Fast-tracking farming system analysis activities within Africa RISING – a proposal – February-March 2013

Participants

Present: Mateete Bekunda (IITA, Africa RISING Tanzania, Malawi, and Zambia chief scientist); Asamoah Larbi (IITA, Africa RISING Ghana and Mali chief scientist); Peter Thorne (ILRI, Africa RISING Ethiopia coordinator); Alan Duncan (ILRI); Jeroen Groot (WUR); Ken Giller (WUR); Bernard Vanlauwe (IITA)
Absent with apologies: Mariana Rufino (ILRI), Lotte Klapwijk (IITA), Pablo Tittonell (WUR)

I. Introduction

Africa RISING (Africa Research in Sustainable Intensification for the Next Generation – *www.africa-rising.net*) is a research program of the Feed-the-Future initiative of USAID, operating through three projects in cereal-livestock systems in East and Southern Africa (Tanzania, Malawi, Zambia), West Africa (Ghana, Mali) and aiming at sustainable intensification of farming systems in specific target areas. The three projects are led by IITA (ESA and WA) and ILRI (Ethiopian Highlands). ILRI leads an associated project on monitoring, evaluation, and impact assessment. Conceptually, Africa RISING is linked to the Humidtropics and Drylands CGIAR Research Programs (CRPs).

Africa RISING is organized around 4 research outputs that are logically linked in time and place:
1. Research output 1: Situation Analysis and Programme-wide Synthesis
2. Research output 2: Integrated Systems Improvement.
3. Research output 3: Scaling and Delivery of Integrated Innovation.
4. Research output 4: Integrated M and E Process

During the Africa RISING meeting in Arusha in October 2012, Research Output 1 (RO-1) was decomposed into separate activities with a specific focus on (Table 1). Some of those activities are related to farming system analysis and identification of entry points towards system intensification.

Table 1: RO-1 activities, proposed during the Africa RISING meeting in Arusha, October 2012. Cells in grey are directly related to farming system analysis and identification of entry points towards system intensification.

Nr	Activities	Approaches, Methods and Tools
1.1.	Mega-site stratification by 'development domains'	GIS, meta-analysis; SI intensification dimensions along with key production systems
1.2.	Action site selection	GIS, meta-analysis; Field visits; Participatory approaches; Participatory experimentation among potential implementers
1.3.	Farm household typologies	Participatory approach; Baseline surveys, collection of secondary data (e.g., LSMS, HIS, production data, etc.); Focus group discussion; Multivariate analyses (Principal Component Analysis and Clustering)
1.4.	Identification of pathway entry points	Experts opinions / estimates; Households and experts surveys; Scoring; Congruence; Econometric modelling (Producer and consumer surplus); DALYS (for valuing other outcomes such environment, nutrition, gender, equity); Sustainable Livelihoods guidance Sheets
1.5.	Inventorize innovations	Jump Starts across AR projects; CRP portfolios; Categorisation of inventoried innovations (on the shelf, in pipelines, in use by farmers); Indigenous knowledge; Development of simple and efficient approaches to characterize technologies in terms of their applicability for different production domains, and household types
1.6.	Ex-ante potential of options	Ex-ante analysis (models and decision support tools to guide identify potential technologies (e.g. production functions)); Comparisons of predicted technology preferences compared to actual technology uptake among different types of households; Validation/confirmation of ex-ante analyses by stakeholders; Modelling and sensitivity testing of alternative technologies and their implications for system productivity (production domains, farm, community)and resilience
1.7.	Priority setting and planning	Development of simple approach es for integrating SI options into typology specific bundles;

	for integrated systems improvement	Systems comparisons in situ; Participatory experimentation processes with households of different typologies; Comparisons of perspectives male / female farmers on technologies within household types
1.8.	Program-wide synthesis and co-learning at R4D platform	Formal M&E process; Use results of hypothesis testing at program level; Outcome mapping to measure the behavioral change

Upon specific request from USAID, the current proposal proposes a strategy and action plan aiming at re-invigorating RO-1 activities (related to the 'grey' activities in Table 1) thereby ensuring that activities proposed under RO-2 have passed an initial screening and prioritization process through RO-1. It is important to note that (i) the implementation of the proposed strategy will require a minimal amount of time so full integration between RO-1 and RO-2 activities is expected to be taken on-board during subsequent seasons and (ii) the Humidtropics CRP has been launched recently (November 2012) so the development of tools and approaches in the context of the Humidtropics is likely going to be running behind the need for accessing and implementing these in the context of Africa RISING, at least in the initial phase of the Humidtropics.

During the Humidtropics meeting in Nairobi, February 2013, a number of scientists interested in and/or coordinating Africa RISING activities met to discuss how the strategy and action plan could look like. The strategy and action plan have been presented and discussed at the Malawi meeting of Africa RISING, 6-8 March 2013.

