



Research on institutional innovation and scaling issues in Africa RISING

This report is produced by

Per Hillbur
Consultant

It is published by

International Institute of Tropical Agriculture (IITA)

August 2013

www.africa-rising.net



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

Through action research and development 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 (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.



This document is licensed for use under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License



This document was made possible with support from the American people delivered through the United States Agency for International Development (USAID) as part of the US Government's Feed the Future Initiative. The contents are the responsibility of the producing organization and do not necessarily reflect the opinion of USAID or the U.S. Government.

Contents

Introduction	1
The role of innovations in sustainable agricultural intensification	2
An area-based approach to sustainable intensification	2
The role of R4D platforms	3
Outputs and benefits from the R4D platforms	5
R4D platforms at the Tanzanian sites	6
Some reflections and lessons from the first year of Africa RISING	9
Scaling and impact of interventions	10
Scaling strategies and scaling patterns	11
Scaling vertically and horizontally	12
A note on scaling, impact and scientific approaches	13
Research on impact – differential effects and gender	14
The targeting of farm households – some typologies	15
Targeting women in sustainable intensification research	17
Conclusions and recommendations	18
References	19
Annexes:	
Terms of Reference	21
A stepwise model for identifying appropriate entry points for scaling of agricultural intensification	22
Stage of innovation/ type of gender analysis	23
List of stakeholders in the Africa RISING Tanzania sites - abbreviations	24

Introduction

Agricultural production in developing countries has increased in a remarkable way during the last decades. In spite of what is widely reported, agricultural production in Africa has grown as well, although not at the same pace as in Asia or Latin America (Pretty *et al* 2011). After about 50 years of independence in most African states, agricultural research and extension has experienced ever-decreasing investments from their governments. Although tapering off in some countries, population growth still triggers new advancements in agriculture to keep pace with the increase in absolute numbers of people in urban as well as rural areas. Consequently, access to productive land diminishes, which calls for intensification in a sustainable way to feed future generations¹.

In 2009, the Government of the United States launched the initiative Feed the Future (FtF), and, by support of USAID, Africa RISING (Africa Research In Sustainable Intensification for the Next Generation) is since 2012 one of the programs to implement this initiative (Africa RISING 2012). One of the cornerstones of Africa RISING is to support integrated farming systems, *i e* farming systems that integrate annual and perennial crops for cash and subsistence, livestock and its products as well as soil and water conservation measures in order to sustain production and household income in a long-term perspective.

This is the second report of two from a consultancy to Africa RISING concerning research on system innovation, stakeholders' platforms and scaling at the Tanzania research sites. The first report is a background paper presenting a broad situational analysis of the three districts Babati, Kiteto and Kongwa as regards the potential for sustainable intensification (Hillbur 2013). It comprises a general background of agro-ecological and socio-economic conditions as well as an analysis of previous on-site research and development efforts relevant to sustainable intensification.

This report provides an overview of research approaches relevant to the current Africa RISING Framework, with particular emphasis on establishment of R4D (research-for-development) platforms, scaling strategies and achievement of long-term impact of the program.

Africa RISING is organized as a network of partners, where all project activities are carried out by different partners, separately or in collaboration with others, and thus, coordination of activities in the project sites is an essential part of the program. As Africa RISING is also aligned to Humidtropics²,

¹ For a recent overview of sustainable intensification and its role in African agriculture, see The Montpellier Panel (2013)

² Humidtropics, a CGIAR Research Program, led by IITA, see www.humidtropics.cgiar.org

an effort has been made in this report to identify opportunities to research and on-site collaboration between the two programs. The overall aim of Humidtropics is to sustain agricultural intensification in the humid tropics, while at the same time reduce rural poverty, increase food security, improve nutrition and health, all within a framework of sustainable management of natural resources. While Humidtropics operate over three continents, some possible geographical overlap can be identified, particularly in the so-called Tier 2 areas of Humidtropics, which includes the West Africa Moist Savanna and the Southern Africa Moist Savanna. The Tanzania project sites are potential collaboration sites for the latter zone.

The role of innovations in sustainable agricultural intensification

Adoption of innovations is a popular topic in agricultural development, but we can also conclude that in most cases we ask ourselves – and our organizations – why adoption does not occur. As stated in the first report (Hillbur 2013), the scope for Africa RISING must be on efficient ways to reach impact, *i.e.* better livelihoods and health for rural people, strengthened market integration and sustainable use of natural resources. This will include a focus on appropriate technological innovations (new crop and livestock varieties, crop arrangements, fertility management, pest management, etc) as well as institutional innovations, involving rural credits, tenure system, market conditions and socio-cultural organization. So, in the long run, the focus on the rate of adoption of innovations must be replaced by providing long-term positive impact by systematic interventions through a demand-driven approach. The consequences for research are obvious; adoption is not the key element, but interactive design, co-evolution and learning (Leeuwis and Aarts 2011). And, by saying this, we conclude that we cannot know which elements will be involved or what kind of impact an open-ended process will have. This will also have an effect on how we look at diffusion and scaling, as will be shown below.

An area-based approach to sustainable intensification

One of the main challenges to agricultural development in Africa is to recognize heterogeneity, both in terms of socio-cultural variation and dynamics - which is apparent even at the local level in many countries and societies – and bio-physical diversity, providing drastically different growing conditions even at farm level.

The tools and methodologies employed in this report can all be seen as part of an area-based approach to sustainable intensification. As elaborated by Törnqvist (1981), an area-based approach is guided by principles of *nearness* – *i.e.* how different objects and processes interact spatially, in a

landscape – compared to a more traditional scientific (discipline-oriented) approach guided by principles of *similarity*. This emphasis of spatial interactions, as *e g* in an agricultural landscape, is called *the arena perspective* (Hillbur 1998). The value added here by the arena perspective is that it makes visible the reality of farmers and other local actors, and thus includes local knowledge systems (Röling 1994, Scoones and Thompson 1994) in strategies and decision-making about interventions.

The area-based approach works well with agro-ecological/systems thinking, but this should also be combined with theories on how to bring about socially acceptable transformation. The social relations approach (Okali 2012) stresses five important organizational elements for such transformation: rules, resources, people, activities and power. The social relations approach strengthens the role of demand-driven interventions, support of an enabling environment and negotiations. This is also critical in making interventions gender transformative. A brief guide for gender analysis in innovation processes (Okali 2012) is found in Annex 2 of this report.

