Farmer Research Networks - approach under development to build the evidence base for agroecological intensification of smallholder farming systems

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Introduction

Agro-ecological intensification (AEI) means improving the performance of agricultural systems through integration of ecological principles into farm management. Depending on the context, improved performance may mean any or all of the following: increased productivity, enhanced use of local resources, maximized returns from external inputs, improved stability and diversity of yields, increased resilience and enhanced environmental service provision from farmed landscapes. AEI is likely to take very different forms under different contexts. Smallholder farming systems in West Africa are highly heterogeneous and cover different socio-ecological contexts (i.e., soil types, rainfall patterns, production systems, production objectives, resourcefulness, gender-specific issues, etc.). Therefore, approaches towards AEI of these systems require a profound understanding of that heterogeneity and adaptation of AEI tactics to specific circumstances.

Farmer Research Networks (FRNs) are an approach under development within the McKnight Foundation Collaborative Crop Research Program (CCRP). It aims at linking problem-solving research with action that can provide a context-specific evidence base for AEI, facilitate positive changes for farmers at scale *and* meet requirements of mutuality, reciprocity, beneficiary ownership and local agency.

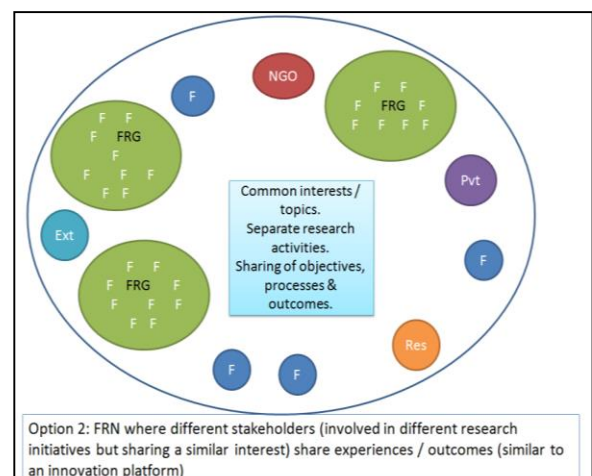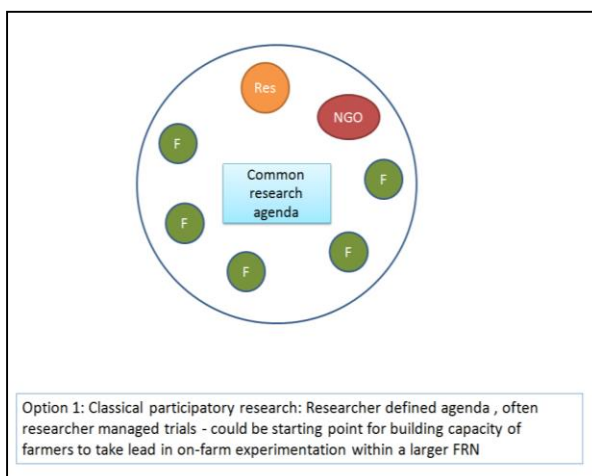## Diagnosis – why could Farmer Research Networks be useful?

Historically, research and extension organizations have sought simple answers and one-size-fits all country-wide recommendations and attempted to impose them in a top-down manner, often with limited success. To develop locally adapted, place-based options related to AEI, a large, representative data base is needed that enables to fit best options for specific contexts, thereby respecting the heterogeneity within the target farming communities. Farmer Organizations and local Development Organizations in West Africa form a collective infrastructure that could support FRN research activities. Linkages between technical and social innovation as well as linkages between local and global knowledge are required in order to achieve impacts at scale. FRNs are meant to provide useful knowledge at farmer, regional and global levels (Table 1).

Table 1. Requirements of research related to agro-ecological intensification (AEI) and what Farmer research networks (FRNs could offer in this regard (R. Coe, 2015, personal communication)

Focus of knowledge generation	Requirements	What an FRN would offer
Farmer	Decision making about place-specific AEI options require large-N datasets for real insights	Practical generation of large N ("big data" with farmers)
	Accelerated learning by exchange of experiences	Communication, farmer-to-farmer learning
Regional	Enabling interpolation rather than extrapolation (join the dots)	Large N to sample heterogeneity
Global	AEI principles and options discovery for global knowledge base	Robust contribution