II. Strategy

The farming systems analysis will work around the following framework, with specific activities highlighted in the grey boxed (Figure 1). In summary, the process starts with a rapid farming system characterization exercise allowing the development of functional farm typologies, and a detailed characterization farming system description, allowing complete farming system diagnosis. This information would then be synthesized and analyzed toward the exploration of system innovations and system redesign, ready for testing and evaluating under RO-2.

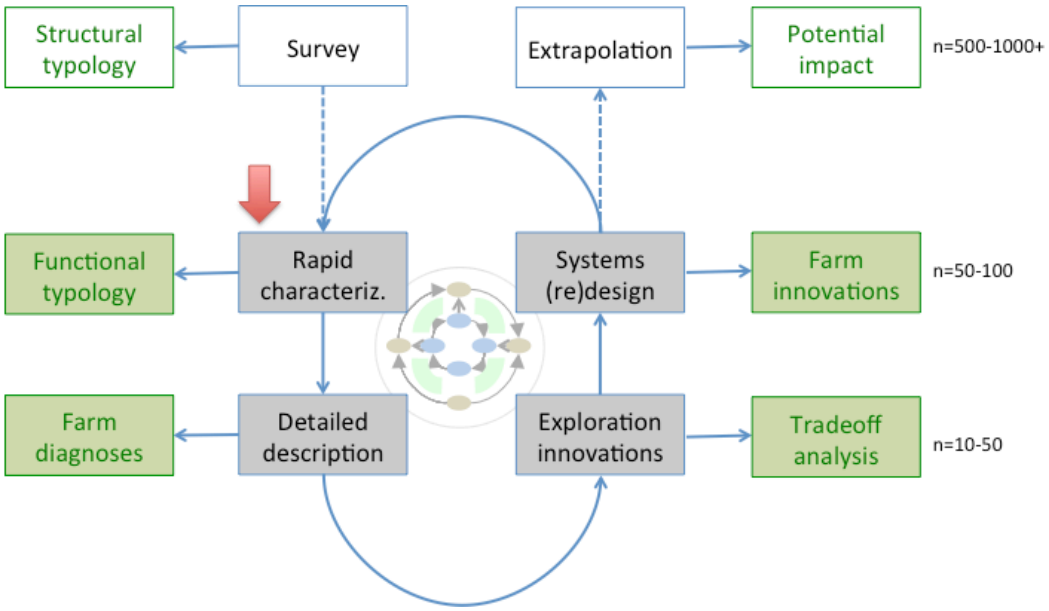

Figure 1: Proposed components of the farming system analysis and entry point identification strategy. Phases in the analysis represented by grey boxes, products indicated in green boxes. Starting point of the analysis indicated with the red arrow. Activities in white boxes fall outside the scope of this proposal.

The process depicted in Figure 1 is the first iteration of an interactive learning cycle with farmers and other stakeholders, following the DEED approach: Describe, Explain, Explore and Design.

Teams:
DT – data collection team in study countries coordinated by Asmoah Larbi (WA) and Mateete Bekunda (ESA).
PT – data processing team, delivers support in data collection and processing, and conducts modeling.
CT – coordinating team consisting of JG and other staff of IITA (BV, IHZ) and WUR (KG, PT, KD, LF).

Activities will be mainly coordinated from the WUR-PPS team linking closely to existing projects in Mali and Ghana (e.g. N2Africa). Activities in Tanzania, Malawi & Zambia will be coordinated from the WUR-FSE team.

II.1. Baseline *(directly related to RO-1 – Activity 1.3 in Table 1)*

The baseline activity is lead by IFPRI and will be executed this year. Information collected therein will allow the definition of structural farm typologies, often equated with resource endowment (e.g., access to land, capital, livestock, labor). The baseline activity is commonly implemented with a large number of households (e.g., 500 – 1,000 households per country).

II.2. Rapid characterization *(directly related to RO-1 – Activity 1.3 and 1.4 in Table 1)*

In absence of a completed baseline study, the households for the rapid characterization will be selected randomly within villages based on willingness to participate, and in some cases experiences in previous projects. The indicative numbers of households selected are presented in Table 2. Where possible existing data from surveys and analyses in other projects will be used, for example from N2Africa in Ghana and McKnight project in Mali. The selected households will be assigned to types in the typology from the baseline study in a later stage to allow extrapolation and assessment of the potential of interventions at the level of the agro-ecological zone. The household selection will be designed in such a way that we capture the largest possible range of diversity of households and farming systems within an agro-ecological zone. In addition to the larger survey members of the PT team will collect data on 10 farms within villages following the Y shape sample frame (Tittonell et al., 2013) to obtain a better impression of the within village variability.