There are many reasons to turn our interest to a range of stakeholders in the innovation process, as successful innovations were usually based on “*an integration of (technological and other) ideas and insights from not only scientists, but also of users, intermediaries and other societal agents*” (Leeuwis and Aarts 2011:22). A powerful technique in applying an area-based approach is the establishment of R4D platforms. These platforms may well operate at different levels, and hypothetically virtual platforms are possible for certain kinds of interaction. In this report, however, an R4D platform has a distinct geographical focus, in order to address a wide range of stakeholders operating in the same environment. The principle of nearness is important to keep together the trans-disciplinary, multi-sector focus.

The role of R4D platforms

Since system interventions require the engagement of various research and development partners, operating in the context of specific components within these systems, proper means for meaningful and effective interactions are needed to prioritize, guide, and evaluate the various research and development processes within Africa RISING. In line with the logic of the CGIAR Research Program on the Humid Tropics, R4D platforms will be constituted within specific development domains. (Africa RISING 2012, p.8)

As shown above, the rationale for employing R4D platforms is to link a range of organizational actors in R4D platforms that can promote the simultaneous technological, social and institutional change needed for sustainable intensification. This may include a range of activities, but from a research point of view, the R4D platform responds to the establishment of three different communicative

strategies: network building, social learning and conflict management (Leeuwis and Aarts 2011:31). Each of these are important to stress, but I would like to emphasize the role of 'social learning' (rather than dissemination), and 'conflict management', which may seem difficult, but appears anywhere where common resources, different perspectives and policy come together.

There are some recent research and experiences from the use of multi-stakeholder platforms in relation to agricultural innovation. Adekunle *et al* (2010) provide a detailed framework for setting up so-called innovation platforms, and they distinguish between a strategic and an operational level (innovation clusters), where the latter would roughly correspond to the district level. In contrast, R4D platforms have a different focus as they emphasize better understanding of social dynamics and the institutional environment, and can put the adoption of particular technologies into some context. R4D platforms differ from innovation platforms as they may take a wider perspective through collaborative learning and research on farming systems rather than a focus on a particular commodity and its value chain.

The formation of effective R4D platforms involves a number of challenges:

- A clear methodology to include actors outside the research – extension – farmer sphere; especially private sector from the value chain and policy makers. Validation of stakeholders in relation to contribution and benefits is however an important step before a formal establishment of the platform.
- Methodology for making visible actors and critical resources. This is particularly crucial for making the most of contributions from local knowledge. No one is participating because they are poor or vulnerable – all stakeholders are there because they make valuable contributions!
- Experience and readiness to facilitate negotiations and conflict resolution. An R4D platform for sustainable intensification will address issues where current norms, rules and policies need to be questioned. Leadership from actors with diverging interests is a key to success.
- Consistent methodology for creating an inclusive environment, allowing new ideas to be tested and grow. This includes collaboration in trying and evaluating different alternatives, potential for scaling, the role of experimentation, failures, etc.
- Identification of training and capacity building needs of partners throughout the process
- Monitoring and evaluation of progress with project implementation
- Establishment of links to national and regional policy through participation of relevant stakeholders at strategic levels

All in all, the complex challenges calls for research and careful M&E processes in order to document, analyze and evaluate the establishment and progress platforms for better understanding of the added value of R4D platforms under different conditions. As with many open-ended processes, we lack insights in what exactly makes R4D platforms effective in changing mainstream practices depending on policy environment, the range of issues involved or the scale(s) at which the platform operates. There is also an urge to know more about how these platforms function when organized around other constructs than just value chains.

Outputs and benefits from the R4D platforms

The primary beneficiaries are the small-scale farmers and other stakeholders in rural areas who, through the platforms, will have better access to information, technologies, skills, credits, markets, etc., supporting agricultural intensification for improved and sustainable livelihoods. Depending on the methodology used for involving farmers and other stakeholders in research, they will increase their understanding of the dynamics of these networks and the conditions/requirements of their success. An important goal for the platform is that results (in the form of interventions, lessons learned and mediated change) will inform decision makers, public and private players in agricultural development and educators about how R4D platforms can work to promote technological, social and institutional change, in order to put sustainable intensification to scale.

To date, there is little evidence on the impact of R4D platforms. Some important experiences can be derived from other multi-stakeholder initiatives, such as the work on innovation platforms in the Sub-Saharan Challenge Programs (SSA-CP, see Adekunle *et al* (2010), Tenywa *et al* (2011) and Adekunle and Fatunbi (2012)). There is also a range of related activities to follow up on, *e.g.* Badibanga *et al* (2013) on agricultural and rural management councils (CARGs) in DR Congo and Kilelu *et al* (2013) on supporting co-evolution of innovation in dairy development in Kenya. In the Africa RISING project sites, experiences of multi-stakeholder platforms are however limited, especially in their range and application for wider impact. Employing an ‘innovation systems approach’, Majule *et al* (2009) carried out a stakeholder analysis involving a number of currently listed organizations of the ‘Kongwa/Kiteto platform’, while exploring responses and adaption to climate change and climate variability. It is important to learn from this and other related exercises for design of activities in Africa RISING. A major lesson is that “[I]n most cases, the introduction of new agricultural innovations to the communities based on their needs seems to work quite well in terms of acceptability” (*ibid*: 23). A related study on farmers’ perceptions of ‘good and bad years’ in terms of climate variation in the southern highlands of Tanzania (Nsemwa *et al* 2009) provide some interesting insights in methodological approaches to demand-driven farm innovation. In both cases, samples have been

small and give no further direction on scaling issues. Furthermore, they are not dealing with particular interventions, but with the agricultural system's response and resilience to (perceived) climate change. For Africa RISING, it is obvious that the early introduction of 'informed experiments', derived from local experience, is a critical part of the overall methodology.

R4D platforms at the Tanzanian sites

As a starting point, a preliminary list of stakeholders in sustainable intensification for Kongwa/Kiteto and Babati, was prepared with some help and feedback by key informants from local research and extension staff (Hillbur 2013). Inspired by experiences made elsewhere, particularly from the Lake Kivu Innovation Platform (Tenywa *et al* 2011), stakeholders seen as relevant to sustainable intensification at the district level were categorized according to their main occupation, or potential contribution. The list for the two R4D platforms is not exhaustive, and the categories should be altered and discussed, as soon as steps towards a real platform are taken. This is a first sketch to get an orientation about how to continue the work. Are these stakeholders relevant to a focus on sustainable intensification? Which stakeholders are not included? What contributions can they make? Who are the beneficiaries? How do we form a platform to get a high level of creativity? How do we secure impact? As mentioned above, a starting point is to define focus for each platform, i.e. "*sustainable intensification of farming in XX*", and a validation of partners in relation to their contributions and benefits from interventions. The performance of the platform is built on the three core activities: network building, social learning and conflict management.