What Farmer Research Networks could look like

An FRN may be described as a collaborative network of stakeholders including farmer groups, researchers, and possibly value chain actors conducting high quality and credible research on mutually agreed topics to address collectively agreed-on constraints. The overall aim of an FRN is to increase productivity and incomes of smallholder farmers and other value chain actors and ensure sustainability (social, economic and environmental) of smallholder farming systems through engagement of farmers in research. A defining feature of FRNs is that farmers cooperate as equal partners with the researchers in the definition of research objectives, creation, analysis, synthesis and interpretation of the datasets. That means that an FRN is characterized by organized and in-depth engagement with farmers. The distinct feature of an FRN is that it creates large datasets with the participating farmers. These "large-N trials" may be conducted by sometimes several hundred farmers, and are designed in a way to enable understanding the heterogeneity of responses and matching options to specific socio-ecological contexts. By creating large, credible datasets based on large-scale on-farm experimentation and enabling farmer-to-farmer learning, an FRN may catalyze research and sharing information around AEI-oriented, smallholder relevant technologies and management practices to improve the performance of smallholder farming systems. Farmers would be strengthened in their capacity to judge AEI options and make informed decisions regarding their own farm management.

Option 1: Classical participatory research: Researcher defined agenda , often researcher managed trials - could be starting point for building capacity of farmers to take lead in on-farm experimentation within a larger FRN

Option 2: FRN where different stakeholders (involved in different research initiatives but sharing a similar interest) share experiences / outcomes (similar to an innovation platform)
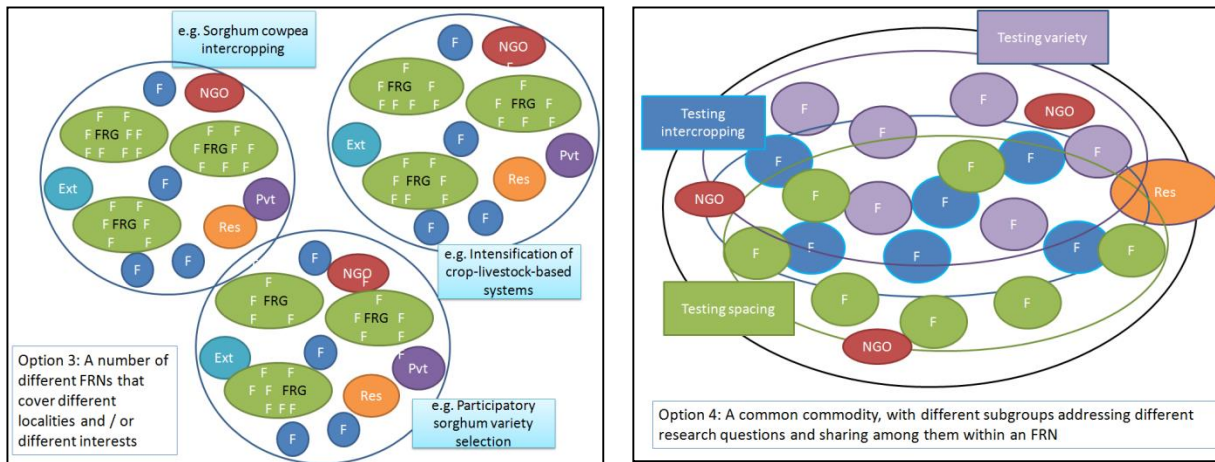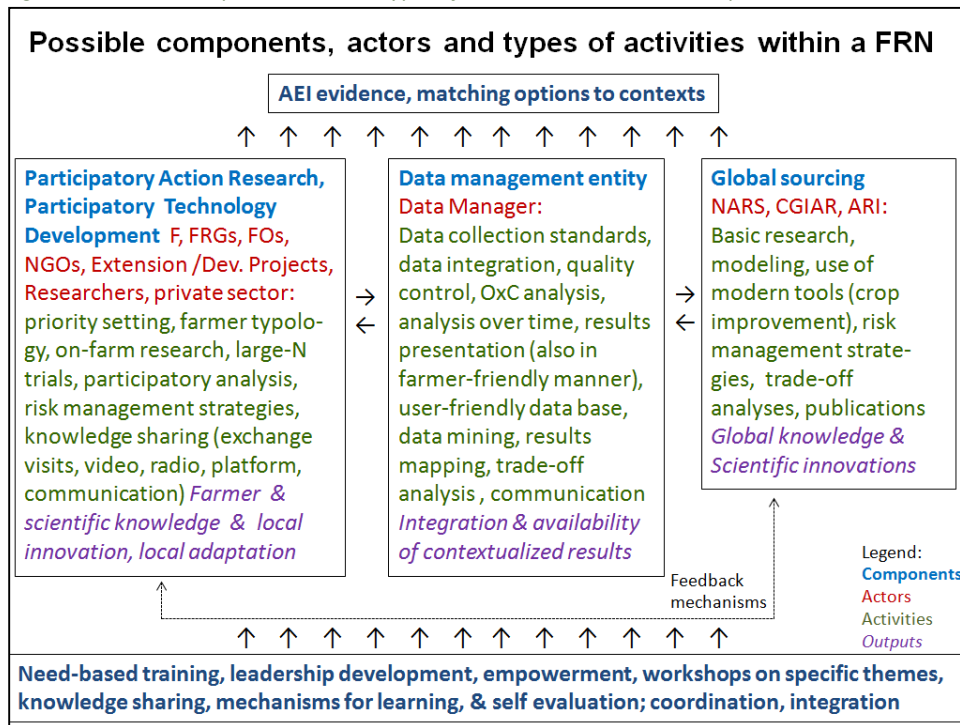
Figure 1. Different options or models for Farmer Research Networks (FRNs); modified from B. Letty, 2015, personal communication.

