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LEISA

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Grassroots innovation

LEISA

July 2000 Volume 16 no. 2

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COVERPHOTO
The cover photo shows W/ro (Ms) Tsige GebreAbezgi who lives in Central Tigray, in the small hamlet of Adi-Nefas, in the village area Maybrazio. The Latin name of the local plant Da"kuia in the picture is not known. She introduced this wild species to protect her fruit trees from termite attack.
Photo: Fetien Abay

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Dear Readers

This is a special on 'farmer innovation'. In earlier issues, innovations developed by creative farmers without the support of development programmes have been regular features. But never have we devoted an entire issue to farmer innovation. Having often experienced that conventional research does not 'deliver the goods' for smallholder agriculture, an increasing number of farmers and development workers are building on local innovation, experimentation and communication.

This issue bears witness to the creativity of farmers. It also shows how they can be inspiring communicators using different media. Participatory Technology (including institutional) Development, Farmer Field School and Farmer-to-Farmer approaches are presented as powerful complementary ways to enhance farmer innovation and, thus, to develop Low-External-Input and Sustainable Agriculture. Readers are invited to support this ongoing process through regional farmer-to-farmer movements and international exchange of practical information on local innovation.

The theme of this issue was suggested by members of the Indigenous Soil and Water Conservation (ISWC) programme working on farmer innovation in several Anglophone and Francophone countries in Africa. Two members of this network, Nourreddine Nasr of the Institut des Régions Arides in Gabes, Tunisia, and Ann Waters-Bayer of ETC Ecoculture in the Netherlands, are guest editors. Beside the regular English and Spanish editions, there will also be a French edition.

The next issues of the ILEIA Newsletter will focus on intensifying agroforestry (deadline 15 August), ecologisation of monoculture (deadline 15 September) and resilience of agriculture (deadline 1 December). For further information, please turn to the back cover. Your contributions are most welcome!

The editorial team

Grassroots innovations for survival

Anil K. Gupta

Honey Bee

The Honey Bee network has collected over 10,000 examples of innovations and examples of traditional local knowledge in the sustainable management of natural resources. These are shared with farmers and scientists through the Honey Bee newsletter. The author presents some of these innovations. Given the unjust practice of extracting local knowledge from people for corporate benefits the author stresses the need for an international registry of farmer innovations and the restructuring of international and national public research.

Photo: Laurens van Veldhuizen

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Forging partnerships with innovative farmers

O.T. Kibwana

The Indigenous Soil and Water Conservation Programme (ISWCP) focuses on discovering and promoting farmer innovation in Burkina Faso, Cameroon, Ethiopia, Tanzania, Tunisia, Uganda and Zimbabwe. Kibwana discusses the different steps involved in ISWCP in Tanzania in which governmental and non-governmental research and extension organisations participate. Awareness among participants was raised, innovations were identified, analysed and documented and a start was made with Farmer-to-Farmer exchange and Participatory Technology Development

Gafsa regional radio

Noureddine Nasr, El Ayech Hdaidi and Ali Ben Ayed

Photo: Chris Reij

By early 1999, a growing number of innovators in dryland farming had been identified by ISWCP in Tunisia. Visits of farmers to innovators were organised, and some of these were broadcast on national TV. However, the major strategic activity was a weekly regional radio programme on "Agricultural and Innovation". This radio programme not only invites farmers to present their innovations for farmer-to-farmer exchange. It also involves researchers, training specialists and development agents in debates about the innovations to create links between farmer innovators and formal research and extension.

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Farmer experimentation: a challenge to all!

Henri Hocdé, David Meneses and Byron Miranda

Since 1994, PRIAG in Central America has facilitated and strengthened farmer innovation through documentation, participatory experimentation, communication and organisation. By describing some of the practical approaches of the programme the authors show how farmers are being empowered and take the lead to develop topical and regional networks for farmer-to-farmer exchange, farmer experimentation, communication and planning. This approach is a real challenge for all as it requires new working methods for a 'learning dialogue' between farmers, scientists and the other stakeholders involved.

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Unleashing the creativity of farmers

The editors

Farmers adapt their farming systems as conditions and needs change. They try out new ideas they have seen or heard about from other farmers, visitors or extension agents, put their own ideas into practice and sometimes work on innovations that have arisen "by accident". Innovations often arise out of necessity, others are born of curiosity. An innovation can be a practical technique or a different way of organising things, like when a farmer makes new arrangements about how land should be used with a neighbouring farmer.

With little or no support from outside – particularly if they live in areas where extension services are poor (p17) – farmers try to solve their problems by putting their trust in their own skills. For example, more than ten years ago, peasant farmers in Central America created the *Campesino a Campesino* (CaC) movement to develop a sustainable agriculture that would make optimal use of local resources by drawing on indigenous knowledge and values (p26). As many articles in this Newsletter show, farmer experimentation and innovation is deeply rooted in the daily struggles of small-scale farmers. Many innovations, especially those made by women, are hidden or isolated but there also can be close connections between them. These connections could be better used to stimulate a continuing process of innovation (p14). There can be serious constraints to farmer experimentation and innovation. Several articles stress that it is important that the community recognises local innovators. Women in particular often have difficulty in winning this recognition (p40).

Widening interest

Farmer innovation is not new, it has always been an essential part of agriculture. Drawing attention to the importance of farmer innovation is not new either. In recent years many books and articles have appeared on local innovations in such magazines as the *ILEIA Newsletter*, *Honeybee* (p5), and *Enlace* (p28). Despite this, formal research and extension has paid little attention to farmer innovation. Now, the tide seems to be turning. Some development programmes have started to go beyond participatory research on techniques originating in formal science. They are deliberately using indigenous innovation as an entry point into joint experimentation to further develop "home grown" ideas. These initiatives involve local innovators, neighbouring farmers, development agents and sometimes even research scientists. International and national research and development organisations are now considering how farmer innovation can best be supported especially for development of ecologically sound agricultural and natural resource management practices suitable for diverse and specific sites (p35).

Seeking complementarities

Ways are being sought to trigger participatory innovation processes in which the knowledge and experiences of small-scale farmers and external advisors are combined in a "learning dialogue" (Hocdé et al., p28). Research scientists have important tasks to play, by bringing in information, methods and analyses which complement what farmers already know and can do themselves. The evaluation of the CaC movement in Nicaragua (p26) revealed that more systematic learning, rigorous comparison of options, and insights from outside are needed to make farmer experimentation more effective. As argued by Braun et al., (p33), seeking complementarity in methodologies could also enhance local innovation processes, e.g. the approach of experimental learning-by-doing (a strength of Farmer Field Schools) could be combined with systematic comparison (a strength of PTD) and with wider sharing (a strength of CaC).

