Research Application Summary

Farmer perceptions and knowledge on soil quality indicators and their use in soil fertility monitoring

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Abstract

Assessing soil quality is important so as to learn about the effects of management practices on soil function, create awareness and education, and provides a basis for evaluation of alternative practices. Soil quality often cannot be directly measured, therefore, scientists use soil quality indicators to evaluate how well soil functions. Unfortunately, the scientific indicators used are expensive and farmers do not often understand the language used. Moreover, scientists have limited knowledge on farmers' perceptions; yet knowledge of local soil quality, including farmer knowledge of soil quality indicators, remain to be validated for reliability.The study will be conducted in rural communities of Lake Victoria Crescent (LVC), Sub-humid Grass Farmland (SGF) and South Western Highlands (SWH) purposively selected to represent major Agro-ecological Zones (AEZ) experiencing drastic transformations in land use. Primary data will be collected by conducting a face to face interview with a number of farmers in the study areas. A cost effective and user friendly tool for farmers' timely decisions making in monitoring soil fertility will be developed and this will help farmers in timely interventions for soil improvement.

Key words: Farmers' knowledge, monitoring soil fertility, soil quality indicators, Uganda

Résumé

L'évaluation de la qualité des sols est importante afin de s'informer davantage des effets des pratiques de gestion sur la fonction des sols, de sensibiliser et d'éduquer. Elle fournit aussi une base pour l'évaluation des pratiques alternatives. La qualité du sol ne peut pas être souvent mesurée directement, par conséquent, les scientifiques utilisent des indicateurs de qualité des sols pour évaluer dans quelle mesure les fonctions du sol peuvent être trouvées. Malheureusement, les indicateurs scientifiques utilisés sont coûteux et les agriculteurs ne sont pas souvent en mesure de comprendre la langue utilisée. En outre, les scientifiques ont une connaissance limitée sur les perceptions

des agriculteurs; pourtant la connaissance de la qualité des sols locaux, y compris les connaissances des agriculteurs sur les indicateurs de la qualité du sol, reste à être validée pour la fiabilité. L'étude sera menée dans les communautés rurales du croissant du lac Victoria (LVC), dans des terres agricoles herbeuses sub-humides (SGF) et les Hautes-Terres du sud-ouest (CES) sélectionnées à dessein pour représenter les principales zones agro-écologiques (ZAE) qui connaissent des transformations radicales dans l'utilisation des terres. Les données primaires seront recueillies en procédant à une interview face à face avec un certain nombre d'agriculteurs dans les milieux d'étude. Un outil rentable et facile à utiliser pour la prise des décisions des agriculteurs en temps voulu dans le suivi de la fertilité des sols sera élaboré et cela aidera les agriculteurs dans les interventions en temps opportun pour l'amélioration des sols.

Mots clés: Connaissances des agriculteurs, contrôle de la fertilité des sols, indicateurs de la qualité des sols, Ouganda

Background

There is rampant decline in soil productivity in Eastern and Central Africa which is largely responsible for the worsening food insecurity and poverty in the region. In Uganda, farming systems are characterized by nutrient mining, and as a result, low crop yields due to declining soil quality. Assessment of soil quality is an effective method of evaluating sustainability of land use and management activities (De la Rosa, 2005). Soil quality often cannot be directly measured, therefore, scientists use soil quality indicators to evaluate how well soil functions (Doran and Parkin, 1996).

Unfortunately, the scientific indicators used are often expensive and farmers do not often understand the language used. Contrastingly, scientists have limited knowledge on farmers' perceptions. In general, knowledge of local soil quality indicators, including farmer knowledge of soil quality indicators, remain to be validated for reliability. This study is, therefore, designed to integrate scientific and farmers' knowledge on soil quality indicators and aims to develop a cost effective and user friendly tool for farmers' timely decision making in monitoring soil fertility and consequently aid timely interventions for soil improvement.