Table 1. Stakeholders and their potential contributions (structure based on Tenywa et al 2011)

Category of stakeholders	Potential contribution
1. Farmers (men, women and youth)	<ul style="list-style-type: none"> - identify and map challenges - make local knowledge visible - test, develop and evaluate candidate interventions - communicate results
2. Input suppliers <ul style="list-style-type: none"> - stockists (seeds, fertilizers, pesticides, herbicides, veterinary drugs) - manufacturers and dealers (farm implements) - crop/livestock boards - cooperative societies - other agri-business enterprises 	<ul style="list-style-type: none"> - timely delivery of quality and affordable inputs/information - commercialize the supply of inputs/tools that support agricultural risk management - package hardware and software (<i>e g</i> after-sale service) - knowledge sharing and promotion of appropriate inputs
3. Output handling and market support agents <ul style="list-style-type: none"> - crop and livestock traders - agro-processors - transporters - other agri-business players 	<ul style="list-style-type: none"> - provide strategic market/system linkages to support producers - guarantee systems/contract farming systems - develop strategies that improve quality and shelf-life of agricultural products - knowledge sharing and flexibility in scaling
4. Financial institutions (especially those providing savings, credit and insurance services)	<ul style="list-style-type: none"> - develop financial products/services that support interventions
5. Extension agents (from local and national governments, NGOs and other farmers' support organizations)	<ul style="list-style-type: none"> - knowledge sharing on identification, development and implementation of projects - support communication and promotion of end products
6. Research institutions	<ul style="list-style-type: none"> - critical situation analysis - leadership in designing interventions - conduct new research where necessary - communication of results
7. Policy makers	<ul style="list-style-type: none"> - mobilize the farmers - support formulation of appropriate policies

Table 2. Potential stakeholders as of category in Kongwa/Kiteto and Babati, respectively. Preliminary list based on Hillbur (2013), Bekunda (2012) and Okori (2012)

Category of stakeholders */	Kongwa/Kiteto	Babati
Farmers	MVIWATA Farmers repr	MVIWATA Farmer repr
Input suppliers	Tanseed TFA TOSCA	Meru Agro, Minjingu Fertilizer Co, PANNAR, SATEC, Tanseed, TFA, TOSCA
Output handling and market support agents	Kibaigwa market	FaidaMali Virtus Global Ltd
Financial institutions	SACCOs	SACCOs VICOBA
Extension agents	Kongwa District Council Kiteto District Council NAFAKA Orgut	Babati District Council Babati Town Council Orgut
Research institutions	CGIAR ARI Hombolo NARI IRA/UDSM Pasture Research Centre Selian ARI SUA UDOM	CGIAR NARI NM - AIST Selian ARI
Policy makers	Kongwa District Council Kiteto District Council MKURABITA	Babati District Council Babati Town Council MAFC
Others (NGOs, donors etc)	CORDS FARM-Africa Inades-Formation INTSORMIL LVIA SULEDO Tuboreshe Chakula USAID World Vision Intl	FARM-Africa FIDE RECODA TAP TCCIA TechnoServe USAID World Vision Intl

*/ Please note that categories are not definite. This is an estimation of main occupation of each stakeholder; several can appear in more than one category. More potential stakeholders will be identified.

Some reflections and lessons from the first year of Africa RISING

So far, it may seem that this report is all about preparation for research and less of building on actual experiences in the field. Although program efforts have been put into baseline studies and so-called “ground truthing” of the project sites, these results have not been available and will be presented elsewhere. A preliminary background paper (Hillbur 2013) was prepared, but this was primarily a compilation of previous research in the area, and does not fill the need for updated base-line characterization data. Instead of speculations, I would rather briefly present the activities in the project sites so far (Table 3), followed by a brief assessment of some preliminary findings, reported in the first Technical Report from the ESA project (Hoeschle-Zeledon 2013).

Table 3. Listing of proposed activities/work packages (WP) in the Tanzania project sites, year 2012/2013³. For details, see Okori (2012) and Bekunda (2012).

Kongwa/Kiteto (Okori 2012)	Babati (Bekunda 2012)
WP 1: On-farm evaluation of improved legume and cereals varieties	WP 1: Identification of the key biophysical production constraints to crops and livestock at farm and landscape levels
WP 2: Integrated soil fertility management in action areas	WP 2: Introducing improved food and feed crop varieties in the maize-based farming of Babati
WP 3: Land management (soil and water conservation) in action areas	WP 3: Introducing improved fodder species in the maize-based systems of Babati as a land management strategy
WP 4: Post-harvest processing, utilization and nutrition	WP 4: Promoting sustainable intensification through efficient application of a local source of phosphorus (Minjingu PR).
WP 5: Crop livestock and poultry integration and productivity enhancement	WP 5: Evaluation of mycotoxin contamination along value chains
WP 6: Characterization of Africa RISING sites	WP 6: Integrating postharvest nutrition technologies into the maize-based farming systems

As a brief comment to the proposed activities in the light of what has been said in this report on the nature of innovations and the potential for adoption, the selection of activities represents a good range (in line with the aims of the program) and a mix of promotion of technologies and system-oriented interventions. The technical report verifies the identification of “*on-the-shelf, indigenous and on-going innovations that would form combination components for new intensification innovations to be quantified and evaluated during the integrated systems improvement research*”

³ The table comprises only the original work packages decided on in 2012. The list is continuously revised and updated.

phase” (Hoeschle-Zeledon 2013:4). Some of these innovations are already present in the area, and are thus better documented. These include: cereal-legume rotation and intercropping; use of synthetic fertilizers (N and P); application of organic inputs; combining synthetic and organic inputs; use of fertilizer trees and shrubs in different crop arrangements; and conservation agriculture (*ibid.*). An overview of the spread and impact in the Tanzanian project sites of some of these innovations is available in Hillbur (2013). The technical report confirms mixed returns to these interventions, even if some of them have been supported by subsidy programs and national campaigns. At the farm level, constraints include *e g* (a) availability and affordability of inputs, (b) timely profit and food benefits accruing from the innovations, and (c) competition for limited resources (land, labor and finances) (Hoeschle-Zeledon 2013).

