

Node: Suite Summary^{1,2}

Ghana: Integration of PTD into NR Management research and extension

Context

Bush fallowing is a common agricultural practice in much of West Africa, including Ghana. It generally involves allowing natural vegetation to regenerate for several years on plots of land that have been under cultivation, in order to restore soil fertility. Fallows play an important role in sustaining rural livelihoods, not only because of soil regeneration but because they serve other purposes, such as the provision of timber, fuel wood, food, fodder and thatch. Any shortening of the fallow period thus potentially jeopardises livelihoods.

In the Brong Ahafo and Ashanti regions of Ghana, farmers have attributed poor crop yields and quality to declining soil productivity, which in turn is linked to shortened bush fallows. The increasing use of inorganic fertilisers has compensated but fertilisers are both expensive and in short supply. Alternative technologies have been developed to address these problems. These include the introduction of leguminous green manures, animal manures, agroforestry and composting.

However, uptake of such technologies has been limited. Dialogue is needed between farmers, researchers and extension agents about the most appropriate ways to develop and disseminate these technologies. Participatory technology development (PTD) draws on a range of dialogue based methods to ensure that interventions are sensitive to local livelihood circumstances. The use of PTD and the training of agricultural extension agents in farmer-participatory techniques have formed the core of the research in this Node: Suite.

Research Topics

- What are the key characteristics of the farming system, including the role played by gender?
- What are the most appropriate technologies for the improvement of bush fallows in the forest-agriculture interface?
- Can PTD provide an effective method for generating and disseminating techniques that are of use to poor rural people in Ghana?

Projects

Three projects were undertaken in this Suite (see below for project links). These were:

- R6789: Development and promotion of improved techniques of water and soil fertility management for sustainable production of crops on land in the humid forest belt, Ghana (Jan 1997-August 2000).

¹ This document summarises NRSP's work in one of its Uptake Promotion Node: suites. For further details and links to project and project documents see <http://www.nrsp.org.uk/6.aspx>

² This document presents research funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

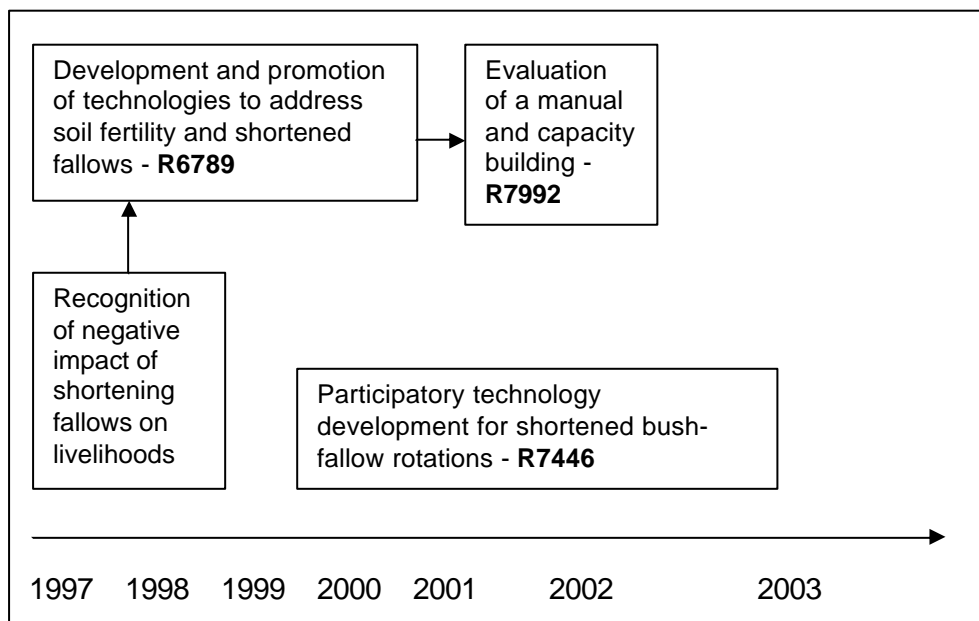
- R7992: Evaluation of the manual ‘Improved vegetable production in the forest-savanna transition zone, Ghana: with special reference to the maintenance of soil fertility’, for use by agricultural extension agents (April 2001-March 2002).
- R7446: Shortened bush-fallow rotations for sustainable rural livelihoods in Ghana (Dec 1999-Feb 2003).

The first project, R6789, was designed principally to develop and promote new improved techniques to enhance the fertility of soils. Research was carried out in the Brong Ahafo region. This involved close collaboration with farmers, extension staff and Ministry of Food and Agriculture (MoFA) research centres. Research was conducted both on-station and on-farm. In addition agricultural extension agents were trained in farmer-participatory techniques.

Project R7992 was a follow up to R6789, and aimed to further test and disseminate one of the products of this project - a manual to be used by extension agents. This in turn led to further curriculum development for the training of extension agents and the production of extension materials.

Project R7446 had a wider remit geographically, and focused more on the lessons to be learned from PTD. Research took place in three villages in the Brong Ahafo and Ashanti regions. The project involved: a process of diagnosis and analysis, using participatory rural appraisal; planning, using stakeholder workshops at which proposed interventions were discussed; implementation, with on-farm trials; and lastly participatory monitoring and evaluation.