Literature Summary

According to Doran and Parkin (1996), there are three main categories of soil quality indicators, that is, chemical, physical and biological. Soil quality attempts to integrate all three types of indicators because these categories do not neatly align with

the various soil functions. Doran and Parkin (1996) provided a relationship between soil quality indicators and soil function (Table 1). These authors asserted that ideal indicators should correlate well with ecosystem processes, integrate soil physical, chemical and biological processes and properties accessible to many users, be sensitive to management and climate and be interpretable.

Table1. The relationship between indicator type and soil function.

Indicator category	Related function
Chemical	Nutrient recycling, water relations, buffering
Physical	Physical stability and support, water relations and habitat.
Biological	Biodiversity, nutrient recycling, filtering

Source: Doran and Parkin (1996).

Soil quality assessments focus on the dynamics or management of affected properties of soil such as nutrient status, salinity and water holding capacity. These properties are assessed in the context of the inherent capability of a particular soil (Doran *et al.,* 1994). Miller and Wali (1995) asserted that assessing soil quality is important so as to learn about the effects of management practices on soil function, create awareness and education, support evaluation of practice effects and trouble shooting and evaluation of alternative practices.

Doran *et al.* (1994) noted that the ability of the soil to support plant and animal life can be assessed by measuring two key indicators. Biological Activity Indicators include active fungi, earthworms, microbial biomass, potentially mineralizable nitrogen, respiration, soil enzymes. On the other hand, Biological Diversity Indicators include habitat diversity and diversity indices for organisms such as bacteria, macro and micro arthropods, nematodes and plants.

Farmer indigenous knowledge. Indigenous knowledge can be defined as a body of knowledge built up by a group of people through generations of living in close contact with nature (Johnson, 1992). There are two basic reasons why it is important for researchers to consider indigenous knowledge when carrying out research projects. It contributes to local empowerment and development, increasing self-sufficiency and strengthening self-determination. Utilizing indigenous knowledge in research projects and management plans also gives it legitimacy and credibility in the eyes of both local people and outside scientists,

increasing cultural pride and thus motivation to solve local problems with local ingenuity and resources.

Indigenous people can provide valuable input about the local environment and how to effectively manage its natural resources. Scientists now recognize that indigenous people have managed the environments in which they have lived for generations, often without significantly damaging local ecologies. Many feel that indigenous knowledge can thus provide a powerful basis from which alternative ways of managing resources can be developed.

Study Description

The study will be conducted in rural communities of Lake Victoria Crescent (LVC), Sub-humid Grass Farmland (SGF) and South Western Highlands (SWH) purposively selected to represent major Agro-ecological Zones (AEZ) experiencing drastic transformations in land use. A survey involving 300 farmers will be conducted to collect information on farmers' knowledge and perceptions of soil quality indicators, soil management practices undertaken, experience in farming and constraints associated with monitoring of soil quality and management. Additional information regarding the basis of farmers' perceptions will be collected through Focus Group Discussions (FGD) and key informant interviews. However, FGD will be conducted separately for male and female farmers. Additionally FGD participants and key informants will also facilitate location of fields where local indicators of soil quality are evident. Standard procedures for soil biological, chemical and physical tests will be used to characterize the sample fields, where local indicators of soil quality happen to be plants, alleloparthy tests will also be conducted on the selected plant to eliminate confusion for soil quality indication

Nature of surveying instruments. Primary data will be collected by conducting face to face interviews with a number of farmers in the area of study. Interview schedules shall be used to guide the researcher to carry out the interview systematically. The researcher shall conduct interviews in each of the farmer's home so that the farmer could recall the necessary information. Some observations shall also be made on the pattern of events occurring in the area during the period of the study that seem to supplement the farmer's responses.

Reliability of the instrument. The instrument will be pretested on a few farmers and the results will be compared with the actual test results. The instrument will always be checked

through to see the relevance of the questions to the research objectives made until when a comprehensive instrument will be developed.

Data analysis. The statistical package for social scientists (SPSS) will be used for most of the analyses. Statistical analysis tools such as; frequencies, percentages, means, standard deviation shall be used. Other analyses will be done for example regression analysis when appropriate.

Acknowledgement

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