Scaling and impact of interventions

Research output 3: Scaling and Delivery of Integrated Innovation. While the first two outputs will generate integrated technology combinations that are effectively targeted to farmer’s real development needs, the scaling and delivery output will develop appropriate approaches for scaling out innovations, taking into account the often complex nature of system interventions. (Africa RISING, p. 12)

Africa RISING, as part of the USAID FtF initiative, is among a few programs that have the resources to include scaling of activities. But what does scaling mean? It has traditionally been conceptualized as dissemination of technologies by design of agricultural extension programs, but scaling is not equivalent to dissemination or extension! Still though, agricultural extension systems may be instrumental in coordinating scaling activities. As shown above, R4D platforms and stimulation of innovation processes are favored by a multi-stakeholder approach, involving private actors, policymakers, NGOs and others outside the traditional research-extension-farmer information system.

As scaling is also an issue for private actors and policy-making, the intended impact for small-scale farmers can never be guaranteed in the long run. Hence, scaling strategies must be part of the identification of entry points for intervention as well as for negotiations in the R4D platforms, if scaling activities are to be ecologically, economically and socially sustainable. It is therefore necessary to look further into is how to make scaling possible and acceptable.

The wide scope of scaling is reflected in the review of 40 programs and projects on sustainable intensification in Africa during the 1990s-2000s (Pretty *et al* 2011). The authors present seven requirements for scaling up and spreading (*ibid*:20)

- science and farmer inputs into technologies and practices that combine crops–animals with agro-ecological and agronomic management;
- creation of novel social infrastructure that builds trust among individuals and agencies;
- improvement of farmer knowledge and capacity through the use of farmer field schools and modern information and communication technologies;
- engagement with the private sector for supply of goods and services;
- a focus on women’s educational, microfinance and agricultural technology needs;
- ensuring the availability of microfinance and rural banking; and
- ensuring public sector support for agriculture.

This proves that some requirements go far beyond the traditional role of dissemination, but the framework of Africa RISING is at least addressing most of the requirements. The second point, ‘to create novel social infrastructure to build trust’ is this far not explored enough, but a sensitive link between R4D platforms and an operational level (*e.g.* sub-village) for farm management is crucial. It is also interesting to note that farmer field schools (FFS) are mentioned as inducing broad impact. Internationally, FFS have in recent years been questioned for not being cost-effective and, hence, having a limited role in scaling initiatives. In the targeted districts, there are some useful experiences of FFS and farmer groups that need to be further investigated, and together with initial public support and responsive rural credits, this form of experimentation at the local level has many advantages. In combination with (mobile) technologies for data analysis, communication and network sharing, local farmers may appear as nodes in scaling initiatives.

After reviewing previous projects and initiatives in the target districts (Hillbur 2013), we can conclude that improvements induced by agricultural research are comparatively small and scattered. It needs further studies to conclude on the reasons for shortcomings, and to the extent any of the above mentioned requirements have been present. As a parallel to the activities in the R4D platforms, we need to look further into models for scaling successful interventions.

Scaling strategies and scaling patterns

As above, we are considering scaling strategies for interventions related to sustainable intensification. The outputs are however many, and scaling strategies need to be adapted to what kind of impact we plan for. Woodhill *et al* (2012) distinguishes between five types of impact of scaling in agricultural development: (1) scale of benefits for those included; (2) scale of numbers of beneficiaries/actors included; (3) scale of change to the overall system/value chain; (4) scale of new profitable models; or (5) scale of environmental sustainability. The question of ‘what to scale’ may also differ at different stages of a program. While the numbers of beneficiaries is a clear aim for long-

term effects of a program, it can hardly be a starting point. As we speak of sustainable intensification, we may also consider ‘indirect stakeholders’ such as ‘nature’ – will scaling of environmental sustainability and scaling to decrease poverty be conflicting targets?

There is a number of expressions used around scaling strategies and scaling processes, and some of these obviously relate to how scaling is approached. Our standpoint here is clearly that scaling is more



Figure 1. Scaling strategies and scaling patterns (after Woodhill et al 2012)

than dissemination of technologies - “scaling is not simply about copying success; it is also about enabling high levels of innovation, experimentation, and feedback” (Woodhill et al 2012:8) - still it is useful to talk about scaling processes along a continuum from more ‘linear’ scaling to adaptive scaling (see Figure 1). The figure may be interpreted in a number of ways, but in an area-based approach as suggested here, the interpretation would be that ‘scaling up’ is used for ‘more of the same’, while scaling out would be ‘the same but in many new places’. Scaling adaptively will then refer to new forms and local adaptations of innovations in new settings. In Africa RISING, scaling up and scaling out may be relevant to limited components, but as systems, combinations and institutional change are in focus, ‘scaling adaptively’ is recommended for wider use.

Scaling vertically and horizontally

Depending on the kind of activities or interventions that is to be scaled, we can also look at scaling from a slightly different angle. A successful intervention that covers all steps and all actors in a value

chain is an example of *vertical integration*, a chain where all steps from resource/producer to recycling/consumer are integrated and depending on each other. The different steps in the value chain may be scaled up and either expand the domain of the value chain or link up with value chains elsewhere. In parallel, we can think of successful interventions *e.g.* within an R4D platform, where a new, innovative way of working is 'exported' from sustainable intensification to, let's say, health service provision or non-formal education. This is also a form of scaling, and if different initiatives, projects or processes come together at the same geographical level, we can talk about *horizontal integration*. Scaling takes place everywhere and all of the time, and not all scaling is benign to the intended process. To have an overview of scaling processes may of course be used as a powerful instrument to control a larger part of production, input supply or markets, along or across the value chain. The value chain approach helps us to identify critical steps as well as rapidly changing conditions, and that processes work both vertically and horizontally. This is a reason to put issues of scaling to the center of local processes and as a concern for R4D platforms. If not well integrated, effects of scaling may have adverse impact on producer prices, supply of inputs or access to markets, unless carefully planned and analyzed. But, scaling is also the road to broad impact and fulfillment of goals for poverty reduction and halted environmental degradation, and the area-based approach based on R4D platforms will be a significant contribution in this effort. There has however been very little systematic assessment of the interaction and complementarity between different approaches to scaling, and this will be a challenge both to Africa RISING and Humidtropics.

