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# A Synthesis of Results of the FTTP Farmer-initiated Research and Extension Practices Initiative in East Africa<sup>1</sup>

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## Introduction

The integration of woody species with crops and animals is an age-old custom practised by people throughout the world. However, the formal study of what is now termed agroforestry started only about 20 years ago. Despite heavy investment, agroforestry research and extension efforts have had mixed success, largely because insufficient attention has been paid to agroforestry systems designed and developed by farmers themselves. The fact that people have been able to carry out successful productive activities and survive under adverse ecological and economic conditions is a clear manifestation of the practical value of local knowledge and innovations. People's knowledge and practices are not static but evolve to adapt to changing socioeconomic, political and environmental pressures. The realization that farmers' experimental and dissemination activities persist independently of formal research and extension, led to a major initiative by the Forest, Trees and People Programme (FTPP) to document these farmer-initiated research and extension (F-iRE) practices.

A case study format was chosen by FTTP as the best way to study farmers' experimental and information-sharing practices and processes. The objectives of the case studies were:

- to document how selected farmers organise experiments and disseminate improved forest and tree management practices;
- to define the current and potential role (if any) for outside institutions to support farmers in the above endeavours.

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<sup>1</sup>An earlier version of this paper was presented at the FTTP workshop on Farmer-initiated Research and Extension Practices, Ahmedabad, India, January 16-17, 1997.

Four case studies were completed in the East Africa region, two in Kenya (Mureithi 1996; Njoka and Makenzi 1996) and one each in Uganda (Aluma *et al.* 1996) and Rwanda (den Biggelaar 1996). All four cases concerned the cultivation and use of trees on-farm, in particular farmers' innovations in species selection, tree management, and use of tree products and services. This paper is a synthesis of the results of the case studies, and is based primarily on discussions held by the principal investigators during a regional workshop in Bungoma, Kenya, in November 1996.

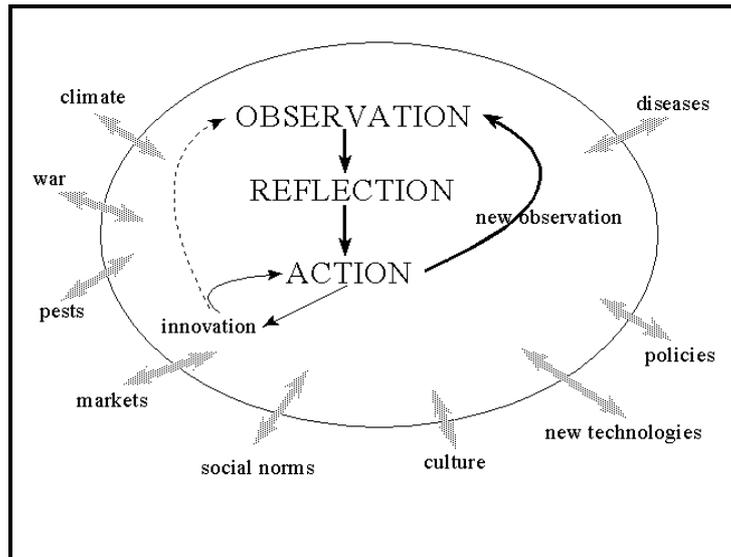
## **FTPP F-iRE Activities in East Africa: Towards a Development-oriented Approach to Natural Resource Management**

In most countries of Africa, indigenous knowledge has been ignored in development programmes in spite of the fact that local innovations are often advanced and well-adapted to local biophysical and socioeconomic conditions. Ever since the colonial period local initiatives have been suppressed and indigenous knowledge has been ridiculed as backward, unscientific or grounded in superstition. Indigenous people have been regarded only as consumers of innovations generated elsewhere, and as passive participants in their own development. In a sense, people have been made – or made to feel – powerless and dependent. Yet even in this negative context, farmers have still continued to carry out their own research and technology development.

One way to empower farmers and to acknowledge local initiatives and innovations is through farmer participation in decision-making in natural resource management. In recognizing the importance of farmers' knowledge and their contributions to solving problems, the FTTP activities on farmer-initiated research and extension practices (F-iRE) contribute to this empowerment, by helping farmers to (re)gain confidence in their own technologies and abilities. This may encourage farmers to develop further innovations, as well as increasing the likelihood of indigenous knowledge being used in formal research and extension agendas.

The F-iRE activities are part of a learning process, an opportunity for different actors to come together and discuss better ways of addressing problems and needs

of rural people while taking into account the strengths and weaknesses of each of the actors. The case studies are a first step in a continuous process of observation, reflection and action for and with farmers. The conceptual framework used for the case studies (see Figure 1) is based on the farmers' experimental process model defined in the FTTP/APAN case study guidelines (FTTP, nd).