In more detail, an FRN consists of participatory research or participatory technology development linked systematically to some form of support structures or activities. Approaches towards FRNs may take different forms (Figure 1), i.e., there is no one-size-fits-all FRN, and different FRN forms may serve different purposes and people best. Option 1 (Figure 1) represents the simplest case of a network of farmers (F) engaging in on-farm experimentation, supported by researchers (Res) and a development organization (NGO). Option 2 shows an example for a simple FRN consisting of individual farmers (F), farmer research groups (FRG), supported by researchers (Res), a development organization (NGO), the extension service (Ext) and the private sector (Pvt). Option 3 illustrates three simple FRNs working on complementary themes, and possibly exchanging their experiences. Option 4 shows an FRN where different subgroups address different themes related to one commodity, and share their learnings.

Different components and actors would contribute to an FRN model as envisaged by CCRP for West Africa (Figure 2): participatory action research or participatory technology development related to AEI would be combined with a central data management entity (technical hub, "data warehouse") and global sourcing (i.e., researchers that contribute knowledge available in the literature, modeling tools, modern types of data analysis etc.), and feedback mechanisms among all components (the arrows). Such a constellation would aim to integrate local and global knowledge, validate options and innovations in large-scale on-farm trials (large-N trials), and the participants altogether would make sense out of the collected data by analyzing the variability of responses and patterns of adaptation in space and time using both statistical and participatory analysis tools. The network would build on leadership and facilitation skills of both farmer and researchers' representatives, knowledge sharing, and mechanisms for learning and self evaluation.

Figure 2. Putative components, actors, types of activities conducted and expected outcomes within a Farmer Research

Possible components, actors and types of activities within a FRN

AEI evidence, matching options to contexts

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Participatory Action Research, Participatory Technology Development F, FRGs, FOs, NGOs, Extension /Dev. Projects, Researchers, private sector: priority setting, farmer typology, on-farm research, large-N trials, participatory analysis, risk management strategies, knowledge sharing (exchange visits, video, radio, platform, communication) *Farmer & scientific knowledge & local innovation, local adaptation*

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Data management entity Data Manager: Data collection standards, data integration, quality control, OxC analysis, analysis over time, results presentation (also in farmer-friendly manner), user-friendly data base, data mining, results mapping, trade-off analysis , communication *Integration & availability of contextualized results*

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Global sourcing NARS, CGIAR, ARI: Basic research, modeling, use of modern tools (crop improvement), risk management strategies, trade-off analyses, publications *Global knowledge & Scientific innovations*

Legend:
Components
Actors
Activities
Outputs

Feedback mechanisms

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Need-based training, leadership development, empowerment, workshops on specific themes, knowledge sharing, mechanisms for learning, & self evaluation; coordination, integration

Network as envisaged by the McKnight Foundation Collaborative Crop Research Program for West Africa. Abbreviations used: AEI=agro-ecological intensification; F=farmers; FRG=farmer research group; FRN= Farmer Research Network; FO=Farmer Organization; NGO=Non-governmental organization; Dev.= development; OxC=option-by-context interaction; NARS=National Agricultural Research Systems; CGIAR= Consultative Group on International Agricultural Research, ARI=Advanced Research Institutions.

Farmers would play key roles in the priority setting of the FRN. The joint decision making in a truly participatory process requires that team members feel free, confident and safe to express themselves. Therefore, skills are needed in managing power relations in diverse teams consisting of farmers and researchers. Skills are also needed in inclusive participatory methods, and research methods that search to understand heterogeneity of performance responses and that aim to match options to specific contexts, where appropriate. When developing FRN approaches, care must be taken to simultaneously develop these required skills among the various FRN participants/actors.

The FRN could be facilitated either by a farmer leader, by a development expert, or by a "participatory" researcher. Preferably, an FRN should be formalized (using for example partnership agreements) so that roles and responsibilities of all partners are clear right from the beginning.