For qualitative input, research on scaling may turn to examples from other sectors. Shortcomings of scaling up successful initiatives in developing countries are also imminent in the health sector. The provision of health services is related to the diffusion of agricultural innovation as they are both complex systems based on technical knowledge but with an aim to reach out to beneficiaries in different settings in distant communities. Paina and Peters (2011) explore the properties and behavior of complex adaptive systems (CAS) to explain shortfalls in scaling up health provision. Some aspects of the model fits well into scaling of sustainable intensification, such as path dependence, power aspects of scaling in networks and 'tipping points' that suddenly distort market conditions. A general recommendation would be to broaden the understanding of agriculture as a complex adaptive system by further exploration of this field.

A note on scaling, impact and scientific approaches

A particular aspect of scaling concerns scientific approaches and methodological considerations. A recurrent theme in science is replicability, an aspect of reliability of research results. For studies of complex systems, this will always be a challenge, because the number of critical variables is high, and

for obvious reasons it is difficult to find suitable counterfactuals, for example for impact assessment. This appears as a problem already in site selection, where the use of randomized control trials, RCTs, and counterfactuals by some researchers are considered necessary for producing any kind of useful results. There is not much experience with RCTs in agricultural research or rural development (as compared to their use in the education and health sectors). Some experiences suggest that the approach is costly, is not conducive to design changes or adaptive management, and that to be effective research questions need to be narrowly defined. The usefulness of different methodological options, ranging from RCTs with well-defined counterfactuals to causal process tracing and thick description of innovation histories, is a major challenge to a program like Africa RISING, where a range of disciplines and methods are needed to characterize, analyze and interpret research results, and, at the same time, facilitate change in a range of bio-physical and socio-technical settings. It is important to carefully consider the strengths and weaknesses of different approaches for both research and monitoring, and see how they may be combined. In this context, 'scaling adaptively' will be a particular challenge.

Research on impact - differential effects and gender

Referring back to our discussion about the nature of innovations and failure to adopt, a systems innovations perspective provide opportunities to more systematically address pathways out of poverty in relation to proposed interventions, rather than recording individual farmers' failures to adopt. A particular challenge is to approach the difficulty of necessary trade-offs to meet the overall outcomes of poverty reduction and ecosystem integrity.

We still have an insufficient understanding of how exclusion of less resourceful groups happens along innovation pathways. Increased investment in the natural resource base may counteract this, as will institutional and policy innovations in the areas of land tenure, micro-credit, information sharing and improved access to input and output markets. In all, it is critical to understand and address power relations as a part of nested innovation networks and, as a consequence of this, better target interventions to benefit the livelihoods of rural women. The institutional framework, including the R4D platforms, will be designed to treat individual farmers, natural resource endowments and the policy environment as an integrated system. Careful monitoring and evaluation of entry points, interventions and impact from the perspectives of underprivileged groups is a priority to reach the desired outcome.

To be able to reach low-income, food insecure, households, a range of strategies are necessary that may not be classical intensification: increasing farm size and diversification of livelihoods (increased off-farm income) may be more successful strategies in some cases (The Montpellier Panel:31). To altogether exit of agriculture is not a viable option for most households, and in many cases diversification is already a common day-to day strategy. This challenges us to learn more about diversity of farmers' livelihoods.

The targeting of farm households – some typologies

The setting up of a research program encounters many challenges, and the criteria for site selection and its relevance for producing relevant data and assessing impact is discussed above. Apart from variation between project sites and villages we must also consider variation within the sites/villages, *i e* a need for methodologies sensitive to socio-economic stratification. There are many ways to explore socio-economic differences, and each methodology has its advantages and disadvantages. A complication is that conceptualization of wealth or well-being varies greatly between different cultural contexts, and is not easily captured by seemingly simple measures as farm size, income or access to credit or remittances. At the same time, existing data suggest that differential effects within villages/communities or even groups of households are prominent in most rural settings.

As argued in the initial discussion about low rates of adoption in many efforts to introduce new technologies, we are concerned to go beyond the individual's adoption of innovations (or failure to adopt) and focus on an enabling environment for innovation. Still, it is important to emphasize that change – as in adoption of an innovation – is a combination of collective processes and individual level change. There must be incentives both for individuals and the community as a whole to succeed. In order to target the primary beneficiaries of the program, *i e* less resourceful households and women, some kind of categorization of household must be made. There is a range of techniques how to do this practically in the field, but we also need some kind of model for impact pathways for farm households. As we are concerned with research about change, it is a wish – and an aim – to improve livelihoods in rural areas, but we also need to understand the mechanisms for inducing change and assessing impact. For this purpose, two different typologies of farm households will be presented here.

The first model was presented in the World Development Report (World Bank 2008) and divides farm households into five categories according to their livelihood strategies (table 4):

Table 4. A typology of rural households (World Bank 2008)⁴

1. households that derive most of their income from actively engaging in agricultural markets (market-oriented smallholders) .
2. households that primarily depend on farming for their livelihoods, but use the majority of their produce for home consumption (subsistence-oriented farmers) .
3. households that derive the larger part of their incomes from wage work in agriculture or the rural nonfarm economy, or from nonagricultural self-employment (labor-oriented households) .
4. households that has decided to leave the rural sector entirely, or depend on transfers from members who have migrated (migration-oriented households) .
5. diversified households , that combine income from farming, off-farm labor, and migration.

The advantage of this typology is that households are clearly defined in relation to their source of income and related value chains. The household's income structure does not however tell whether a particular household is successful or not, *i e* it is not immediately possible to target the poor.

Depending on planned intervention, however, this may be a valid typology. Each of the five strategies can become pathways out of poverty, but there is no 'pre-determined pattern', as the categories are broad and heterogeneous in terms of resources and status/position within the community. There are three powerful - and complementary - pathways out of poverty: smallholder farming; off-farm labor in agriculture and the rural nonfarm economy; and migration (*ibid*:92). As the model is applied world-wide, some features and livelihood strategies are more common than others in East Africa, but it will work well for open-ended discussions on pathway scenarios.

