

# Sustainable soil fertility management

## Lessons from action research

The NGLWG and farmers from selected areas identified the issue of low soil fertility as a priority for their action research. Nutrients removed by cropping were traditionally replaced by bush fallowing and the use of farmyard manure and household refuse. However, these latter sources of nutrients are

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becoming increasingly scarce particularly because the number of livestock kept per household is decreasing. Inorganic fertilisers were used as long as they were subsidised, but now subsidies have been stopped. Now, fewer than 30% of smallholders in northern Ghana buy inorganic fertiliser for food crops and purchase small amounts for maize and rice. This has led to declining soil fertility and unstable farming systems.

The indigenous methods of managing soil fertility probably worked reasonably well under the ecological and socio-economic conditions that prevailed in the past. Now it is obvious that LEIA is not sustainable and prevailing economic conditions make HEIA impossible. During action research, smallholders in northern Ghana attempted to determine, in quantitative and qualitative terms, the role of organic manure in ensuring the continuity of crop production.

### Sustainability in farmers' terms

Agricultural sustainability is a concept open to a wide range of interpretations. A simple grassroots definition given by Edward Agana from Zuedema, Builsa District in the Upper East Region is that their farming system can be considered sustainable when soils, crops, animals, trees, environment and people 'get better every year' and many other farmers in the area agree. This indigenous definition regards sustainability as something dynamic and suggests that there are degrees of sustainability.

But how should 'getting better' be determined and who should be the judge? The search for answers to these questions constituted a major part of the present research. There is a need to build up farmers' capacity to determine 'getting better' more systematically. The criteria developed by those with the highest stake in the process should be used in assessing sustainability. In the research process, farmers' criteria had to be brought to the fore, but it was also necessary to ensure that farmers became aware of other variables.