Enthusiasm and ownership

Supporting farmer innovation involves a variety of interlocking activities, as discussed on page 9, 25 and 28. The articles from Latin America in particular stress the importance of "farmer promoters" in facilitating innovation. Farmer promoters help farmers realise that they are capable of recognising and offering solutions, doing experiments and communicating options to others. Promoters can help farmers bring out their ideas and guide them in designing their own experiments. The goal is to promote a culture of enquiry and experimentation among farmers which helps build enthusiasm, self-confidence, pride and hope for the future (p26). Magazines, video, radio, television, fairs, workshops and farmer congresses (pages 18, 28 and 39) have proved to be effective tools for identifying, sharing and analysing local innovations and for stimulating further experimentation. As Hocdé et.al. (p28) observe, the important thing is that innovators do these things for themselves and take pride in them. In Costa Rica, innovating farmers took the initiative to found a committee of farmer experimenters and representatives from the public and NGO sector to support and plan participatory innovation development at regional level that put farmers' organisations in charge of research (p28).

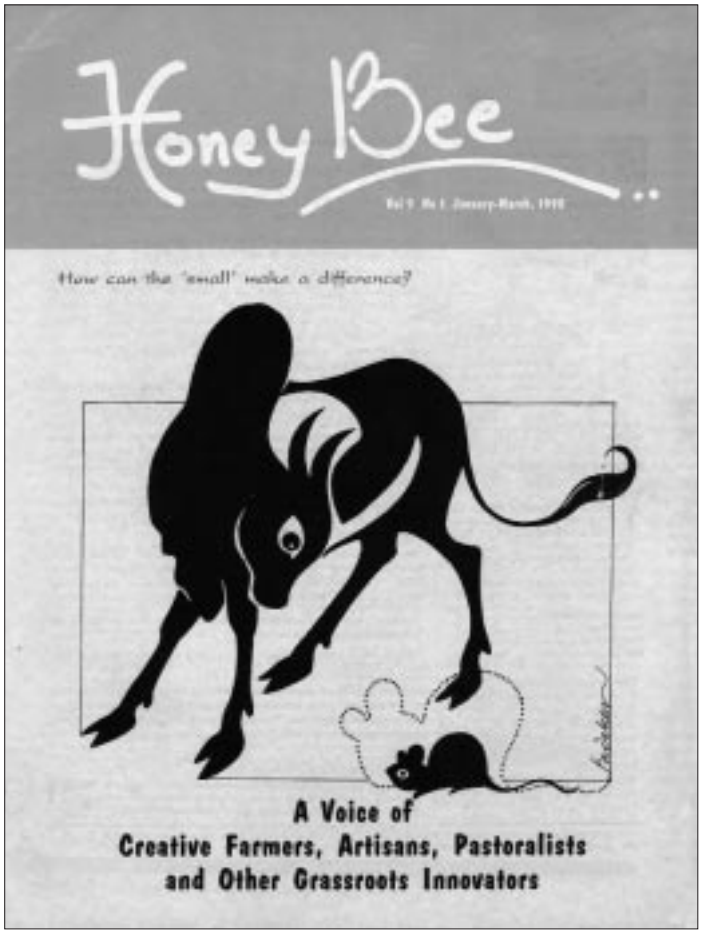
Re-orientation needed

The articles included in this Newsletter make it clear that there are two major preconditions for supporting farmer innovation. First, empowering farmers to take the lead in experimentation, communication and organisation; and second changing the attitudes and roles of researchers and development workers so that they recognise farmer innovators as equal partners, with experiences and skills different to their own. Only then can they facilitate processes of participatory innovation and provide the complementary inputs needed.

Re-orientation is also needed in policy-making from the local to the international levels. The experiences of the CaC movement (p26) and in Tanzania and Ethiopia (p9, p23) show how vital it is to involve all stakeholder groups (farmer organisations, research and extension institutes, universities, development agencies, ministries, banks and the private sector) in platforms for dialogue. This should lead to change in policy relating to research, extension, education, land tenure, trade and many other factors that can stimulate or constrain farmer innovation.

The ultimate aim, as so aptly expressed by Braun & Hocdé (p33), is to stimulate social processes that unleash the creative skills of people and their organisations in order to create a permanent movement of innovation driven by the rural population. ■

Photo: Martin Moll



Grassroots innovations for survival

Anil K. Gupta

Although participation is much discussed, poor people rarely get the opportunity to develop their own agenda and vision or set terms for the involvement of outsiders. The entire participatory paradigm illustrates that people are participating in plans and programmes that we – outsiders – have designed. Not only is there little opportunity for them to articulate their ideas, there is also seldom an institutional space where their ingenuity and creativity in solving their own problems can be recognised, respected and rewarded.

Poor people must be inventive to survive. However, sometimes their coping strategies are inadequate and then they have serious difficulties in meeting their basic needs, educating their children and generating sustainable employment opportunities. Nevertheless, there are clear signs that within their local knowledge they have a tremendous potential for restoring the economic and ecological balance.

The Honey Bee network

Ten years ago, this awareness motivated me and some of my former students and colleagues to set up the Honey Bee network. Metaphorically the Honey Bee represents the ethical and professional values that most of us often neither profess or practise. A honey bee does two things that we intellectuals often fail to do: it collects pollen from the flowers and they do not complain, and it connects flowers in pollination. In the Honey Bee network, it is a matter of principle that we always credit the knowledge we collect from people and we share any benefit that arises from this knowledge fairly with them. We insist that this knowledge is transmitted in vernacular languages thus ensuring people-to-people communication. Honey Bee is a knowledge centre/network pooling solutions developed by people working in different sectors from all parts of the world. It creates links not only between people but also between formal and informal science. Honey Bee has collected over 10,000 examples of contemporary innovations and outstanding examples of the use of traditional local knowledge in the sustainable management of natural resources. These innovations are shared with local communities and individuals in over 75 countries through the Honey Bee newsletter which is issued in eight different languages (English, Spanish, Hindi, Gujarati, Tamil, Kannada, Pahari, and Telugu. SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), a global NGO based in India, was set up in 1993 to provide support to the Honey Bee network.

Of course, people cannot solve all their own problems and sometimes the solutions they find will be inadequate. Often there is scope for adding value and improving efficiency and effectiveness. However, it is clear that a development strategy that does not build upon what poor people are rich in, their knowledge, institutions and creativity, will never be ethically sound, professionally accountable or efficient.

Finding the odd balls

Our local innovation database has been developed using methods and approaches that people can use without much difficulty. We believe that learning has to be mutual and patient. The categories used must be those that people work with in defining their worldview. What Honey Bee has done is quite simple. During their summer vacation we ask students to help us find the odd balls, the farmers in the villages who are experimenting and doing things differently. Many of these farmers have found very creative and innovative solutions to their problems. The unusual thing about these innovations is that they remain so localised that even farmers in the same village sometimes do not know about them. However, this lack of diffusion does not mean these innovations lack validity.

We use several other methods to scout out innovations including competitions among functionaries of agricultural departments, NGOs, and educational institutions and information stalls in cultural and agricultural fairs. 'Shodh Yatras' or walks through the villages are organised every year in summer and winter for ten days to identify as well as honour the innovators and traditional knowledge experts at their doorstep.

We have come across technological, socio-cultural, institutional and educational

innovations that contribute to the conservation of local resources, generate additional income and reduce or prevent losses. Farmers have developed unique solutions for controlling pests or diseases in crops and livestock, conserving soil and water, improving farm implements, various kinds of bullock carts for performing farm operations, storing grains, conserving land races and local breeds of livestock and conserving aquatic and terrestrial biodiversity. Below are some examples.

