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Research Application Summary

Translating integrated soil fertility management empirical knowledge into action through participatory learning and marketing with farmers in Zimbabwe

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Abstract

In this paper we report on findings from a co-learning experience we undertook with smallholder farmers in two areas in Zimbabwe aimed at developing their capacity to apply integrated soil fertility management (ISFM) options to improve food security. We were interested in improving farmers' understanding of ISFM and its practices. Constraints to increased productivity were common in the two areas and included poor soils, high costs and poor access to mineral fertilizers, low availability of organic nutrient resources and poor market access for both inputs and outputs. Through this work, policy guidelines to improve smallholder farmers to access and use the various sustainable farming technologies are being drafted.

Key words: Food security, organic fertilizers, participatory action research, SOFECSA, technology adoption

Résumé

En cet article, nous parlons à propos des résultats d'une expérience de co-apprentissage que nous avons entreprise ensemble avec des petits fermiers dans deux régions au Zimbabwe, ceux-ci étant appelés à développer leur capacité d'appliquer des options de gestion intégrée de fertilité du sol (ISFM) pour améliorer la sécurité alimentaire. Nous étions intéressés à l'amélioration du niveau de compréhension des agriculteurs de la gestion intégrée de la fertilité du sol ISFM et de ses pratiques. Les contraintes à la productivité accrue étaient communes dans les deux régions et inclus les sols pauvres, les coûts élevés et l'accès pauvre aux engrais minéraux, la faible disponibilité des ressources nutritives organiques et l'accès pauvre au marché pour les besoins et la production.

Par ce travail, des directives de politique pour permettre aux petits agriculteurs d'accéder et d'employer de diverses technologies agraires durables sont sur brouillon.

Mots clés: Sécurité alimentaire, engrais organiques, recherche-action participative, SOFECSA, adoption de technologie

Background

The continued decline in agricultural productivity on most smallholder farms in sub-Saharan Africa is often attributed to a declining natural resource base and poverty. Poor soils, coupled with inappropriate methods of crop production, continue to certify that communities do not rise out of this poverty trap. This remains so, despite substantial empirical knowledge generated through research in improved agricultural technologies that are relevant for smallholder farmer conditions, goals and aspirations. Most results from on-farm experimentation indicate high crop yield responses through improved soil fertility management techniques, but apparently, adoption rates of promising technologies by target groups continue to be low and insignificant. Diagnostic enquiries with smallholder communities point towards lack of suitable mechanisms for transferring the available knowledge on concepts and principles of integrated soil fertility management (ISFM) technologies to farmers as reasons for low adoption.

The Soil Fertility Consortium for Southern Africa (SOFECSA) has used ISFM as an entry point for working with smallholder farming communities in southern Africa over the past three to four years. The SOFECSA's working definition of ISFM is a "a combination of a proven set of concepts, principles and practices on the efficient use of (a) available organic and inorganic resources, (b) soil water; (c) appropriate plant genotypes, and (d) according to farmer circumstances, in maintaining or improving soil fertility leading to sustainable crop production for household food and income security, and enhanced livelihoods". On-going work with smallholder farmers is being guided by the hypothesis that when empirical knowledge on ISFM is translated into action through participatory research (PAR) approaches, different categories of farming households are able to adopt the technologies and realize improved crop yields and income. This paper gives preliminary findings following initiatives to co-learn with different categories of smallholder farming households aimed at developing their capacity to apply principles and concepts of diverse ISFM options which seek to improve food and livelihood security in Zimbabwe.

Literature Summary

To date, over 80% of sub-Saharan African (SSA) economies are anchored on agriculture, yet per capita food production has lagged behind the rest of the world (www.fao.org). Poor and declining soil fertility is often cited as the biophysical root cause for declining per capita food production in SSA (Sanchez and Jama, 2002). Several research initiatives, aimed at addressing soil fertility challenges in smallholder farming systems, have apparently failed to generate the desired impacts at scale, as is often evidenced by problems of perennial food insecurity, characterized by obtaining staple cereal crop yields of less than 1 t ha^{-1}. Despite the evidence suggesting positive returns to labour, land and time investments into most of these soil fertility technologies (Mekuria and Siziba, 2003), the major causes for low rate of adoption remain largely unclear.