Project links within Ghana Suite 2: 2000 – 2003



Outputs

Findings

Use of the PTD approach in R6789 revealed that mulching and compost making were not the most suitable technologies, given socio-economic (particularly labour availability) and natural constraints. In the first instance the use of animal manure was therefore the central focus of research. Cost-benefit analyses indicated that combinations of cow and poultry manure were the most profitable options. All of the animal manure treatments were found to be more profitable than either green manure or farmers' existing practices (which involved neither of these technologies). However, the extent to which farmers relied on hired labour had a significant effect on the financial profitability of their enterprises.

The labour requirements of the different technologies were also investigated. Farmers preferred using animal manures to green manures because incorporation of green manures was seen as "very tedious" work. This finding highlights the need to consider the nature of the work input required for a particular technology as well as the amount of labour.

One of the outputs of R6789 was a manual for extension agents, which included a series of information leaflets. The manual was reviewed by the successor project, R7992, which devised further training materials to improve the technical knowledge and understanding of MoFA extension agents and farmers. However the effective use of these materials may be curtailed by the resource constraints under which MoFA operates. R7992 found that extension agents lacked sufficient training, transport and materials and were poorly paid.

The research also found that soil fertility is just one of several constraints facing dry season vegetable producers. Water is of critical importance, but this has not yet been the subject of adequate research.

R7446 identified two main livelihood systems – 'native' and 'settler'. This is because origin largely determines the land ownership status of individuals and households, and hence their access to productive resources. Gender was also a key variable affecting livelihoods, particularly in the way that it determined access to both labour and land. The livelihoods of at least 90% of the population were largely dependent on farming, with some variable off farm employment.

After discussion with farmers, five main interventions were identified as suitable for on-farm experimentation. These were maize-legume relay, permanent plantain, cocoa-shade trees, yam-legume relay and planted tree fallow. Farmers tested these technologies over two years. Joint evaluations between farmers and researchers indicated positive impacts of all interventions on fertility and that further adoption and dissemination were likely. In order to support this, extension materials were produced and extension workers were trained. In addition, a computer-based decision support tool, Legume Expert System (LEXSYS), initially developed by the International Institute for Tropical Agriculture (IITA), was modified and widely distributed by the project.

Research messages

- In the research sites, the characteristic of the farming system that is of most importance for determining livelihood outcomes is the status of farmers as either 'natives' or 'settlers'. This status affects access to land.

- Gender is also a key variable in determining access to land and influences the ability to mobilise labour.
- The nature of the labour required for a new technology may be as important as the amount of labour.
- There is a wide range of technologies which can assist farmers in improving soil fertility. Among these, the use of animal manure, the planting of trees and permanent crops and the use of yam or maize-legume relays are most promising.
- Participatory technology development (PTD) is useful for ensuring that interventions are appropriate to poor farmers' needs. Adoption of the PTD approach needs to take into account the particular institutional constraints and contexts, including those facing the extension service.

Key research products

- A manual outlining the most promising horticultural technologies for use by the extension service and NGOs involved in agricultural extension activities: Kiff, E., O'Connell, N., Binney, K., Jackson, J., Awiti, S., Chan, M-K. and Nelson, D. 2000. Improved vegetable production in the forest-savannah transition zone, Ghana: with special reference to the maintenance of soil fertility. Chatham: Natural Resources Institute. (R6789).
- A significantly revised version of the manual cited above: Nsiah-Gyabaah, K. 2002. Guidelines to improve vegetable production in the forest-savannah transition zone, Ghana: with special reference to the maintenance of soil fertility. Sunyani, Ghana: Sunyani Polytechnic. (R7992).
- A reflection on the PTD process: McDonald et al. 2003. People, place and participation. International Journal of Agricultural Sustainability (R7446)
- Extension leaflets on using cocoa shade trees (R7446)
- A computerised database containing information on legume species (LEXSYS) (R7446)
- A decision support system on the integration of legumes into cropping patterns in Ghana (LEGINC) (R7446)

Impacts

All farmers participating in the projects have seen improvements to their livelihoods, although there was no quantification of this impact. R6789 has developed technologies that have resulted in increased returns to cultivation and the reduction of bought inputs. In addition, extension workers have developed facilitation skills and this has helped a move away from prescriptive extension messages. However R7992 notes that while the technologies developed with farmers are promising, the resource constraints facing the MoFA extension service mean that the continuation of practices beyond the life of the project is likely to be limited. Farmer-farmer knowledge flows have led to some uptake of technologies, but larger scale uptake will be hindered by the weakness of the extension service.

Communication of the findings of R7446 to target institutions, the Council for Scientific and Industrial Research (CSIR) and the Forestry Research Institute of Ghana (FORIG), has resulted in the incorporation of these findings into their programmes. For FORIG in particular, the development of skills in participatory technology development was seen to be

particularly important, as this has enabled the Institute to move towards more demand-driven research.

Further work

At the time of completion of these projects, the constraints facing the MoFA were identified as important limitations to the further development of PTD for improved soils management. Addressing the problems of providing training, transport, materials and payment should be a priority for any future research work.