**Figure 1** F-iRE case study process model patterned on the farmer experimental process model.

In this model, farmers' observations are followed by reflection which, in turn, may lead to action. The action itself (e.g. the planting of a new tree species) is an opportunity for observations (e.g. on how the species grows and behaves in relation to other crops) upon which the farmer can reflect and hence adjust the action accordingly. This iterative process continues until the farmer is satisfied with the performance of the innovation, at which point it becomes 'normal' practice. An example of the latter is the treatment of milk using tree products in Trans-Nzoia District, Kenya (see Box 1); the innovation was developed over 300 years ago, and at present appears stable. However, when new constraints or opportunities arise (e.g. when farmers relocate to a new area, or when preferred species become scarce in the environment), this may lead to reflection and new action (e.g. the search for new species suitable to treat milk) to adjust to the changing situation. Thus, innovation is a dynamic process influenced by, and in turn influencing, the external environment in which it takes place.

**Box 1**

**Selection of Tree Species for Milk Treatment**

The use of trees in milk treatment is widespread among the farmers in Trans-Nzoia District, Western Kenya. They have adopted the practice from pastoralist communities like the Pokot, whose treated milk (*chekha mwaka*) can be stored for over a year. Farmers identified the following problems which led to their experimentation with milk treatments:

- a need to improve the palatability, taste, and flavour of milk, which is a major food source;
- a desire to improve the unpleasant colour and odour of milk;
- a need to store excess milk during the dry season, partly due to lack of a market and partly because milk provides food security during droughts;
- the need for a treatment to neutralise the bad smell and taste imparted to the milk by the gourds, which are the cheapest and most easily available form of storage for farmers.

Treatment involves debarking and drying a small branch of a selected tree species. One end of the dried branch is burnt and then gently squeezed on the side and bottom of a milk storage gourd to crush it into charcoal dust. This procedure is repeated until the gourd is completely coated on the inside. After removing any excess dust with a brush made from palm leaves the gourd is ready for milk storage. Farmers judge the quality of *mursik* (treated milk) obtained through this process by its colour, smell and taste. They claim that traditionally treated milk is superior to untreated milk or milk processed by dairy plants.

*Tree identification and selection procedure*

According to oral history, the identification, selection and recommendation of tree species to be used in milk treatment was a systematic and lengthy exercise. It involved both men and women, though their role varied in different communities. Among the Kikuyus (a traditional farming community), for example, men were involved both in identification of suitable species and in milk treatment. In pastoral communities (e.g. the Kalenjin and Pokot) both men and women used to be involved in the identification of suitable tree species, while only women treated the milk. More recently, however, women have become solely responsible for the development, implementation and maintenance of the technology.

Selection of a potential milk treatment species is based on its availability and any prior knowledge about its uses, particularly for medicinal purposes. Further selection involves smelling the tree's leaves and/or the smoke produced by a burning branch and chewing certain parts such as leaves, stem, and bark. Species with a pleasant smell and good taste, that are easy to burn and produce a porous charcoal, are used to treat milk on an experimental basis. The quality of the product determines whether or not the tree is adopted for milk treatment.

*Source: Mureithi, 1996*

## **Emerging Issues and Lessons Learned**

A major lesson learned from the case studies was the complementary nature of scientific research and farmer experimentation. Given available resources and technical know-how, farmers' innovations are often the best solutions to problems and needs encountered. Nevertheless, opportunities may exist for research to further investigate selected practices and innovations with farmers in order to (1) refine and improve their practices; (2) investigate how and why certain innovations work, for example, the locally developed drip irrigation methods in Kikapu (see Box 2); and (3) develop detailed descriptions of the innovations (in the form of an 'operating manual') to facilitate replication and dissemination.

The case studies are not an end in themselves, but rather one part of an iterative technology development process that benefits from continuous interactions between all actors (farmers, researchers, extension workers, NGOs, policy makers) involved. Future actions may be oriented to development or to additional research. Any resulting technologies will have a better guarantee of acceptance as they have been identified with farmers and tackle problems which farmers themselves are already trying to solve.

A major issue encountered in the field was the problem of language incompatibility between researchers, extensionists and farmers. Thus farmers in the case studies did not recognise their own activities as 'research' as they do not have a word to describe this activity. A similar observation was made by Lyons (1996) in a study of farmers' research in East Anglia, UK. Farmers think that they are not engaged in research as they associate it with people having gone to school, and working in distant laboratories. In Rwanda, it took the author some time to discover the term farmers use to describe experimentation: *igerageza*, which is the noun derived from the verb *kugerageza*: to experiment or to try out (den Biggelaar 1996). To advance farmers' research and extension practices, therefore, it may be necessary to develop a new vocabulary to ensure that all actors involved understand what is being talked about in the same way.