Strip-sowing equipment

Amrutbhai Agrawat, an artisan, makes farm implements in Pikhor Village, Junagadh District, Gujarat. He had developed several innovative farm implements including a wheat-sowing box and a groundnut digger. In most sowing equipment, the seeds fall on the ground through the lowest pipe-shaped portion. The spacing devices are located in the seed box. In dry windy regions, lodging can be a problem in irrigated fields. Amrutbhai devised a box that spreads the seeds in a strip. While the seed rate remains constant, the distance between the seeds is increased and they do not fall on one another. With better root growth, there is more efficient nutrient uptake and the crop does not lodge. With a stronger root network, the crop is better able to withstand water stress and also does not lodge. Similarly, the groundnut digger was designed with the help of a flexible blade hoe that allows the distance between the two rows to be changed and the depth at which the hoe enters the soil to uproot the groundnut pods to be adjusted.

Venture capital

Amrutbhai also tackled another centuries old problem. On most tropical plains, farmers cart farmyard manure to the field. They have to spread the manure by carrying it by basket to the right place. This demands much time and labour. By modifying the bullock cart Amrutbhai created a cart that the farmer could easily tilt so he could gradually distribute manure single-handed over the entire field. He discussed the idea with us and defined the risks. This was an idea worthy of the support of Venture Capital Fund (VCF). There are many programmes on micro-finance but no program on micro-venture finance. SRISTI recognised the gap and, with the support of a grant from the International Development and Research Centre (IDRC) and using its own resources, decided to experiment with the VCF idea. A proposal was prepared and reviewed and the cart was developed through a small risk-taking venture of Amrutbhai and SRISTI.

Later, this innovation received support from the Technoprenurial Promotion Program (TePP) of the Department of Scientific and Industrial Research through the efforts of Gujarat Grassroots Innovation Augmentation Network. GIAN helped in filing the patent on behalf of the innovator and in licensing the innovation to three entrepreneurs for five districts and for five years netting about US$ 2,000 as a license fee to Amrutbhai.

Many other ideas and inventions remain undeveloped or inadequately developed because there is no VCF to support them.

Cross-cultural exchange

This knowledge has great potential for generating cross-cultural and regional linkages. For instance, pastoralists in Mongolia make an animal lick out of onion leaves with wheat germ, sodium bicarbonate and dried milk. This lick is rich in selenium. Selenium deficiency, for example, can cause young calves to die prematurely. When the Honey Bee network idea was discussed with Akwasasne people in Canada it emerged that they had a livestock problem which could be traced to selenium deficiency. This shows the potential of the Honey Bee network: a practice in Mongolia, documented by a professor in Scotland and published in Honey Bee, was made available to indigenous peoples in Canada and provided a possible solution to local problems.

Rewarding creativity

The intellectual property rights of local communities and individuals have often been usurped by national and international corporations and professionals without any regulation or restriction. Not only were the contributions of local knowledge not recognised but when profits were made nothing was shared with the people. An example of unfair extraction: about 70% of plant-derived human drugs are being used commercially in the same way as they were used by the native people who discovered them. What modern science did was to improve the method of extraction or develop a synthetic analogue of the compound. The basic R&D was done by the people but they were never compensated.

There is a clear need to correct the unfair and unjust system of extracting local knowledge from people for corporate benefit. It should be noted, however, that many local communities do not necessarily seek material rewards but this is no reason for keeping people poor.

International registry

At present, any innovation once published comes into the public domain and becomes non-patentable. At the same time, people-to-people networking requires dissemination of ideas in numerous different languages to promote learning and experimentation. An international innovations registry INSTAR (International Network for Sustainable Technologies Application and Registration) was set up to prevent conflict developing between the need to protect intellectual property rights and dissemination for people-to-people networking. This registry, like the ISBN number for books, can provide a quick and inexpensive way of gaining some protection (say for ten years) for innovations. Later, with the help of an international fund for promoting sustainable technologies, more detailed patent applications could be filed on behalf of the innovators. Securing benefits also may raise the interest of younger people in green technologies, which may help this knowledge system not just survive but grow.

Recently, the Government of India has set up the National Innovation Foundation to make a national register of innovations, help link innovations with investment capital and enterprises, and to forge links between formal and informal science. Perhaps the time has come for setting up a Global Innovation Foundation as well.

Restructuring required

For most marginal communities in fragile environments, the standardised solutions developed for high-potential "green-revolution" regions are unworkable. However, in general there are no organisational arrangements that provide incentives to encourage scientists to work with the people to develop technologies that limit the potential for diffusion. Restructuring of international and national research organisations is required if technology development and diffusion is to become relevant and meaningful for marginal environments and disadvantaged communities. The Honey Bee network, with its limited resources and experiences, has demonstrated that such a transformation is feasible.

■

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Pacific Islander agriculture is dominated by root crops such as taro and yams and islanders face many problems with their cultivation. In Samoa, the introduction of leaf blight disease in 1993 devastated taro production and caused a dramatic decline in supplies of this staple food and export commodity. In Tonga, yam anthracnose continues to be a major problem. Island farmers, however, are important innovators and experimenters when it comes to solving the production problems associated with these crops. In Samoa, farmers have used their own innovations to ensure the rapid multiplication and availability of disease tolerant taro varieties, while in Tonga farmers have devised ways of minimising anthracnose disease and ensuring the vigorous growth of yams.

Photo: by authors

The Reverend Tauvela Suafoa alongside a patch of taro in his homegarden.

Farmer Innovation in the South Pacific

Steve Rogers, Tolo Iosefa, Taniela Hoponoa, Steve Hazelman and Danny Hunter

In 1996, the Samoan Ministry of Agriculture identified and released PSB-G2, a leaf blight tolerant taro variety from the Philippines. In general, taro is propagated vegetatively, and headsetts (also called tops) or large suckers are the best planting materials. However, the multiplication of PSB-G2 is enhanced because this variety also produces runners (stolons). The runners can be left attached to the mother plant to produce multiple suckers or cut and subdivided into pieces about 10 cm long. These are raised in nursery beds until they are ready for field planting (Figure 1). In Samoa, farmers received planting materials from the Extension and Research Divisions of the Ministry of Agriculture or from other farmers. Because there was a limited supply of planting material, most farmers received about 25 tiapulas (headsetts or tops) each.

Successful multiplication

In 1998, the European Union - Pacific Regional Agriculture Programme (EU-PRAP) Farming Systems Project and the University of the South Pacific (USP), in conjunction with the Research and Extension Divisions of the Ministry of Agriculture, carried out an impact assessment into the multiplication and distribution of PSB-G2. In the two-year period following the release of PSB-G2, the survey recorded an almost 75-fold increase in numbers with some farmers achieving a 700-fold increase. Although they had been provided with basic information on using runners for multiplication, the survey found that several farmers had been particularly successful at multiplication by innovating and adapting the above methods.