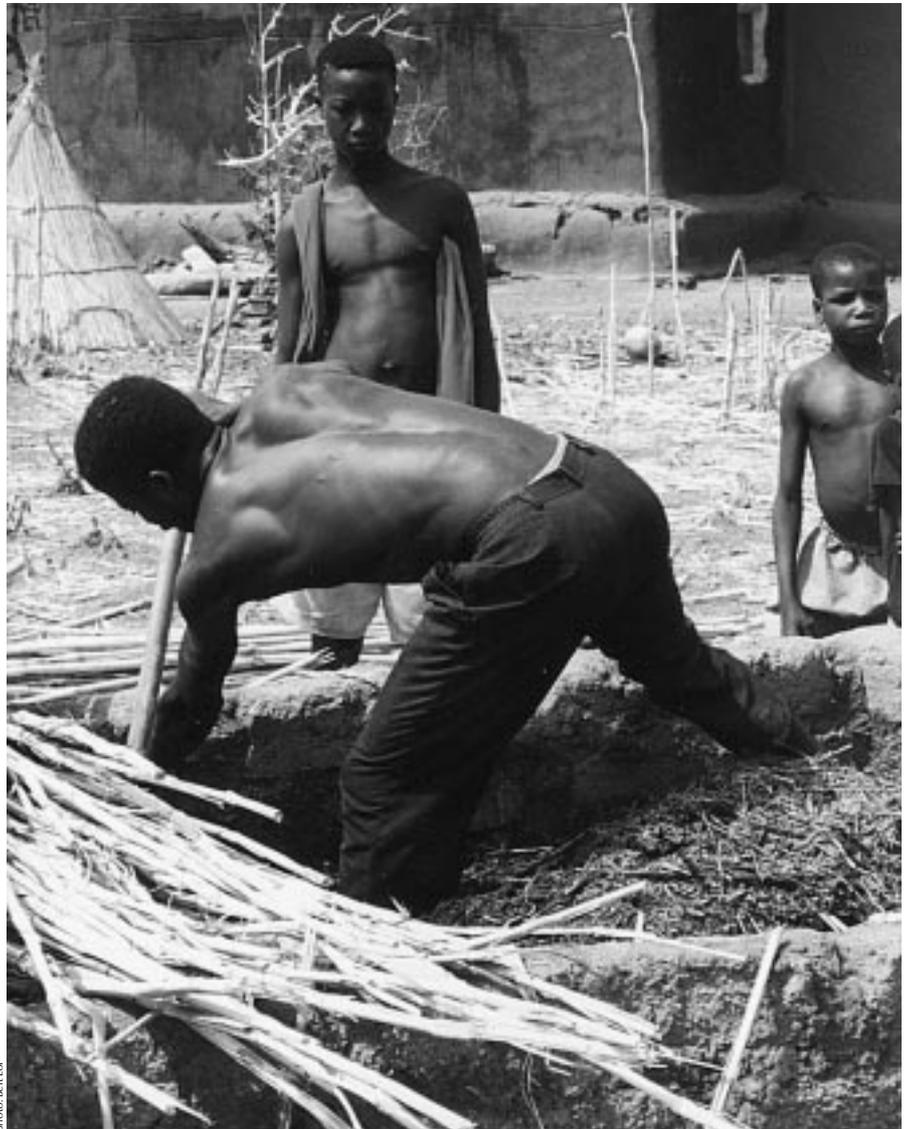


Photo: Bert Loef

Recycling organic matter to restore soil productivity.

### Managing soil fertility

Many farmers in northern Ghana have cultivated the same land for over 40 years without any significant use of chemical fertilisers. They have obviously been using some soil improvement techniques. They are well aware of the role of FYM, animal droppings and household refuse in crop production. Nevertheless, soil fertility is declining. In the two pilot areas of ILEIA-NGLWG collaboration in northern Ghana, farmers identified this as the most important research issue. "With a dead soil, one can forget about producing enough to feed the family", said a woman farmer at one of the workshops.

The collaborative research was designed to explore differences in the efficacy of the various types of organic manures known to the farmers. Our hypothesis was that LEIA could be trans-

formed into LEISA if farmers would systematically improve their indigenous knowledge of soil fertility management. During this action research, we tried to assess LEISA practices for improving soil fertility. We explored the problems associated with using organic manure and how farmers were tackling or proposed to tackle these problems.

Two complementary methods were used: field plot experimentation (more akin to conventional on-farm trials) and farm monitoring (FARMS) in which the inputs and outputs of all the plots of experimenting farmers were analysed. We felt that, if the farmers could see more clearly what went into production, what came out and what remained in ►

the soil to be used by crops the following season, they would become more aware of sustainability. Farmers, researchers and extension agents collaborated in monitoring the farmer-managed experiments, sharing ideas and solving problems encountered in the research. Women were fully involved in this community process of identifying problems, seeking solutions and experimenting with improved methods of making compost.

### Potentials and constraints of manure

In two years of experimentation, many lessons were learnt. The use of organic manure leads to significant improvements in soil fertility and crop production over time. Farmers' assessments also clearly indicated the potential of organic manure in reducing crop production risks and lowering the incidence of notorious weeds such as striga.

The experimenting farmers realised that organic manures differ in quality, depending on how they are managed. Farmers explored better methods of managing manures and new methods of composting some of which they had seen during their trip to Burkina Faso (Box 2, p 46). This was a vital step towards more sustainable agriculture.

It became clear, however, that most

farmers have a problem getting organic matter and that women farmers have virtually no access to FYM or household refuse for their own plots. Manure is probably the most valuable resource for sustainable farming in northern Ghana. However, because many households are without animals or the few they possess are tended by Fulani herders, manure is difficult to come by. The search for ways of better integrating crops and livestock needs to be intensified. The concept of crop-livestock integration is indigenous but was discouraged in the push towards 'modernise' in past decades. It should be possible to regain integration, perhaps in a modified way.

Another potential threat to moving towards more sustainable production is that organic manure is bulky and sometimes needs to be transported over long distances to the "bush farms". Farmers may need financial assistance to acquire donkeys and carts, not only to bring manure to the fields but also to bring farm products back to their homes.

