Fertile Ground? Soil fertility management and the African smallholder

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On 14 May 2007 Michael Misiko defended his PhD. dissertation titled "Fertile Ground? Soil fertility management and the African smallholder" at Wageningen University, The Netherlands.

The focus in this thesis is to form a view of how well soil fertility research performs within the ever-shifting smallholder contexts. This study examined the application of agroecological knowledge for soil fertility management by smallholder farmers, with the view to enhancing the utility of research among resource-deprived farmers of western Kenya.

The full version of the thesis can be found on the FFSnet database.

Dr. Misiko's PhD-defense (both video and PowerPoint) can be viewed on WUR TV. Access here (only for broadband/ fast internet connections).

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Summary:

The focus in this thesis is to form a view of how well soil fertility research performs within the ever-shifting smallholder contexts. This study examined application of agroecological knowledge for soil fertility management by smallholder farmers, with the view to enhancing the utility of research among resource-deprived farmers of western Kenya.

A realist methodological approach to the study of soil management was applied. It is shown that soil fertility management operates under the assumption that consequences (soil management) are to be explained not just by contextual states (in this case farmer knowledge) but by “mechanisms” of decision making and soil management that need to be uncovered. Knowledge is nothing unless it engages with real soil management processes.
Between 2003 and 2005, participatory experimentation, monitoring and evaluation of technologies and concepts were explored. Those experiments involved: (i) cereal-legume rotations; (ii) screening new soyabean varieties for selection among smallholders; (iii) organic resource quality concepts and biomass transfer; and (iv) mineral fertiliser response. Farmers’ practices following these experiments were investigated, with particular focus on their underlying justifications and livelihood objectives. Participating farmers selected experimental plots to ensure that the soils were representative in terms of type, fertility status and history of cultivation. These farms were classified as infertile during the participatory soil characterisation. Farmers deliberately selected the infertile plots to “see if the new technologies worked”, and as part of their wider objective. These experimental plots were researcher-designed.

Researcher notions of organic resource quality was interpreted and amended by farmers based on existing knowledge, experiences and cultural constructs. For instance, Tithonia was perceived as a “hot resource” that could be added to composts to increase the “speed of cooking”. Amendments to this concept, and to new soil fertility management technologies, were based on “ordinary” applications and reflected perceptions of inconvenience; meaning especially labour constraints, land shortage, uncertain yield and economic returns. Alternative (i.e. not-for-soil-fertility-management) uses of the different technologies were prominent. For example, legume varieties with utility beyond soil fertility management were preferred which resulted in readily observable gains when applied under variable local conditions. Those local conditions demanded the use of mineral (P) fertiliser in the successful implementation of the cereal-legume rotation scheme or adoption of new promiscuous soyabean varieties. Farmers selected varieties primarily on the basis of yield, rate of growth and appearance.

Poor yields when mineral fertiliser was not applied, or unsteady crop responses after its use, cost - coinciding with priority expenditures and association with particular technologies such as hybrid maize - complicated the use of fertiliser. Limited understanding of fertiliser functionality, soil nutrients or soil fertility mechanisms is clarified in terms of the context-mechanism-outcome paradigm of “realist” explanation. The farmer paradigm refers mainly to context and outcomes, which we interpret as a kind of positivism. On the one hand, scientists’ focus on mechanisms (to the apparent exclusion of context and outcome) does not match the highly variable local social, physical and economic contexts made more difficult by poor (implementation of) policy. Both farmers and researchers, it is argued, need to enhance their capacity to modify their knowledge sets by engaging in well-designed joint research drawing on the context-mechanism-outcome configuration. Experimentation is seen as one way to expand farmers’ knowledge sets on soil fertility and to make mechanisms (e.g. nutrient availability) more visible, so that farmers can engage in soil fertility improvement activity in ways that are both more effective and more meaningful.

This thesis also concludes that to increase the utility of research requires a shift from component research to research at subsystem or whole-farm system level to address broader household objectives. The chances of sustainable application of scientific innovations by smallholders will be greatly enhanced if field research embraces and embeds social science methods of engaging the farmer sustainably as a partner in technology development and not simply as a client.