Highlights
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Building dynamic expertise for integrated soil fertility management in western Kenya

For Kenya's smallholder farmers, managing soil fertility is not just a matter of maintaining a balance of chemicals in the topsoil. Soil fertility is part of the complex environmental picture that farming families "read" as they apply their knowledge and opinions of soils, crops, climate, markets, pests, and their interactions to decide what will be practical for growing the food they need.

Phyllis Weswa gives her observations on a collective experiment that her group ("Utafiti Obuheri Women's Group) is conducting on legume-cereal rotations.

Since 2001, CIAT scientists have been working with communities in western Kenya to understand the ecological knowledge base (the "folk" ecology) that farmers use to manage their environment. This work, which began with four farmer research groups (FRG) in four communities and now operates with over thirty groups in six communities, is also investigating the processes whereby useful agricultural knowledge is generated and spread ("scaled out") within farmers' own networks.

Farmers' knowledge is not a panacea, but farmers' knowledge and opinions about factors such as soil types, nutrient content, composting, and crop response to organic and inorganic amendments directly affect their farming decisions. Our research approach uses dialogue between farmers and outsiders (researchers, extension agents, etc.) to build "dynamic expertise" to solve soil fertility problems (Figure 1). Understanding the processes that lead to the evolution of this "dynamic expertise" is just as important to TSBF-CIAT as the expertise itself.

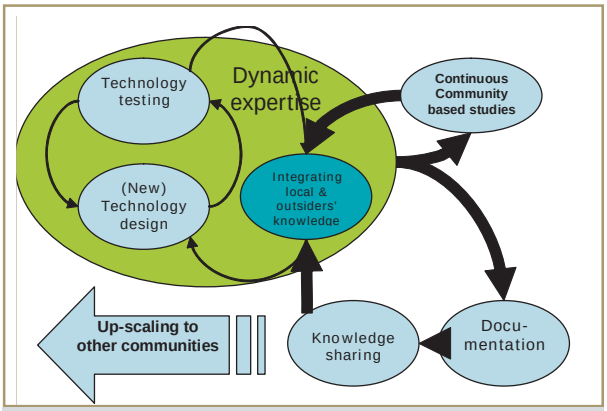

Figure 1: The "Strengthening Folk Ecology" approach

The process of participatory experiment design and evaluation includes iterative cycles of the following components:

- ***"Integrating local and outsiders' knowledge"*** through dialogue and group activities (e.g. regular meetings and discussions at collective and individual experiment sites). These build a common awareness and vocabulary for soil fertility deficiencies and establish shared criteria for evaluating local experiments.

- *"Technology design and testing"* use the priorities emerging from the collective discussions of challenges and opportunities. Collective experiments are designed with researcher collaboration (advice on feasible treatments, layout, and contribution of inputs). Groups manage and monitor the collective sites, using regular meetings with researchers and other FRGs to review, evaluate, and explain progress. Individual experiments are fully under farmers' own control.
- *"Community-based studies"* have addressed specific topics such as the range of knowledge about soil nutrients and inputs; management of agro-ecological niches (especially by women); the dynamics, patterns of membership, and activities of different FRGs; and the logic and performance of individual experiments using participant observation with key informants and focus group discussions.
- *"Documentation"* of experimental plans and their results (as brochures and calendars produced seasonally in Kiswahili) and of key concepts emerging from the community-based studies (e.g. brochures on soil nutrients, management of soybean, Striga control, farmyard manure).
- *"Knowledge sharing"* is emphasised through regular meetings at the sites of collective or individual experiments, with group members encouraging each other to interpret and explain research results as they are observed. This collective learning process also extends to field days and cross-site visits open to other, non-participant groups (*"Scaling up activities"*).

Addressing complexity: experiments and collective action

Since 2001, when the project initially introduced "simple" experiments to test the value of various organic materials as soil inputs, the FRGs have diversified their activities greatly. The soil fertility management concepts are now applied well beyond the staple maize and bean intercrop in this region, including women's high value vegetable crops, legume-cereal rotations, soybean, and other food security staples, such as millet and cassava.

Farmer research now includes eight collectively-run experiment sites and individual experiments on over 200 farms. Researchers are now focussing on evaluating what happens as farmers decide to stop "testing" and to use particular preferred technologies (e.g. farmyard manure, soybean-cereal intercrops). There are some interesting findings on testing and use of technologies by farmers outside of the research groups (e.g. soybean in particular is spreading rapidly).

Given the diversity of soils and household conditions in the area, farmers are collecting a wealth of data from their individual experiments to share with their FRGs. These individual experiments test the merits and constraints of technologies when families face competing demands for labour, cash, and land.

Future plans: scaling up successes

Farmers conducted their own evaluation of the strengthening "Folk Ecology" approach as the first project phase ended in 2004. Their reports showed a great potential in using soil management as an entry point for participatory research on natural resource management issues. The challenge now is to scale up the use of community-based learning strategies so that knowledge sharing can take place among larger numbers of farmers and development partners. This is a key aim of the second three-year phase of the project.

Strong community interest is already driving this desire to scale up the process. Since 2001, participating FRGs have grown from four to over 30. In the second project phase, two new communities joined the project to test whether the ethnographic strengthening "Folk Ecology" process can be accelerated, particularly by strengthening farmer-to-farmer exchanges of expertise. However, while participants want to learn the "right" answers to their land management questions, they quickly realise that these answers are different for each soil, crop, and household's history.

In the later generations of farmer-to-farmer training, knowing how to experiment and to interpret results is not given high priority, but it is not neglected. Local communication continues to stress field-based learning through the season and dialogues between farmers and outsiders to find appropriate ways of generating, sharing, and documenting information to build each research group's confidence in their own knowledge. The most popular means have included local language data sheets giving soil experiment results, calendars with photos and descriptions of successful practices, and short dramas, poems, and songs for building community awareness. The groups have also placed a lot of emphasis on recognising achievements, using membership certificates and awarding prizes for various competitions for greatest improvements within or between the groups. Lessons from this research should be useful elsewhere in improving rural institutions and the linkage between formal and "informal" research.

For more information contact:
Joshua J. Ramisch
jramisch@uottawa.ca

CIAT
Africa Coordination
Kawanda Agricultural Research Institute
P.O. Box 6247
Kampala, Uganda

Phone:
+256(41)567670

Fax:
+256(41)567635

Email:
ciat-uganda@cgiar.org

Internet:
www.ciat.cgiar.org

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