The innovations of Tauvela Suafoa

Reverend Tauvela Suafoa from Malaemalu village in Falealili district is an excellent example of a farmer who developed his own approach to multiplying and growing the new taro. He only received 50 *tiapula* in May 1997, yet in less than a year he had more than 3000 mature plants. Reverend Tauvela attributes this success to his mulching methods and sheer hard work. He described his method as follows:

- Remove the taro runners and cut them into node sections of about 5 to 10 cm long.
- Place node sections horizontally on a prepared nursery soil bed and cover with a thin layer of soil.
- Cover the nursery bed with a thin layer of cut *Erythrina* leaves. Good shoot growth will appear after 3 to 4 weeks.
- When the shoots are 25 to 30 cm long, transplant them to the field plot and mulch with "Samoan Manure". This consists of a layer of cut banana leaves and a layer of *Erythrina* leaves and lawn cuttings, followed by another layer of banana leaves and a final covering of coconut fronds.

Reverend Tauvela has also experimented with the spacing of the new variety. Instead of the traditional spacing of 100x100 cm, he recommends a closer spacing of 50x50 cm. With this spacing he observed that PSB-G2 grows well and produces more runners. This means that more taro can be grown on a small area with less mulching material. Moreover, he not only succeeded in getting more taro plants, he also noticed an increase in the size of his Sunday congregation. This he attributes to his Sunday *To'onai* feast where he serves up *faalifu talo* and *luau* (taro corms and leaf in coconut cream). The Minister and his congregation all agree that the new variety has an excellent taste.

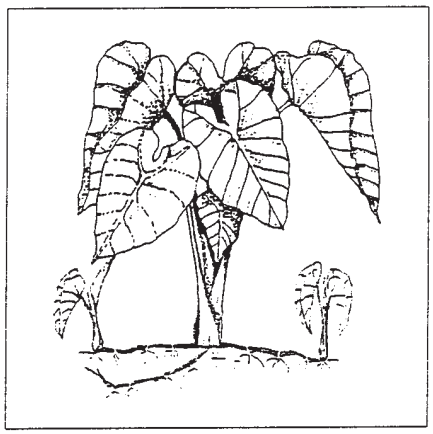
Food security increased

Farmer innovation in multiplying taro has meant a considerable increase in the availability of planting materials for other farmers. Because the area under taro cultivation - mostly using PSB-G2 – is increasing, there is more taro on the local market and at cheaper prices. This is great news for Samoa. For the first time since 1993, more people have the opportunity of eating their favourite food on a regular basis. Farmers are now selling planting material for half the price it was two years ago. Today, the Ministry of Agriculture estimates that there are about 10 million *tiapula* available in the country.

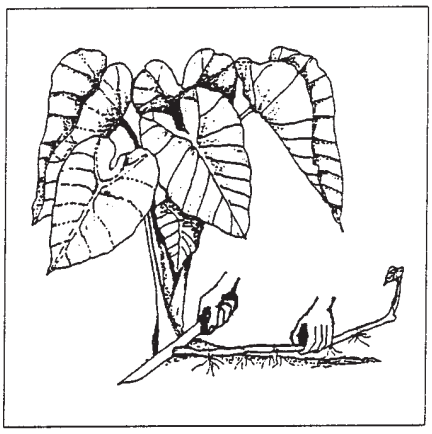
Superior yam planting materials

In Tonga, during on-farm yam trials to investigate ways of managing yam anthracnose, considerable variation in plant growth was observed. This was the result of non-uniform sprouting. Discussions between farmers and researchers resulted in the identification of local techniques for preparing and multiplying superior yam planting materials that could ensure a uniform vigorous growth and minimise anthracnose disease

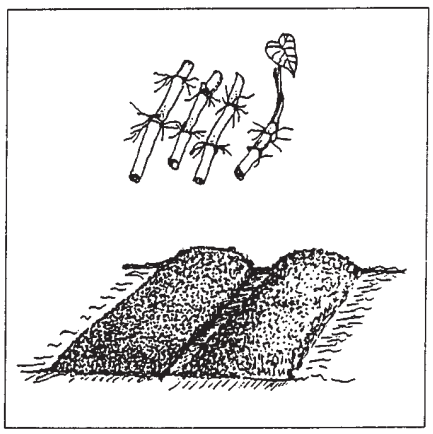
Figure 1



Runners left intact on mother plant.



Runner removed from fully grown taro plant.



Runners cut into single or double nodes and planted in nursery.

problems. The expertise of Tevita Tui, a prominent yam grower and experimenter from Ta'anea village was a major input and other farmers cooperating in the on-farm trials also provided information.

Selection improved

Farmers identified five selection steps to ensure that superior planting materials are used:

- Select disease-free plants that are growing vigorously. Before reaching full maturity, cut off and remove the whole shoot to ensure the tubers remain disease-free.
- After harvest, select the best tubers. Keep the tubers separate from the rest of the yam and store to avoid further disease infection.
- When yams are in storage make a further selection and remove tubers with undesirable characteristics.
- Only prepare mini setts when yams have reached optimum dormancy time. This can be tested by cutting off the end of sample tubers and placing these horizontally on the floor overnight. If no fluid comes from the cut surface the tuber is said to be dried (*matu'u*) and ready for cutting. Setts with discolouration or signs of injury should be discarded. Many growers see this as the final step before yam setts are planted in the field. However, Tevita carries out a further innovative step that improves the selection of planting material.
- Incubate setts in a circular pit (*tanu*) until they are uniformly sprouted. This can take up to 2 months. Place setts horizontally in the pit up to three layers deep. A dried stick of 5 to 10 cm diameter and 100 cm long should then be placed in the centre of the pit. This stick is often referred to as the "nose" for it ensures ventilation. Tevita recommends that there should be no more that 200 setts per pit. Several dried sticks (*fetaki*) can be put across the top of the pit to ensure proper ventilation. Finally, dried banana leaves should be placed on top of the pit and covered with loose soil (Figure 2).

Multiple benefits

The *Tanu* method provides the following benefits for Tevita and other yam growers:

- sett size can be reduced to one quarter of that normally used for field planting without sacrificing crop yield. This means that more tubers are available for home consumption and sale;
- uniform crop growth can be achieved by selecting pre-germinated mini setts and eliminating diseased setts;
- one or two months of early field weeding can be avoided by germinating the setts in the Tanu pit;
- setts can be kept in the pit during periods of unfavourable weather.

Tevita has freely shared his knowledge with other farmers and extension staff. His enthusiasm and skill in giving practical demonstration of his innovations have encouraged other farmers and several Ministry staff to try these methods for themselves.