Farmer Research Network Principles

The McKnight Foundation CCRP is using an evidence-based, principles-focused approach to developing FRNs across the program. The principles have several purposes. First, the principles are intended to build a common understanding about what the FRN will include. Because the FRN will be implemented in a wide variety of contexts it is not a confined, predetermined model. Rather, it is an approach that includes a set of general truths that implementing partners

can adapt to develop suitable models and practices to their context. Second, the principles should be considered as a set; projects that include FRNs will develop and use practices and models that are in alignment with all of the principles. These principles are based on the following: (1) Situational analysis; (2) Mutual benefit; (3) Knowledge sharing and co-creation; (4) Use research to discover hidden social and technical patterns; (5) Ongoing engagement; (6) Inclusion and equity, and (7) Embedded scaling.

1. *Situational Analysis:* New initiatives are more successful when a situational analysis is conducted that justifies and explains how the initiative borrows from and identifies gaps from pre-existing approaches and current work on the ground. The creation of FRNs will be grounded in situational analysis that explains and justifies how FRNs borrow from and add value to existing farmer-centered organizations and farmer-centered research approaches. In addition, the analysis will review how existing farmer networks, organizations, both formal and informal, and other relevant stakeholder interests and relationships are working on research or with research institutions.

2. *Mutual Benefit:* Strategies among networks are more successful where there is shared mutual understanding of what network participants have to offer, what they want and need, what they are able and willing to do, and what will benefit the whole network. When developing or working with FRNs, develop strategies, priorities, roles, and responsibilities based on the mutual understanding of what each network partner can offer, needs, and wants with attention paid to the benefit of the whole network.

3. *Knowledge Sharing and Co-creation:* Sharing tacit and explicit knowledge from multiple perspectives in a system reduces information asymmetry, re-balances power dynamics, and helps inspire the co-creation of new questions and knowledge. FRNs will facilitate the sharing of tacit and explicit knowledge of all relevant stakeholders including but not limited to farmers, researchers, and intermediaries to support learning, inspiration, adaptation, and co-creation.

4. *Use Research to Discover Hidden Social and Technical Patterns:* Many of agriculture's technical and related social problems can be better understood and improved with the use of systematic collection and analysis of data that reveals hidden patterns and options and solutions for particular contexts. Address agriculture's technical-social problems with research designs, protocols, and sound analysis methods that can reveal patterns and suitable options across diverse agro-ecological and social contexts within the target environments.

5. *Ongoing Engagement:* Continued engagement as equal partners and joint decision making of network partners helps ensure that mutual interests are addressed in research designs, analysis, and use. Engage all network partners in the four stages of the research, from diagnosis through sourcing of options and principles, to local implementation and adaptation, to scaling.

6. *Inclusion and Equity:* The benefits of agriculture research often reach those who are most advantaged and share similar characteristics. Ensure inclusion of diverse farmers' voices and authentic engagement based on recognition of farmer diversity, making serious efforts to involve those who are often excluded because of income or other status.

7. *Embedded Scaling:* Scaling research products (technology or knowledge) is a non-linear process that involves the processes of local discovery and *agency*, adaptation, and

inspiration. In an FRN, such scaling is *embedded* in the whole process, from negotiation of objectives, design and implementation of activities, discovery of results, and learning throughout the research and farmer engagement processes. It is evaluated how technology, knowledge, and ideas facilitate inspiration or are adapted in the research and action processes so that others can learn from these experiences.

Pathways to Change and Scaling via Farmer Research Networks

Embedded scaling is a FRN principle and may be further explained as follows:

As more farmers and organizations participate in multiple parts of the demand-driven research process within an FRN, farmers can derive and understand principles and achieve learnings which would not be possible by working alone or receiving extension. Equally, researchers and other stakeholders involved in an FRN can gain information beyond what they would gain when working in isolation. This helps in contextualized scaling and targeted use of promising options.

FRNs enable large networked datasets created by hundreds of farmers, managed jointly by farmers and researchers (depending on capacities of each partner), and stored possibly in a central data base that is accessible by all. These large data sets reveal useful patterns of performance across heterogeneous farmers' socio-ecological contexts. Analysis of larger datasets and detection of response patterns is jointly done by researchers and farmers and thereby provides better understanding of options-by-context interactions.

By working in a large, participatory network, FRNs can contribute to promoting increased use of research technologies and adaptive action by farmers, thereby taking social and biophysical heterogeneity into account, and enabling farmers to make informed decisions what fits best into their specific context. This implies a paradigm change from farmers being considered as "beneficiaries" or "receivers" of a technology towards a situation where farmers are equal partners and final decision makers in a research and development process.

However, there is need for an evidence base of if and how FRNs are successful. During the workshop, we would like to discuss with and learn from others, how they see the scope for FRNs in West Africa, and how such FRNs could concretely look like in specific situations.

Could FRNs be a better way of doing research?