some existing seed systems models serve farmers 2. Report on existing seed policies and their implications on farmers' seed access /seed industry development 3. Documented evidence of existing varieties and farmers' capacity to identify varieties 4. A seed systems strategy for an impact-oriented and sustainable seed system development 5. A catalogue of seed suppliers and related input suppliers per country 	170 000
ICRISAT: Moses Siambi	CIMMYT, CIAT, and ICRISAT has several national partners for various roles in the seed production cycle.	Seed multiplication	Tanzania, Zambia, Malawi	<ol style="list-style-type: none"> 1. Produced seeds (8.3 tons of bean seeds; 0.95 tons of winter bean seeds; 4 tons of maize seeds; 13.2 tons of groundnut seeds; and 18 tons of pigeon pea seeds) in readiness for support to AR 2012/2013 activities 	270 000
CIMMYT: Christian Thierfelder	Total Land Care, Bunda College, Washington State University	Intensification of maize-based farming systems*	Dowa and Nkhotakota districts, Malawi	<ol style="list-style-type: none"> 1. Report on the suitability of sweetpotato as a rotation crop in CA systems 2. Report on the impact of intercropping pigeon pea on household nutrition and income 3. Economic model to measure the financial impact of different cropping systems; 4. Increased capacity of University of Malawi's soil analytical and food quality labs to analyze soil and plant samples 	109 999

Africa Rice: Paul Kiepe	ACDI-VOCA, SUA, Uyole, KATC, CAMARTEC, Intermech	Weed management in rice-based systems*	Rain-fed lowlands, Tanzania	<ol style="list-style-type: none"> 1. Farmer instruction videos (rotary hoe weeding and safe use of herbicides) produced and disseminated to farmers 2. Rotary weeders tested with farmers and national partners and most suitable design selected for production 3. Local craftsmen trained on manufacture and repair of rotary weeders 4. Weed knowledge capacities enhanced among local agricultural R&D professionals and students 	170 000
AVRDC: Victor Afari- Sefa	IITA, SUA, OSU, Hort-CRSP, Africa-Rice, TPRI, SRI, DALDOs	Enhancing vegetable value chains in rice- based systems of Morogoro*	Mvomero and Kilombero districts	<ol style="list-style-type: none"> 1. Compilation of baseline data on production and markets constraints for vegetables and food safety analysis 2. Characterization of rice-vegetable production sites and consumption patterns of rural and urban households 3. On-farm assessment of incidence of pests and diseases 4. Analysis of microbial, pesticide and heavy metal contamination of market and farm samples 5. Stakeholders' workshops 	214 969

**Project in no-cost extension*

Annex 2: Lessons from jumpstart projects

Jumpstart Project	Lessons
Grain legume value chain analysis	<ul style="list-style-type: none"> • Markets at all levels are short of legumes • Legumes could substitute imports of poultry feed • Lack of capabilities to supply end products • Poor access to inputs • Low productivity • Lack of postharvest technologies • Price volatility • Lack of road infrastructure to reach markets • Unavailability of financing instruments • Poor government market regulation
Improved postharvest technologies	<ul style="list-style-type: none"> • Storage of produce needed for 6-12 months • Proccession increases profitability • Simple technologies available for grain storage • Polyethylene bags preferred grain storage method
Scaling-up of Evergreen Agriculture	<ul style="list-style-type: none"> • Fertilizer trees increase maize yields compared to maize production without external inputs • Poor availability of improved tree seeds and seedlings • Farmer-to-farmer exchange is important way of accessing tree seeds and seedlings • Improved access to and use of weather data would help farmers to make better decisions with regards to climate change adaptation • Farmers really use official weather forecast data • Weather forecast information from TMA too general for planning purposes • Adaptive capacity of villagers to climate change is low because of poverty • Lack of alternative livelihood options • Environmental degradation • Participatory land-use planning needed to minimize conflicts over land-use
Catalogue of tested crop, soil, and water management options	<ul style="list-style-type: none"> • Technologies, training materials, and policies are available to promote sustainable intensification • Land Degradation Surveillance framework (LDSF) is an appropriate tool for assessing land and ecosystem health
Mycotoxins in maize, cassava*	<ul style="list-style-type: none"> • Survey and analytical methods needed to be optimized; analyses still in progress • Cassava contamination with aflatoxin lower than expected; high levels of contamination in maize
Identifying efficient seed system practices and models for maize, legume, and forage seeds	<ul style="list-style-type: none"> • Very limited production of legume breeder, basic, and pre-basic seeds • Current policies unfavorable for legume integration • Lack of private sectors' interest in seed production • Inadequate availability of legume seeds to farmers • Farmers not aware of availability of improved legume varieties • No released forage varieties • No seeds systems for forages • Farmers eager to experiment with improved legume and maize varieties
Multiplication of breeder and basic seed for maize and legumes	<ul style="list-style-type: none"> • Demand from Africa RISING for legume and maize seeds in year 2012/2013 can be met
Intensification of maize-based farming systems in Malawi	<ul style="list-style-type: none"> • More research needed to develop strategies to incorporate sweetpotato in conservation agriculture systems • Crop residue retention in conservation agriculture important for resilience to drought and climate variability
Weed management in rice-based systems*	<ul style="list-style-type: none"> • Rotary weeders can reduce labor-input by 50-64% and can be further reduced through practice • Herbicide use is most labor-saving
Enhancing vegetable value chains in rice-based systems of Morogoro*	<ul style="list-style-type: none"> • Lack of specialized equipment for food safety analysis • In Morogoro region, less than 10% grow vegetables as an intercrop with rice; more than 50% grow vegetables as a sole crop after harvesting rice