Important resources

Farmer innovation, and the knowledge and skills generated, are important resources in agricultural development. Ways should be found to build on these resources in national research and extension programmes. The innovations described in this article have formed the basis of farmer-to-farmer training and extension programmes to provide community-based training opportunities. This has led to a wider adoption of innovations and has also encouraged other farmers to experiment and innovate in a similar way. ■

Steve Rogers, Former Team Leader, EU-PRAP – Project 1
Tolo Iosefa, Taniela Hoponoa and **Steve Hazelman**, Former EU-PRAP graduate research assistants
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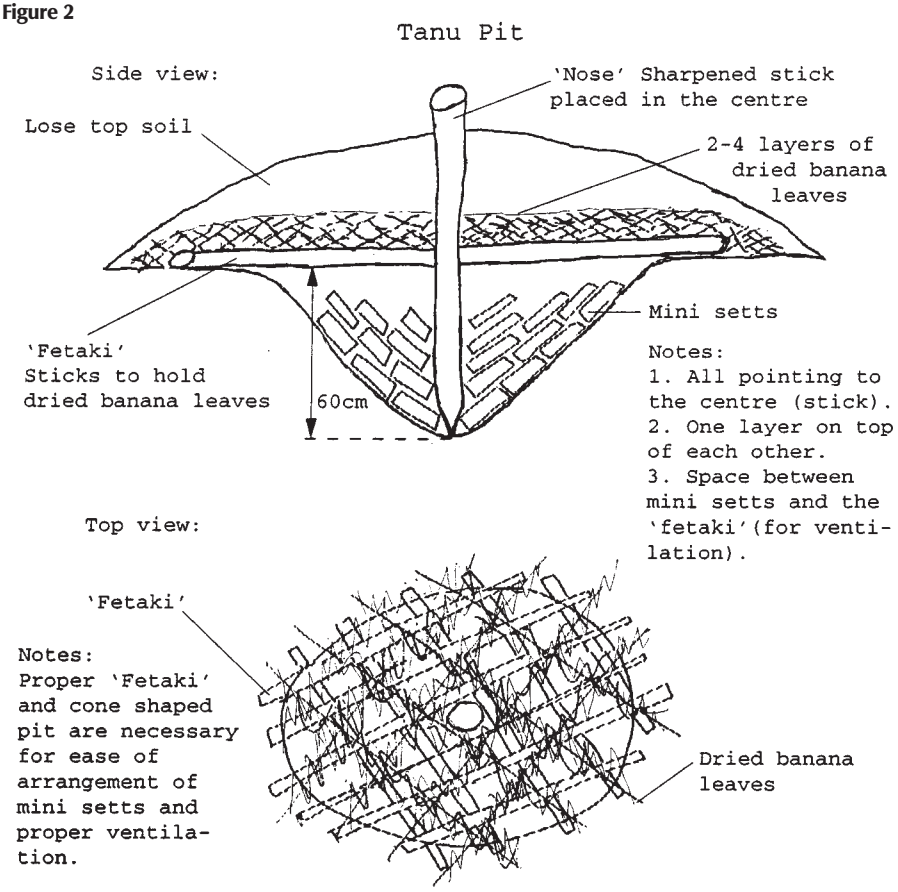
Figure 2



Forging partnerships with innovative farmers in Tanzania

O.T. Kibwana

New ideas are the key to agricultural development. In today's dominant model, researchers develop and test new ideas, extension agents package them into "messages" and farmers are told what to do. A very specific status hierarchy is perceived by all the actors. While the ineffectiveness of this linear model is now recognised, the question of how researchers find out the relevance of innovations at field level remains open. Mechanisms have been introduced to feed back farmers' opinions via the extension system to researchers, but they have done little to change the assumption that new ideas originate from experts working at a superior level.

The Indigenous Soil and Water Conservation Programme (ISWCP) in Tanzania (see Box 1) recognises that such experts are an important source of new ideas. But it also believes and has concrete evidence that farmers are very resourceful in generating and testing new ideas.

Agricultural development demands continual innovation. All farmers innovate in their struggle to make a living from the soil. However, not all farmers innovate to the same extent. There are always those who lead the way. ISWCP's challenge was to identify these farmers and to forge a genuine partnership between them, and researchers and extension agents.

Before ISWCP began there had already been interactions between these actors, and the attitudes, behavioural patterns and role definitions that had developed were being taken for granted. To change these attitudes meant creating a "new order". ISWCP tackled this task in the following way.

Breaking the ice

One of the first activities of ISWCP was to bring together researchers and extension agents in a **Joint research-extension workshop on PTD**. "Experts" in agriculture believe they are more open to new ideas than farmers, and see themselves as "Agents of Change". The workshop aimed at getting researchers and extension agents to agree on a new concept of farmer innovation (as they were still thinking of "innovators", "adopters" and "laggards" in the terminology of transfer-of-technology extension), and at introducing and offering training in participatory methods. A longer-term objective was to nurture a working relationship between research and extension. The workshop gave participants the opportunity to understand and appreciate each other's roles and points of view, and led to the setting up of mixed teams to identify farmer innovators.

Opening eyes

Farmer innovators and innovations had to be identifying and analysed. ISWCP began by selecting two or three divisions within each district according to the extension staff's evaluation of the general level of innovativeness in the area and whether village-level extension staff who had attended the PTD workshop were based in the division.

Research and extension teams were formed. These consisted of the divisional extension officer (DEO), selected village extension workers (VEWs) and a researcher from one of the two research organisations in ISWCP-Tanzania's National Steering Committee (NSC). As only one researcher works in each region, that researcher takes part in all the divisional research-extension teams in that region.

VEWs were selected according to their interests, capabilities and disposition to regard farmers as creative. Team leaders were people from above the divisional level who were known to be interested in participatory research and extension.

The different approaches adopted in identifying innovators reflected the composition and orientation of each team. In some areas, the teams asked the local VEWs to identify local innovators. Others asked the VEWs to convene a meeting of community leaders to discuss the general topic of farmer innovation and experimentation. Community leaders were then asked to identify local innovators. In Njombe, for example, 12 innovators were identified in this way.

The teams visited the farmers identified as innovative and saw and documented their work. In the case of the more technically-oriented teams working through VEWs, the teams screened which innovations were interesting to document. Where community leaders were involved in identification, they met with the identified farmers and the research-extension team to discuss techniques and distinguish between innovations and traditional practices.

Innovator Profiles

The VEWs, assisted by the researchers, created innovator profiles using a format provided by the ISWCP. Profiles consisted of bio-data, economic status, social influence, neighbours' perceptions and motives for innovation. They found that:

- Most innovators had responded to problems they faced during their daily work, i.e. their motivation was to solve problems;
- Most innovators were middle-aged men with families, but the more striking

Photo: Laurens van Veldhuizen

Farmers discussing their experiences of "partnerships"

Partnership in action: planning future activities.

Photo: Laurens van Veldhuizen

innovations were undertaken by males in their early 30s;
- Some of the older male innovators held official positions in their localities; the younger ones were seen as being wayward. One was nicknamed "Pwagu", a popular character in a radio play who is always trying out new ideas but with little success;
- Better-off innovators embarked on more expensive innovations requiring purchased materials and hired labour, the poorer ones on simpler, less resource-demanding innovations; however, many who started resource-poor became richer through their innovations;
- Fewer women were identified as innovators, and their innovations tend to be homestead centred (e.g. mixing urine with manure from stall-fed cattle);
- Most innovators claim to have been inspired by their own ideas and curiosity; few admit to having been inspired by other farmers or extension agents; only later did it become possible to trace the origin of any particular innovation.