A first appraisal will be made of the farm components present (soil, crops, livestock, etc.), to arrive at first model-based estimates of nutrient flows, labor use, profitability and efficiencies. Such information will allow the construction of functional typologies, e.g., more directly related to production objectives.

Practically, this activity involves a household-level data collection process, followed by data quality control, analysis, and synthesis. The complete activity, from the data collection to the construction of the functional typologies and compilation of the synthesis report, could take between 2 and 3 months. This activity is best implemented with one team of national technicians per country (DT team) after training by and under supervision of one technical person (PhD student or consultant from the PT team) who has experiences with above processes.

II.3. Detailed description *(directly related to RO-1 – Activity 1.4 and 1.6 in Table 1)*

A sub-set of the households (e.g., 10-50 per country, see Table 2 for indicative numbers) engaged in the rapid characterization activity will be identified for detailed characterization of their farm and livelihood status. More detailed data on actual production levels, costs and prices will result in accurate **diagnosis** of

resource flows and socio-economic performance. Such information will allow the diagnosis of the main factors driving the generation of outputs at farm level.

Table 2: Indicative numbers of households (HHs) selected for the rapid characterization and involved in detailed description is indicated between brackets. Where possible existing data from other projects will be used.

Country	District/region	Number of HHs	Total
Ghana	North	50 (10 com. 5 HH/com.)	
	Upper West	50 (10 com. 5 HH/com.)	
	Upper East	50 (5 com. 10 HH/com.)	150 (15)
Mali	Koutiala	25	
	Bougouni	25	
	Yanfolila	25	75 (9)
Tanzania	Babati	80	
	Kongwa and Kiketo	80	160 (16)
Malawi	Dedza	40	
	Ntcheu	40	80 (8)
Zambia		80 (4 com. 20 HH/com.)	80 (8)
Overall total			545 (56)

As for the rapid characterization, this activity involves a household-level data collection process – more detailed than for the rapid characterization – followed by data quality control, analysis, and synthesis. The complete activity, from the data collection to the construction of the functional typologies and compilation of the synthesis report, could take between 2 and 3 months. This activity is best implemented with one team of national technicians per country (DT team) after training by and under supervision of one technical person (PhD student or consultant from the PT team) who has experiences with above processes.

II.4. Exploration of innovations *(directly related to RO-1 – Activity 1.4 and 1.6 in Table 1)*

A model-based **exploration** of alternative farm configurations will be made for each selected farm. Based on current inputs and production activities (cropping, animals, manure use, etc.) and potential innovative practices, a set of alternatives will be generated using a multi-objectives optimization technique. This will provide insight into tradeoffs and synergies among farm objectives, and will inform discussions with farmers and other stakeholders towards selection and implementation of an improved farm set-up.

This activity involves engagement of a scientist experienced with farming system analysis or a post-doctoral fellow working directly with such scientist (from the PT team). It would also be important to have ideally 1 PhD student per country (or at least 1 PhD student per region) working with this senior scientific team (across activities II.4 and II.5) in view of the engaging nature of this activity. The duration of this activity is in principle not limited in time since the basket of innovations and the consequent (re)design of the system is a continuous activity (see Figure 1).

II.5. System (re)design *(directly related to RO-1 – Activity 1.7 in Table 1)*

The **redesign** is based on the set of alternatives generated under II.4 and discussions with farmers and stakeholders. The most promising alternative in terms of productivity, profitability and efficiency will be selected. This represents a new farm set-up that needs to be further fine-tuned for implementation on farms of the same the functional type (see II.2). The performance of the new farm set-up will be monitored and new cycles of diagnosis – exploration – redesign can be conducted to reach an adaptive farm improvement.

As activity II.4, this activity requires active engagement of a scientist experienced with farming system analysis or a post-doctoral fellow working directly with such scientist (from the PT team). Above-mentioned PhD students could get directly engaged in this activity and collect feedback under farming conditions on the performance of the (re)designed system. Also the duration of this activity is in principle not limited in time since system (re)design is a continuous activity, influenced by monitoring and evaluating the performance of earlier (re)designed systems (see Figure 1).

Remaining attention points that fall outside the scope of this proposal and associated activities:

- After this year the DEED process should be continued under RO2 (Design implementation), with repeated activities planned here for RO1 (Describe, Explain, Explore and select).
- The extrapolation of the potential of proposed and tested innovations to the scale of an agro-ecological zone has not yet been elaborated within Africa RISING.

III. Detailed action plans

See accompanying Gantt chart.

References

Tittonell, P., Muriuki, a., Klapwijk, C. J., Shepherd, K. D., Coe, R., & Vanlauwe, B. (2013). Soil Heterogeneity and Soil Fertility Gradients in Smallholder Farms of the East African Highlands. Soil Science Society of America Journal. doi:10.2136/sssaj2012.0250