Another issue raised in all four case studies was that farmer-to-farmer dissemination of locally and/or externally developed technologies was found to be all but absent. The reasons cited for the underdeveloped informal extension networks were similar in each case:

**Box 2**

**Tree Selection and Watering Devices in Kikapu**

Kikapu is located southwest of Lake Nakuru in the Rift Valley Province of Kenya. When it was settled by the Kikapu Farmers Society in 1965, the area was covered with indigenous grasses and shrubs with very few trees as the previous owner had cleared most of the vegetation to grow cereals and raise livestock.

After settling, many farmers started planting tree species to serve as sources of fuel, building materials, windbreaks and for aesthetic value. They experimented with various local tree species and with species they had brought with them from their homes in the highlands of Central Kenya. In spite of the harsh environmental conditions Kikapu farmers have succeeded in planting trees on farms, along boundaries and roads as living hedges, and in compounds as ornamentals. They have overcome water constraints using several indigenous innovations:

*Rain water harvesting* – a number of farmers have excavated surface earth dams to collect runoff water for their livestock and to raise seedlings.

*Sunken seedbeds* – seedlings are raised in sunken seedbeds, under which a polythene sheet is spread to stop loss of water into the ground.

*Kitchen water* – farmers separate soapy and greasy kitchen and bath water by digging two holes side by side. Kitchen and bath water is poured into one and allowed to permeate through the soil to the other in which the tree seedlings grow.

*Locally improvised drip irrigation devices* – individual seedlings and young trees are provided with the small amounts of water necessary for them to survive dry periods through the use of inverted bottles, holed and covered tins, and wooden flumes (see diagram). These technologies deliver water directly to the roots, limiting water loss through evaporation. After some failed initial attempts, it was discovered that the devices had to be buried deeply to prevent the water from overheating and damaging the plants.

Source: Njoka and Makenzi, 1996

- The lack of a legal framework to protect local innovations and practices against exploitation by competitors, who are often outsiders or local elites. The concerns raised in this regard include the issue of intellectual property rights and the need to certify or register local inventions and innovations.
- The absence of a system of rewards to compensate farmers for the resources and time invested in developing innovations. The rewards do not necessarily have to be monetary, most farmers simply want to be recognized for their contributions.

## **Future FTTP Activities on F-iRE at the Regional Level**

At the Bungoma workshop members of the four case study teams identified a number of activities for possible development:

- 1) Additional studies to promote exchanges of ideas and technologies between communities using similar innovative practices in order to further develop these innovations. An example might be an investigation of the use of various tree species in milk treatment among different pastoralist communities.
- 2) The organisation of regional workshops and/or exchange visits for researchers, extensionists, farmers, NGOs and community-based organisations to foster the exchange of ideas and promote the dissemination of locally developed technologies and innovations within the region.
- 3) Dissemination of the results of farmers' experimentation through simple manuals or audiovisual programmes to reach other interested communities, research and extension staff, NGOs, etc.
- 4) Specific investigations to understand the mechanisms underlying some of the practices identified during the case studies (e.g. the effectiveness of different drip irrigation systems [Box 2] or local pesticide concoctions [Box 3]), and the constraints which may limit the innovation process or the wider uptake of certain techniques (e.g. difficult propagation of preferred tree species).

**Box 3**

**Locally Developed Pesticides**

In Iganga District, Uganda, farmers develop their own pesticides from local plants and other ingredients. One such concoction consists of the ground leaves, twigs and bark of the neem tree (*Azadirachta indica*), chilli pepper, chicken dung, and yellow flowers from an unidentified shrub. These ingredients are mixed with a little water and left in a covered container for five days before being filtered and diluted with an equal amount of water. This liquid is applied to vegetables, oranges and coffee, being sprayed on the soil between the plants rather than on the leaves. The mixture repels pests such as caterpillars, aphids, cutworms and other insects. According to the farmers, one should harvest the crops at least three days after spraying. The concoction is claimed to be very effective, although some farmers had reservations and were not using it because of its rather offensive smell.

*Source: Aluma et al, 1996*

- 5) Preparation of education and training materials about intellectual property rights (IPR) relating to farmers' innovations, a subject on which all actors concerned were found to be poorly informed. Given the global nature of this issue, a separate series of international workshops was suggested to explore ways to establish a certification or product registration system for farmers' innovations, to inform policy makers, and serve as a basis for potential new legislation on this topic.

## **Conclusions**

For agriculture and agroforestry to develop more rapidly, there is a need for more collaboration between research and extension staff, development agencies and farmers as equal partners in the development process. A first step in promoting such collaboration is the recognition of the value of farmers' knowledge and innovations. This recognition can enhance farmers' self-esteem and facilitate their involvement and willingness to work with researchers and development agencies.

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