Success Stories

Creating Awareness on Labor-saving Technologies for Weed Control in Rice Production



A farmer testing a mechanical weeder introduced under the activities of this project

Weeds are one of the major constraints to rice production in sub-Saharan Africa (SSA). Without control, they can cause yield losses ranging from 28% to 89%. One major contributing factor is the lack of knowledge and information on labor-saving weed control and management technologies among farmers and extension workers.

The jumpstart project on 'Building local capacities in weed management for rice-based systems' led by the Africa Rice Center (AfricaRice) sought to remedy this by creating awareness on available and appropriate labor-saving and efficient weed management practices to boost the crop's production.

It targeted research and development (R&D) partners, the private sector, and farmers involved in rice-based production systems in Tanzania.

R&D professionals and students

The project conducted a one-day training on weed control and management practices, and on the use of an online interactive weed identification tool, AFROweeds at the Sokoine University of Agriculture (SUA) in Morogoro, Tanzania. The training was attended by 22 R&D professionals and 15 weed science students.

The workshop aimed at enhancing networking between national and regional weed scientists by introducing the open-access online African weed science network *Weedsbook*. This network includes researchers from international and national research organizations, government extension officers, university lecturers, and students.

“Weed is the number one constraint in rice production in many countries in Africa and awareness on sustainable and cost-effective ways to control them in rice-based systems is low. In this project, we wanted to not only build capacity but also enhance the network of weed scientists and other people interested in weeds for easy knowledge and information sharing among each other,” Jonne Rodenburg, Weed Scientist at AfricaRice and the research team leader, explained.



R&D professionals and student trained on recognizing rice weeds

Fabricators of mechanical weeders

The project further organized a training workshop on fabrication of rotary weeders for blacksmiths drawn from all over the country to control weeds of lowland rice. This will make rice widely available and at competitive prices for the farmers.



Blacksmith fabricating a localized rotary weeder during a training workshop

Currently, farmers mostly rely on hand or hoe weeding, which are both extremely time and energy-consuming. The rotary weeders are hand-operated devices that can be easily manufactured by local blacksmiths using locally available materials. They are very popular in Asian countries; however, in Africa, they are only found in Madagascar.

Three new types of weeders were fabricated during the workshop. Two of these were selected for promotion in the country after subjecting them to further on-farm testing with the farmers. Technical drawings are currently being produced, which will enable even more blacksmiths to produce these weeders.

“We wanted to build local capacities to manufacture locally adapted rotary

weeders for resource-poor farmers in Tanzania. We showed the diversity of mechanical weeders and that they can be adjusted to suit local conditions or preferences of the end-user (the farmer),” Rodenburg said.

Farmer-to-farmer video



Capturing farmers doing hand-weeding while filming the farmer-to-farmer's videos on labor-saving weed management

The project has also developed two farmer-to-farmer videos on labor-saving weed management technologies—the rotary-hoe weeder in lowland rice, and safe and efficient use of herbicides.

“With the rotary-hoe weeders, the weeding labor is reduced by up to 60–65% while the herbicides reduce it by over 80%. However, farmers do not always use the herbicides correctly and this can impact negatively on their health and the environment; hence, the need for the videos,” Rodenburg said.

The videos shall be translated into four languages and distributed to at least 10 000 farmers and extension workers from the rice-growing areas in SSA.

Partners

The main project partners are AfricaRice, Sokoine University of Agriculture (SUA), University of Dar es Salaam, Intermech Engineering Ltd, NAFKA (ACDI-VOCA project on Tanzania Staples Value Chain), Kilombero Agricultural Training and Research Institute (KATRIN), Mbeya Agricultural Training Institute (MATI-Igurusi), Kilimanjaro Agricultural Training Center (KATC), Centre for Agricultural Mechanization and Rural Technology (CAMARTEC), the Ministry of Agriculture, Food Security and Cooperatives (MAFC), IITA, and the World Vegetable Center (AVRDC).