A similar model is presented by Tittonell (2011) and includes five possible broad rural household livelihoods strategies. The strategies are also represented in a pathway pattern in Figure 2:

- (i) intensification of production;
- (ii) diversification of agricultural productivities for increased output value;
- (iii) increased farm size;
- (iv) expansion in off-farm income;
- (v) complete step out of agriculture.

⁴ Definitions: Farm-oriented household (category 1+2): more than 75 percent of total income from farm production.

1. market-oriented smallholder: more than 50 percent of agricultural production sold on market.

2. subsistence-oriented farmer: less than or equal to 50 percent of agricultural production sold on market.

3. labor-oriented household: more than 75 percent of total income from wage or nonfarm self-employment.

4. migration-oriented household: more than 75 percent of total income from transfers/other non-labor sources.

5. diversified household: neither farming, labor, nor migration income source contributes more than 75 percent of total income

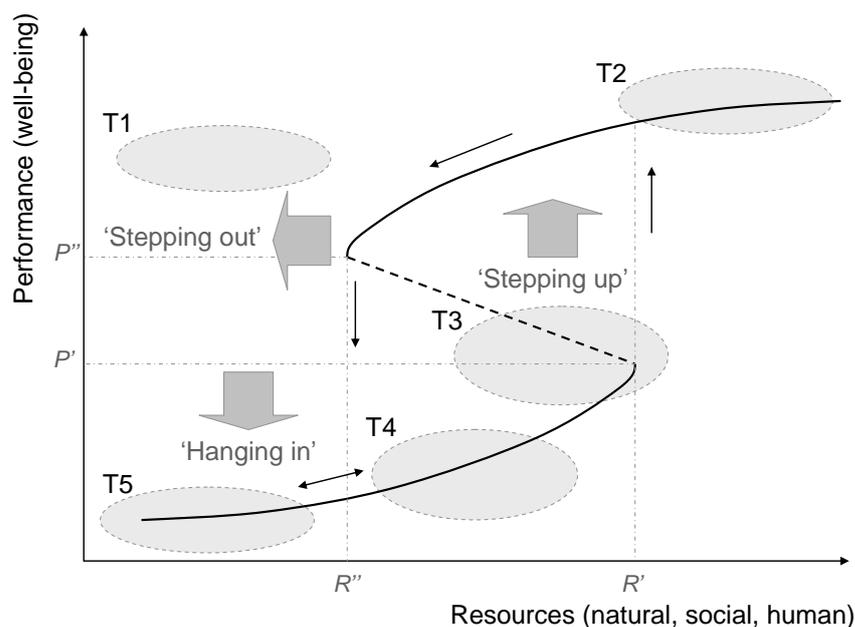


Figure 2: Theoretical representation of the position of five household types (T1-T5) that are common in East Africa. The two dimensions refer to resource endowment and performance. Full lines indicate two alternate system regimes (Tittonell 2011)

Tittonell's model is interesting as it is based on cases from East Africa and provides a terminology for strategies, processes and performance within the system. The diagrammatic representation illustrates well intensification as well as exit strategies. A great disadvantage is the seemingly 'pre-determined pattern' that appears. The model should rather be interpreted as empirical evidence from a number of studies, while the usefulness of the model for inducing innovation patterns in local communities is more doubtful.

Targeting women in sustainable intensification research

Gender equity is a prime determinant for success that implies reducing poverty among rural households through system interventions at all levels (household, farm, village, landscape, etc) including changing market and policy environments. Institutional innovations are therefore crucial to support successful targeting of women. As part of this, women's access to resources (incl. land tenure), incentives and value-adding components directed to women will be targeted, as well as platforms for capacity-building based on women's access to extension, education and market exposure. To certify that outcomes are met, trade-offs and flexibility in the institutional setting will be necessary. For a complete understanding of the potential and implementation of system innovations, men and women must be understood not only as two distinct target groups, but in addition as a wealth of livelihoods specified by their actual access and performance as subsistence

farmers, tenure holders, heads of households, marketing agents, policy- and decision-makers. The research teams need to be put together to develop a capacity to address these issues, both as part of the process design and for analyses at the level of the final beneficiaries.

Conclusions and recommendations

This report on research needs on institutional innovation and scaling issues in Africa RISING has focused on three major topics. Firstly, in order to address long-term impact of the program, a clarification of what sustainable intensification means in a local setting is needed. Research to support this would benefit from an area-based approach, which can address target beneficiaries, farmers' knowledge as well as local organization and capacity building. A part of this is development and adjustment to a relevant farm household typology as an analytical instrument to properly address and assess impact of the program, *i e* securing that the program will reach its beneficiaries. The second feature is the establishment and facilitation of research-for-development (R4D) platforms, an initiative that brings together all relevant stakeholders to discuss, design and negotiate entry points and future innovations within the field of sustainable intensification. The establishment of R4D platforms is important also to make the most of highly qualified research to focus on appropriate – and, thus, scalable – technologies, practices and institutional arrangements for long-term beneficial impact of the program. The third feature – but not necessarily the last in order – is the approach to scaling. This report recommends a wider interpretation of scaling that goes beyond 'copying of success' (Woodhill *et al* 2012), adding aspects of active enabling of local experimentation, adaptation and feedback. This means that the scalability of an intervention is an important aspect already from the beginning, as is the institutional environment and its potential for *continuous* innovation.

A strong recommendation to the program is therefore to plan for the following research activities:

- complementary situation analysis to include socio-economic aspects and integrate these into the current work packages, This includes a study that identifies a relevant farm household typology to be used as a targeting instrument for AR interventions
- a study on impact of research approaches to introduce, communicate and scale integrated systems innovations
- preparation and facilitation of multi-stakeholder (R4D) platforms to address a demand-led approach to systems innovation in sustainable intensification activities.

Whilst the initial phase of Africa RISING has had a distinct focus on developing and promoting (sustainable) technologies and practices for intensification, the time has now come to address the communities and the beneficiaries in order to prove that these preliminary entry points and interventions will add value and give long-term benefits to people and the natural environment. The best way to do this is to involve farmers, the public and private sectors and, last but not least, policy makers to make sustainable intensification more than a buzzword.