Let's get together

Parallel workshops for farmer innovators were organised at regional level (Iringa, Mbeya and Ruvuma), bringing together farmer innovators from several districts The general design of the workshops was made by a researcher, a PTD trainer and a woman who heads the national farmers' organisation. The main objectives were to provide a forum for exchanging experiences and to stimulate networking among the innovators. This was important because innovators often felt isolated within their own communities and unappreciated by the "experts" in research and extension services. The facilitation team for each workshop included a researcher, a PTD trainer, an extension agent and a farmer.

The farmer innovators greatly appreciated the workshops. For many, it was the first time they had travelled across district boundaries and their first opportunity to explain to others what they were doing. They exchanged seeds and planting materials as well as ideas. During the workshops, participants examined some innovations in the field and assessed their strengths and weaknesses. New friendships were made and innovators were enthusiastic to learn more from each other.

Farmers learn from farmers

Cross visits were organised in two stages. First, farmer innovators from one district visited others in the same district for three days and each group member played host in turn. Then, a group of innovators from one district visited innovators in another district within the region. VEWs accompanied farmers on their intra-district visits and the DEO went with them on inter-district visits.

The cross visits took place in December 1998. After each visit, group members evaluated what they had seen and identified the ideas to try out at home. In April/May 1999, teams of VEWs visited the farmers involved to see what they had put into practice. Farmers had been very active. The newly acquired seeds and planting materials had been tested. Some of the innovations had also been adopted, the most striking being the sowing of several maize seeds in a pit, the idea of Wilbert Mville in Njombe (see Temu et al., p.12). Seventy-nine farmers trying out this technique were identified in Njombe District alone. No wonder one farmer commented that "Learning from exchange visits is better than being visited by a VEW".

Agreeing on topics

Researchers and farmers often have different ideas about what problems should be studied first. Negotiations are needed to reach consensus on the relative importance of problems. Only then can joint action start. This process requires that each stakeholder group has the capacity to express its own position. Preparatory work is needed if fair negotiations are to take place. ISWCP tackled this on two fronts: by confronting the "experts" and addressing the farmer innovators. A series of workshops were held to help experts appreciate the farmers' potentials. Meanwhile, the process of identifying innovators, regional workshops and cross visits had served to strengthen the position of the farmers, who had became more confident, assertive and better able to argue their interests.

Negotiating priorities

Once these two parallel processes had matured, priorities could be set for joint experimentation building on local innovations. Multidisciplinary teams consisting of researchers (agronomists and soil scientists) and the VEWs visited individual farmers and discussions took place in the fields. Clusters of innovations were identified, for example:
- mixed cropping involving food crops and fruit trees;
- agroforestry systems;

- replenishing soil fertility with organic materials;
- testing different sowing systems;
- tapping underground water for irrigation;
- diverting waterways and managing the water;
- harvesting run-off water;
- production of agricultural tools.

Results were summarised and presented at a research-extension workshop for further negotiation. Finally, the proposals were reviewed by the NSC, which monitors the general orientation of the action research. The woman representative of the farmers' organisation had a special responsibility for ensuring that the farmers' agenda was maintained.

Learning together

During the first cropping season, a few farmer-experimenters were identified in each action area. Research teams consisting of a farmer-experimenter, the local VEW and a researcher were formed. The general framework for sharing responsibilities had already been agreed upon during the earlier workshops, but the teams still had to work out the details to fit their own situation.
Most experiments involved crops and some had been set up after the growing season had begun. In order to improve research in the next season, a workshop was held for the farmers, researchers and extension agents involved in the first experiments. The main aims were:

- to review the process of joint experimentation: How was it planned? How was responsibility shared? What happened?
- to derive lessons learnt so far: What went well? What problems had there been? How were these dealt with? What should be done differently next time?

Generally, participants and especially the farmer experimenters were satisfied with the process. For them, the most gratifying part of the experience was that they had been treated - at long last - as partners and equal to the "educated elite".
Of course, some problems were also identified. A major one was that it had been assumed that, simply by dividing responsibilities, the partners would be able to play their roles effectively. As it turned out, even in cases where the partners were clear about what they were supposed to do, they were not always prepared to do it. The participants therefore requested that, in each district, practical "hands-on" training be given. This should focus on the tasks that the farmers, researchers and VEWs should undertake in the next cropping – hence, experimenting – season. These workshops would also serve as planning sessions for the next season – a good way to complete the reflection-action-reflection loop.

Just catch words?

Participation, stakeholder involvement, empowerment are concepts that have gained popularity, but there is a danger that they become catch words. ISWCP-Tanzania is being implemented by partners – including research institutions and extension agencies, both governmental and non-governmental - who have claimed from the beginning that they believe in participation. However, experience shows that old habits die hard. Deliberate efforts have to be made to achieve a common understanding of the vision, philosophy and strategies of genuine participation. The terminology used must have a clear and shared content. Mutual trust is also critical in genuine partnership. You trust people whom you respect and understand. The mixed workshops were powerful tools for building trust, but it is wise to remember that farmers are old hands at uncovering deception. They may decide to keep quiet. And this would be a very dead end. ■

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Box 1: Indigenous Soil and Water Conservation in Africa (ISWC II)

The first phase of ISWC focused on indigenous knowledge (IK) in land husbandry. The second phase (ISWC II) focuses on dynamics in IK: discovering and promoting farmer innovation. The programme operates in Burkina Faso, Cameroon, Ethiopia, Tanzania, Tunisia, Uganda and Zimbabwe. The main objectives are:

- to improve the effectiveness of ISWC practices and innovations through joint experimentation by farmers, researchers and extension agents
- to initiate research on ISWC, spread research results, and create lobbying platforms to show policymakers that building on ISWC practices and innovations is an effective option for development.

Local innovators, who develop new ideas without direct influence from formal research and extension, are often overlooked as a source of inspiration for development. Innovators already in the midst of informal experimentation can be entry points into a process of Participatory Technology Development (PTD). The major components of ISWC II are:

- identification and analysis of farmer innovators and innovations
- networking between farmer innovators
- participatory research involving men and women farmers to develop improved land-husbandry technologies and systems
- setting up farmer-based monitoring and evaluation systems
- dissemination of tested technologies through farmer-to-farmer visits.

In each country, researchers and extension agents are trained in PTD methods. The researchers' role is to support experiments by farmers. Extension agents participate in planning the experiments. They help the farmers to monitor them, and organise farmer-innovator workshops and farmer-to-farmer exchange visits.

In each country, a government agency or NGO concerned with agricultural research or development acts as the lead agency. It establishes links with other local research, development and teaching institutions interested and experienced in participatory approaches to improving land husbandry. A National Coordinator in the lead agency manages programme activities. A National Steering Committee, involving representatives of the collaborating organisations, approves plans and evaluates the activities.

Annual review meetings and regional workshops in Anglophone and Francophone Africa bring national programmes together. An informal newsletter (*Farmer Innovators in Soil and Water Conservation*) also allows exchange between the participants. Advisory support is provided by a European consortium involving the Centre for Development Cooperation Services (CDCS), Free University of Amsterdam; International Institute for Environment and Development (IIED) Drylands Programme, Edinburgh, Scotland; Institute for Development Studies (IDS), University of Sussex, UK; and ETC Ecoculture, Leusden, Netherlands.