There is overwhelming evidence to suggest that most farmers can double their current cereal crop yields (to > 1.5 t ha^{-1}) through efficient use of locally available organic nutrient resources (e.g. manure and compost) and nitrogen-fixing legumes (Mtambanengwe and Mapfumo, 2005). There is further potential to approximate yield levels of > 3 t ha^{-1} with moderate amounts of mineral fertilizers. Mapfumo (2009) highlighted the need to bridge the serious technical knowledge gaps between researchers and major actors in the agricultural sector to generate impact. Such gaps, in turn, undermine the potential for effective evaluation and quantification of demonstrable benefits of ISFM technologies at scale, in order to stimulate interest from major players in agricultural input/ output markets. Recently, SOFECSA has demonstrated the potential for field-based learning platforms and innovation systems approaches in promoting stakeholder participation in adapting technologies on ISFM and climate change adaptation measures under diverse southern African agro-ecosystems and socio-economic circumstances. Application of PAR approaches in these initiatives has, however, revealed major demands to quantify farmer and market driven ISFM innovations at process level.

Study Description

Work is being conducted in eastern Zimbabwe, in Makoni district (Bingaguru and Nyahava wards) and Wedza district (Dendenyore and Goto wards). Bingaguru and Nyahava wards are located approximately 260 km north-east of Harare, and lie in agro-ecological region (NR) III, receiving between 650-750 mm of annual rainfall from November to March. The area was opened for resettlement by the Government of Zimbabwe in

the early 1980's to relieve pressure on over-populated communal areas, and has a total population of about 10 000 people. Average landholding is 6 ha household^{-1} with maize and tobacco being the main crops on arable land. Agricultural potential in the area can be described as medium to high, characterized by poor fertility soils and poor market access. Dendenyore and Goto wards in Wedza are located about 160 km east of Harare, and are in NR II receiving >750 mm annum^{-1}. The two wards are in a high potential area with good market access and established infrastructure but very challenging soils. Wedza has a medium to high population density (>45 person km^{-2}) relying on subsistence farming on comparatively smaller land holdings, <3 ha household^{-1}. Our activities were anchored on understanding ISFM with communities and accessing farmers' understanding of ISFM practices.

a) Understanding ISFM with communities – Farmer and extension's understanding of ISFM included (i) Use of naturally available resources in improving crop yields and livelihoods within a community; (ii) Combining different technologies addressing soil fertility for sustainable crop production leading to improved livelihoods (iii) Maintaining the soil in its most productive state (adding nutrients, conserving what is there).
b) Farmers' understanding ISFM practices: This constituted combining two or more of the following - Pit-stored manure, leaf litter, termitaria soil, moisture conservation, inorganic fertilizers, green manures (sunnhemp, mucuna), and cowpea-maize rotations. A successful ISFM farmer would also be found to be: (i) able to demonstrate new knowledge(ii) a member of at least one functional group e.g. master farmer club, (iii)able to plough early (iv)intensifying, as well as diversifying crops.

Research Application

The diagnostic phase with the farming communities have revealed commonalities in constraints to agricultural productivity in the two districts. Of importance were: (i) unproductive soils requiring annual fertilizer inputs; (ii) high costs and poor access to mineral fertilizers; (iii) low and restricted availability of organic nutrient resources; (iv) poor input/output market access.

Through this work, policy guidelines to help smallholder farmers from diverse backgrounds to identify and use improved and sustainable farming technologies will be developed. This work is also enhancing the capacity of participating institutions and

individual researchers and students to conduct participatory action research with smallholder farming communities.

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