References

- Adekunle, A A and A O Fatunbi (2012) Approaches for Setting-up Multi-Stakeholder Platforms for Agricultural Research and Development. *World Applied Sciences Journal* 16 (7): 981-988
- Adekunle A.A, A.O Fatunbi and M.P Jones (2010). *How to set up an Innovation Platform. A concept guide for the Sub-Saharan African Challenge Program (SSA CP)*. Forum for Agricultural Research in Africa
- Badibanga, Thaddée; Ragasa, Catherine and John Ulimwengu (2013). Assessing the Effectiveness of Multistakeholder Platforms. Agricultural and Rural Management Councils in the Democratic Republic of the Congo. IFPRI Discussion Paper 01258, April 2013.
- Hillbur, Per (2013) The Africa RISING research sites in Tanzania. Opportunities and challenges to sustainable intensification and institutional innovation. Background paper, July 2013, Africa RISING.
- Hillbur, Per (1998). *The Knowledge Arena. Approaching agroforestry and competing knowledge systems – a challenge for agricultural extension*. Meddelanden från Lunds universitets geografiska institutioner, Serie avhandlingar 136. Lund University Press.
- Kilelu, Catherine W; Klerkx, Laurens and Cees Leeuwis (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agricultural Systems* 118: 65-77.
- Leeuwis, C. & Aarts, N. (2011). Rethinking Communication in Innovation Processes: Creating Space for Change in Complex Systems. *Journal of Agricultural Education and Extension*, 17(1), 21-36.
- Majule, A E, T. Stathers, R. Lamboll, E.T Liwenga, A. Chiwatakwenza, C Ngongondo, M. Kallanda-Sabola, S. Ndau, E Swai, A Katunzi, L Nsemwa and B Gwambene (2009). Experience from action research on strengthening local agricultural innovations to adapt to climate change in Tanzania. In: Maro, Paul S and Amos E. Majule (eds.). (2009). *Strengthening local agricultural innovations to adapt to climate change in Botswana, Malawi, South Africa and Tanzania*. Conference papers presented at Kunduchi Beach Hotels in Dar es Salaam, Tanzania

24-26 August, 2009. Implementation and Coordination of Agricultural Research and Training (ICART), SADC Secretariat, pp. 6-26.

Nsemwa, LTH, Gondwe BJ, Liwenga ET, Majule AE, Stathers T, Lamboll R and MD Sabola-Joshua (2009). Strengthening local agricultural innovation systems to adapt to climate change in Tanzania: Experiences from the Southern Highlands. In: Maro, Paul S and Amos E. Majule (eds.). (2009). *Strengthening local agricultural innovations to adapt to climate change in Botswana, Malawi, South Africa and Tanzania*. Conference papers presented at Kunduchi Beach Hotels in Dar es Salaam, Tanzania 24-26 August, 2009. Implementation and Coordination of Agricultural Research and Training (ICART), SADC Secretariat, pp.45-55.

Paina, Ligia and David H Peters (2011). Understanding pathways for scaling up health services through the lens of complex adaptive systems. *Health Policy and Planning* 2011, pp. 1–9.

Pretty, Jules; Toulmin, Camilla and Stella Williams (2011) Sustainable intensification in African agriculture. *International Journal of Agricultural Sustainability*, 9(1) 2011, pp. 5–24.

Röling, Niels (1994). Communication Support for Sustainable Natural Resource Management. *IDS Bulletin*, vol 25 (2), pp. 125-133.

Scoones, Ian and John Thompson (eds.) (1994). *Beyond Farmer First. Rural people's knowledge, agricultural research and extension practice*. London: Intermediate Technology Publications.

Tenywa, M.M., Rao, K.P.C., Tukahirwa, J.B., Buruchara, R., Adekunle, A.A., Mugabe, J., Wanjiku, C., Mutabazi, S., Fungo, B., Kshaija, N.I.M., Pali, P., Mapatano, S., Ngaboyisonga, C., Farrow, A., Njuki, J. and Abenakyo, A. (2011). Agricultural innovation platform as a tool for development oriented research: Lessons and challenges in the formation and operationalization. *Journal of Agriculture & Environmental Studies* 2(1):117-146

The Montpellier Panel (2013). *Sustainable Intensification: A New Paradigm for African Agriculture*, London.

Tittonell, P (2011). Farm typologies and resilience: The diversity of livelihood strategies seen as alternative system states. Paper presented at the 5th World Congress of Conservation Agriculture incorporating 3rd Farming Systems Conference, September 2011, Brisbane, Australia.

Törnqvist, G (1981). On Arenas and Systems. In: *Space and Time in Geography. Essays dedicated to Torsten Hägerstrand*. Lund Studies in Geography, Ser. B, no. 48. CWK Gleerup, pp. 109-120.

Woodhill, J., Guijt, J., Wegner, L., Sopov, M. (2012). From islands of success to seas of change: a report on scaling inclusive agri-food markets. Centre for Development Innovation, Wageningen UR (University & Research Centre). Wageningen.

World Bank. (2008). World Development Report 2008: Agriculture for Development. The World Bank, Washington, DC

Internet sources

Africa RISING (2012). Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) Program Framework 2012 – 2016. International Livestock Research Institute. Available at: www.africa-rising.net

Bekunda, Mateete (2012). *Research in Sustainable Intensification in the sub-humid maize-based cropping systems of Babati*. Africa RISING East and Southern Africa. Research Proposal 2012/2013. International Institute of Tropical Agriculture (IITA). Available at: www.africa-rising.net

Hoeschle-Zeledon, Irmgard (2013) *Sustainable Intensification of Key Farming Systems in East and Southern Africa 01 October 2012 to 31 March 2013. Technical Report*. Submitted to: United States Agency for International Development (USAID). Available at: www.africa-rising.net

Okali, Christine (2012). Gender Analysis: Engaging with Rural Development and Agricultural Policy Processes. Working Paper 026, Available at: www.future-agricultures.org

Okori, Patrick (2012). *Intensification of maize-legume based systems in the semi-arid areas of Tanzania (Kongwa and Kiteto districts) to increase farm productivity and improves farming natural resource base*. Africa RISING East and Southern Africa, Research Proposal 2012/2013. Available at: www.africa-rising.net

Annex 1:

Terms of Reference

The Terms of Reference are as follows:

- I. Identify the economic, social and institutional constraints to the adoption of agricultural technologies and institutional innovations in ESA Project Areas, Tanzania.
- II. Undertake an assessment of the legacy of selected research and development projects in the Africa RISING –ESA Project study districts of Babati, Kongwa and Kiteto in Tanzania
- III. Advise terms to be adopted for the engagement of various research and development partners for effective interactions to prioritize, guide, evaluate and scale research and development (R4D Platforms) for SI (sustainable intensification) in the selected areas.
- IV. Draft a research plan to develop the understanding of the economic, social-cultural

and institutional constraints that could affect technology adoption, for the purpose of consideration during the 2013/14 ESA Project Planning meeting (September 2013)

- V. Link up with potential additional sources of funding for Africa RISING.
- VI. Present draft research plan (item 4) at the ESA Project Planning meeting in September 2013.
- VII. Amend research plan by considering feedback received at the meeting.