Funding is provided by the Directorate General for International Cooperation (DGIS) of The Netherlands Ministry of Foreign Affairs. Each partner country manages its own fund for activities such as training in PRA and PTD, farmer-innovator workshops, participatory research and farmer-to-farmer exchange visits.

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Photo: Anderson Temu

Digging the pit

Sowing maize in pits: farmer innovation in Tanzania

Anderson Temu, Zacharia Malley, Salome Mwigune and Norsis Kinabo

Wilbert Mville, a 34 year-old farmer, lives in Itulike Village in Njombe District in the Southern Highlands of Tanzania. This is an area of sloping and undulating land at an altitude of between 990-2200 m. Temperatures range from 13 to 18ºC, and annual rainfall (November-April) varies with altitude from 600 to 1500 mm. The dominant soils are red kaolinitic clays with moderate natural fertility and medium to high water-holding capacity. Under continuous cropping, they degrade quickly through compaction, and plant rooting is shallow.

Research-minded farmers

In these and similar areas of southern Tanzania, the Indigenous Soil and Water Conservation Programme (ISWCP) set out to identify farmer innovators. This was the first step in establishing a process of Participatory Technology Development (PTD). Researchers and extensionists were trained in tools for farmer-led analysis and experimentation, an approach very different from the scientist-led research that dominates the official level in Tanzania.

Two PTD training workshops in March 1998 and April 1999 were crucial to changing the attitude and behaviour of researchers and extensionists from a conventional transfer-of-technology approach to a more participatory one. Workshop participants learned about innovation and informal experimentation by "research-minded" farmers. It was stressed that these should not be confused with "progressive" or "contact farmers" who had the resources to adopt techniques suggested by extension officers. Farmers who are less responsive to such messages often have fewer resources, but may still be very active in trying out new things in their farming system (Veldhuizen et al. 1997).

Locally-developed LEISA

A field trip during the 1998 workshop in Njombe exposed researchers to farmer innovation. Godson Lupenza, a village extension officer (VEO) in Njombe who had seen Mville's maize pits, suggested that a field-work group should visit him. The group members marvelled at Mville's willingness to speak, listen and answer questions, and his amazing knowledge. He had developed several innovations, e.g. different ways of planting maize, a pipe system to distribute water and cattle urine to his fields, a tree nursery and fish ponds. The scientists were keen to analyse these innovations and start joint research with Mville, who had already – on his own initiative – outlined topics for experimentation:

- comparing maize yield from large and small pits;
- trying bigger pits, each seeded with up to 30 plants, without thinning;
- sowing on raised seedbeds in old pits (from the previous season) to observe yield response to residual fertility;
- using compost instead of manure and crop stover as organic fertiliser;
- one top dressing of slurry compared with three top dressings.

Closer look

When two of the researchers (Temu and Malley) visited Mville again in February 1999, he explained that his ideas came from seeing that extension officers recommended sowing 2-3 seeds together in rows if there were enough nutrients (organic or inorganic). He reasoned that it must be possible to sow many more seeds in a pit that was rich in organic matter and still obtain a good yield. Since the soils on his farm are exhausted and because he had enough farmyard manure (FYM), plant materials and animal feed refuse, he set about designing the pit method. A year later, in 1997, he tried it on a small scale and modified it in 1998.

His technique involves digging pits 60-120 cm in diameter, 30-60 cm deep and 75-100 cm apart. Crop residues and manure (one bucket of 20-litre) are put into each pit and mixed with topsoil. 20-25 maize seeds are then sown in each pit and later thinned to 15-18 plants, depending on the size of the pit. He top-dresses the maize with a mixture of manure slurry from the kraal floor and urine collected with his piped system, diluted 1:1 with water. On each of three consecutive days, he applies about 2 litres of this mixture per pit. The following season, he makes new pits on the undisturbed soil between the previous season's pits. In this way, he hopes eventually to saturate the field with organic manure and thus improve the soil. Mville noted that he harvested 20 bags/acre (5 t/ha). When he planted in rows his yield was less than 5 bag/acre (1.25 t/ha).

Mville's wife works with him and has introduced her own experiments. For example, after the maize was harvested, she planted leafy vegetables irrigated by the pipe system to see how residual fertility could be used.

Technical staff

In the 1998/99 season, Mville began a trial to compare the effect of pit size on maize yield, a topic he had mentioned during the first workshop. He and his wife jointly monitored the trials, and she kept the records. A neighbouring farmer, Rose Kitamkanga, saw what Mville was doing and decided to experiment on her own to find out whether pit planting with manure produces more local maize than conventional row planting. The technical staff (researchers and extensionists) joined these experimenting farmers in the middle of the growing season. We had still been trying to work out mechanisms for participatory research, so the farmers started their trials without us! We helped them identify simple assessment criteria so that, at the season's end, they could use them to interpret the results. The farmers were able to record many parameters, the researchers only had to record a few including pit dimension, grain yield and soil analysis. Grain yield was measured at harvest in the presence of the innovators, VEOs and researchers.

Results

The results of these two trials, plus more from other farmer innovators, were pre-

sented in two farmer experimentation workshops held in November 1999 in Iringa and Mbeya Districts. Assisted by researchers and VEOs, the farmers used flipcharts to present their data to the other innovators. Results were discussed in a plenary session.

Farmers' comments

Mville and his wife noted that the larger pits produced better results than the smaller ones (8.8 compared to 3.6 t/ha). Rose noted that the maize yield from pits was 50% higher than from rows. The other farmers made the following comments on the trials and the results:

- the plot size for large pits was smaller than for small pits;
- the exact amount of FYM in Mville's trial was not known;
- the fertilisation schedule differed in the comparison of row and pit planting;
- the amount of urea applied was not specified.

Table 1: Results from Mville's experiment, using introduced maize variety

	Size of pit	
Parameter	**Large**	**Small**
Area of maize plot (m²)	28	100
Number of pits	8	56
Number of plants	192	448
Depth of pits (cm)	60	30
Spacing between pits (cm)	105	85
Diameter of pits (cm)	123	58
FYM applied at sowing	not known	not known
Top-dressing (manure slurry)	15	3
Maize cob weight at harverst (kg)	19.8	14.9
Grain yield (bags/acre)	35	14.4
Grain yield (t/ha)	8.8	3.6

Table 2: Results from Rose's experiment, using local maize variety

	Sowing method	
Parameter	**Pits**	**Row**
Area of maize plot (m²)	100	100
Number of pits	40	13
Number of plants	480	303
Depth of pits (cm)	60	-
Spacing between pits (cm)	60	90
Diameter of pits (cm)	59	-
FYM applied at sowing (l)	10	-
Top-dressing (manure slurry)	-	Urea
Maize cob weight at harverst (kg)	16.1	16.4
Grain yield (bags/acre)	24.0	16.0
Grain yield (t/ha)	6.0	4.0

Observations

It was interesting to note that farmers saw the need to standardise non-experimental factors so that fair comparisons could be made between treatments. During the workshops, researchers guided farmers to brainstorm about other rules that could improve experiments in the next season.