### Action research shows the way

In 1997, the first year of experimentation there was drought but in 1998 the rains were adequate. How can sustainability be inferred when conditions vary from year to year? Was the 1998 harvest better

because farmers applied organic manure or because the rains were good? This could be difficult to answer with results from field plot experimentation. Taking the farm experimentation as a whole, analysis of the many different plot situations within and between farms indicated the positive effect of better fertility management. It is clear, however, that conclusive statements cannot be made after only two years of experimentation.

Despite this limitation, the action research has been a learning experience for farmers and other stakeholders. All were convinced of the potential of participatory research to help realise sustainable agriculture in northern Ghana. Those involved saw that problems relating to the availability of manure, its transportation to the fields, proper management to conserve nutrients, and the availability of water to make compost were hampering the move from LEIA to LEISA. Action research also led to a better understanding of the issues involved and to a more focussed approach to solving the key constraints to sustainability at farm level.

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## Internalising PTD and LEISA in agricultural training

The ILEIA-NGLWG collaboration in Ghana involved the building of relationships between farmers, development workers, researchers and university teachers in agriculture and related disciplines. At the outset, these relations were loose and full of (often unspoken) contradictions in terms of beliefs, orientations and biases. It was in the process of concrete action, especially when the stakeholders repeatedly met in rural communities to discuss farmers' problems and to do research together, that points of consensus began to emerge. Mutual appreciation of the different professions and of the strengths and weaknesses of each began to grow. All stakeholders began to understand not only why farmers do what they do, but also why professors say what they say. It was the participatory nature of the methodology that led to the breaking down of psychological barriers. The process of PTD opened the way for better mutual understanding.

We came to the consensus that agriculture in northern Ghana is not likely to experience a 'Green Revolution'. However, if farmers are left to depend on their present LEIA methods, they are unlikely to survive long in agriculture. The only alternative is to work together with farmers in improving present practices and move gradually from LEIA to LEISA. During our collaboration, we recognised that participatory research can lead to a systematic movement in this direction.

The research was unconventional, and many were somewhat sceptical at the start. The Faculty of Agriculture of the UDS has the task of preparing future extension workers to work in rural communities and help farmers to solve their problems. However, most of the academic staff were originally trained in universities where there was little interest in participatory approaches and most government and donor-sponsored development efforts failed to emphasise them. In Ghana, it was left to the NGOs to promote the participatory approach.

Some of the Faculty of Agriculture agreed to become involved in the ILEIA-NGLWG research. Over the past two years, during interaction with farmers in PTD, many new things about agronomy, soil and water management, weed science, economics and sociology were learned. It was observed that farmers gained confidence in what faculty staff said, because they knew that their views and experiences were being taken into consideration.

We are now convinced of the merits of the PTD approach to LEISA. However, no matter how good it is, it is not likely to gain wide acceptance and be followed in mainstream research and extension activities in Ghana if most people being trained in agriculture do not know about it. The agricultural colleges and the faculties of agriculture have a key role to play in institutionalising LEISA and PTD in agricultural develop-

ment. But first, these approaches have to be internalised by the staff of the training institutions. Professors of agriculture need to discard their biases against the knowledge and intellectual abilities of "illiterate" farmers. This can best be achieved by bringing them into direct interaction with farmers.

In the second year of ILEIA-NGLWG collaboration, it was decided that LEISA as a group of agricultural techniques and the PTD approach to LEISA should form an integral part of the curriculum of the Faculty of Agriculture. The theoretical aspects of LEISA and PTD are now taught on the campuses in Tamale-Nyankpala and Navrongo, and practically applied by university students and staff in NGO agricultural stations such as Langbensi, Garu, Sandema, Tumu, Funi and Nandom, as well as in several other rural communities. As a result, graduates from UDS are likely to bring about radical changes in the methodology of agricultural extension in Ghana.

For rapid internalisation of LEISA and PTD, the agricultural extension workers with MOFA and donor-assisted projects will also need to be re-oriented toward more participatory approaches. For this reason, UDS is now preparing to offer short, in-service training courses in LEISA and PTD for extension workers.

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