The deliverables are as follows:

- Background paper: Opportunities for adoption and institutional innovation in Africa RISING Tanzanian research sites (items 1-3), completed July, 31, 2013.
- Draft research plan for research on institutional innovation and scaling issues in Africa RISING (item 4), completed August, 31, 2013.
- PowerPoint presentation of suggested research (for item 6), completed August, 31, 2013.
- Completed research plan after feedback from management/meeting (item 7), completed September, 30, 2013.

Annex 2:

A stepwise model for identifying appropriate entry points for scaling of agricultural intensification

Research/Implementation Process	The case of Africa RISING
Focus	Aspect(s) of Sustainable intensification
Definition of area	Action Site, field site, study units
Background	Baseline studies, history of area, previous interventions
Trends	Which are the current trends (poverty, environmental degradation, market conditions, etc.) – potential for sustainable intensification
Stakeholders/actors	Include all relevant stakeholders at relevant level to secure future information flows (R4D platform)

Indirect stakeholders	Media, nature, etc
Validation of stakeholders	Contribution and benefit patterns
- - -	M & E : preliminary level for IDOs, impact - - -
Vision for the area	Impact at regional level (ESA) Preliminary formulation of entry points
Strategy	Research logistics, time frame
- - -	M & E: internal monitoring of program resources - - -
Work plan	Entry points (innovation + target area/group)
Formalizing/signing agreements	local – intermediate – (national)

**Annex 3:
Stage of innovation/ type of gender analysis**

Design

- Was the client group differentiated by gender at the research initiation stage?
- Were different available solutions identified for men and women?
- When deciding the relative importance of solutions to be tested, were the differences between women and men’s priorities analysed?

Testing

- Was the client group for evaluating potential innovations or technology options differentiated by gender?
- Was it determined whether women and men have different yardsticks for measuring what is an acceptable solution or not?
- Was it considered whether men and women wanted to recommend different solutions to other farmers?

Diffusion

- Was the client group for awareness building, and validation and dissemination of tested innovation of technology options, differentiated by gender?
- Were the differences between men’s and women’s preferences analyzed when deciding when, to whom, and in what way to supply new inputs needed for adoption?

(Adapted from Lilja and Ashby, 2001, in Okali 2012)

Annex 4:

List of stakeholders in the Africa RISING Tanzania sites - abbreviations

ALAT - the Association of Local Authorities of Tanzania

ARI Hombolo – Agricultural Research Institute Hombolo, Dodoma

Babati District Council, Manyara Region

Babati Town Council, Manyara Region

CGIAR - the Consultative Group on International Agricultural Research

CIAT - International Center for Tropical Agriculture

CIMMYT – International Maize and Wheat Improvements Center

CORDS (Community Research and Development Services) – local NGO with pastoralist focus

FaidaMali – Faida Market Link

FAO (Food and Agriculture Organization of the United Nations)

FARM-Africa – British NGO

FIDE (Friends in Development Trust) - local NGO, Babati

HPI (Heifer Project International) - international NGO, based in the US.

ICRAF – World Agroforestry Centre

ICRISAT – International Crops Research Institute for the Semi-Arid Tropics

IFPRI – International Food Policy Research Institute

IITA – International Institute of Tropical Agriculture

ILRI – International Livestock Research Institute

Inades-Formation International (Réseau de Solidarité et d'accompagnement des initiatives de développement des populations défavorisées) – international NGO, based in Ivory Coast

INTSORMIL - The International Sorghum and Millet Collaborative Research Support Program, supported by USAID

IRA/UDSM – Institute of Resource Assessment, University of Dar es Salaam

Kibaigwa market, Kibaigwa, Dodoma

Kiteto District Council, Manyara Region

Kongwa District Council, Dodoma Region

LAMP (Land Management Programme) - a long term development programme financed by Sida in Babati, Simanjiro, Kiteto and Singida Districts until 2008

LVIA (Associazione internazionale volontari laici) – Italian NGO; projects on agriculture, health and water, Kongwa

MAFC - Ministry of Agriculture, Food Security and Cooperatives

Meru Agro – a Tanzanian agro-input company

Minjingu Fertilizer Company

MKURABITA (Mpango wa Kurasimisha Rasilimali na Biashara za Wanyonge Tanzania) – The Property and Business Formalization Programme, a Government of Tanzania initiative

MVIWATA (Mtandao wa Vikundi vya Wakulima Tanzania) - a national farmers’ organization

NAFAKA – Cereal Staples Value Chain, implementation programme, financed by USAID

NARI - Naliendele Agricultural Research Institute, Mtwara

NM-AIST – The Nelson Mandela African Institution of Science and Technology, Arusha

Orgut – an international consultancy firm, *e.g.* responsible for the implementation of LAMP

PANNAR – South African seed company

Pasture Research Centre, Kongwa

PHILA (Post Harvest Innovation Learning Alliance) - a network for post-harvest matters funded by the United Kingdom Department for International Development (DfID)

RECODA - Research, Community and Organizational Development Associates

SACCOs (Savings and Credit Cooperative Societies)

SATEC (Suba Agro Trading & Engineering Co. Ltd) – a Tanzanian agro-input company, Arusha

Selian ARI – Selian Agricultural Research Institute, Arusha

SUA – Sokoine University of Agriculture, Morogoro

SULEDO – Community forest project, Kiteto

Tanseed - Tanzania Seed Company

TAP - Tanzania Agricultural Partnership

TCCIA - Tanzania Chamber of Commerce Industry and Agriculture

TechnoServe – international NGO

TFA - Tanzania Farmers’ Association

TOSCA - Tanzania Official Seed Certification Agency

Tuboreshe Chakula - The Feed the Future Processing and Consumption Project

UDOM – University of Dodoma

USAID – the United States Agency for International Development

VICOBA – Village Community Banks

Virtus Global Ltd – international trading company

World Vision International – an international Christian relief, development and advocacy NGO