The importance of design, replication, randomisation, controls and plot area for trials, for example, were discussed. We all agreed that these principles would be put into practice when joint experiments were conducted in the 1999/2000 season.

Innovation spreads

The pit-planting technique spread quickly and was made known through:

- visits by individual farmers (mainly neighbours) to Mville's farm;
- farmer-exchange visits facilitated by the ISWCP;
- farmer-innovator and farmer-experimentation workshops;
- publication in the Swahili newsletter *Pambazuko* produced by a national farmer network (MVIWATA);
- presentation by Mville at the NANE Annual Agricultural Show in Arusha in August 1999;
- publicity through church congregations.

A quick survey made in Itulike and Wikichi Villages in Njombe District in June 1999 found that 71 farmers had already adopted or were adapting the innovation. Three farmers in Iringa District, who had seen it during exchange visits were trying out pit planting for themselves. However, while farmers are keen on the technique, it was agreed during the farmer-experimentation workshops that the innovation will be studied again in the 1999/2000 season and that the rules of experimentation decided upon in the workshop should be applied. Initially, only two treatments were selected: row vs. pit planting. We agreed on factors to be kept constant and data to be monitor. There are 11 farmers (replicates) doing the trial in Njombe and 3 in Iringa District. The trials are being closely monitored by farmers, extensionists and researchers.

Advantages to explore

Mville's data suggest that his technique may be a promising alternative to conventional row planting. However, labour input comparisons are needed. Pit planting cannot be easily mechanised; it may therefore be more suitable for farmers who cannot afford mechanisation. From our point of view, the advantages of this innovation appears to be:

- improved soil productivity over time;
- simpler weeding, as weeds only need be hand-pulled from the pits;
- reduction in labour for field preparation, because tillage is minimal: only in the pits;
- less erosion, as less soil is detached from non-pitted area;
- the pits collect runoff, allowing it to infiltrate and be conserved in the spongy organic fraction of the soil in the pits;
- concentration of nutrients in the pits and looseness of the soil favour maize root growth and nutrient absorption.

After analysing the results of the initial PTD trials, we will start working with the farmers on further studies to explore the potentials of this local innovation. ■

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The result, healthy growth of maize

Photo: Anderson Temu

Photo: Chris Reij

Innovator Samuel Toh explaining the night paddocking technic to a radio agent during a study tour in Babanki. The paddock has just been tilled. A visiting farmer listens attentively and makes notes.

Chains of innovation by farmers in Cameroon

Paul Tchawa

Samuel Toh's farm in Upper Babanki is almost 2000 m above sea level and receives about 1500 mm of rain each year between May and September. Population density is about 150 persons/km^2. The "grassfields", where Bororo Fulani pastoralists keep their cattle, lie above the farming areas. In the early 1980s, Toh saw that his soils were becoming poorer and that, with population growth, there was less space for traditional long fallow to restore soil fertility. Bororo cattle grazed in the surrounding hills and he began to collect manure and transport it in jute sacks to his field. As this was strenuous work, he decided to build a fence around his field and to ask a Bororo herder to bring his cattle there each night for about a month. Afterwards he cultivated the fertilised area and the bumper crop he was able to harvest showed him that his new system worked. Over time, Toh improved his system. For example, he noticed that the animals tend to concentrate in one corner of the field and the manure was not well distributed. He subdivided the paddock, and the cattle were moved each night to different subdivisions.

Toh's innovation met with extraordinary success. One plant in particular is grown regularly after manuring: black nightshade or wonderberry (*Solanum nigrum*). Its leaves are eaten like spinach and are highly appreciated in Northwest Cameroon and in the cities of Yaounde (Central Province), Kumba (Southwest) and Douala (Coastal). Almost all farmers in Upper Babanki (more than 500 families) have adopted the night-paddock system, and a stream of traders in "bush taxis" weave through the villages to collect the leaves and take them to the city markets. Usually, the farmers grow nightshade for two years and then maize for another two years. The cattle then return and the fields are manured again.

New harvesting tool

Besides bringing direct benefits in terms of income, the innovation has borne other fruits as well.

With better soil fertility, farmers had five times as many nightshade leaves to harvest several times per season. It is hard work to break off the stems by hand. In the early 1990s, another local farmer, Phillip Ndong, tried to harvest with a knife but it was not sharp enough. Moreover, because the women and children were involved in harvesting several knives were needed and this was expensive.

He then tried using a razor blade held directly with the fingers. This cut the stems better, but also often cut into the fingers. He therefore took a piece of bamboo about 20 cm long and attached the razor blade to the end. After trying out several types of blade, he settled on one with three holes, which could be fixed firmly to the bamboo with thread. With this tool, which costs less than 25 FCFA (FF 0.25 or US$ 0.04), the price of a razor blade, the nightshade leaves can be cut quickly and efficiently and, because the stems are not damaged, leaf re-growth is stimulated.

Neighbours were sceptical at first, but now all nightshade growers in the area use Ndong's innovation. It spread spontaneously. Then another farmer in Babanki, Christopher Vitsuh, noticed that market demand for nightshade leaves was not being satisfied in the dry season and the price therefore increased threefold. This inspired him to develop a system of irrigation by gravity, so that he could produce nightshade leaves in the off-season.

Market demand

Since the 1960s, small canals have been dug in the Babanki area to conduct water towards brick-making yards. In 1986, Vitsuh thought of using the same technique to lead water to his farm. The night-paddock system had greatly increased nightshade leaf production in the wet season and the fertility could still be used in the dry months if there was water. Vitsuh started a small irrigation system, that expanded as additional families wanted to be connected to it. In 1999, the system was irrigating more than 10 ha to the benefit of some 40 farm families.

When Vitsuh had first thought of this idea, he contacted some advisors in water engineering. After examining the site, these experts estimated it would cost six million FCFA (60,000 FF) to set up the system. As Vitsuh could not afford this, he had the choice of giving up the idea or working out something himself. He did the latter and his initial network of 5 km of canals cost him only 110,000 FCFA (1100 FF).

To begin with, Vitsuh identified streams that could be diverted into canals. Depending on the location of the plots of the other farmers involved, the most

Participatory research on night-paddock manuring

A team composed of members of ISWC Cameroon, CIPCRE (a local non-governmental organisation), the University of Dschang, the Institute of Agricultural Research for Development (IRAD) and farmers has been formed to examine the production of nightshade (*Solanum nigrum*) in Babanki. The village lies
30km from Bamenda on the road to Nkambe. Here, market gardening is an important income-generating activity,and nightshade is the major crop.
Farmer innovators and the ISWC coordinator organised a workshop in June 1999 to identify priorities for joint experimentation. About 50 men and women farmers met at the palace of the traditional chief (Fon). During this workshop, the farmer innovators said they knew that the researchers' priorities differed from their own, but stated clearly: "Let's work first on our priorities; then we can help you with yours". They specified which aspects of the night-paddock system they wanted to address.
The farmers were paddocking 50 head of cattle overnight for one month, but suspected that these plots were being too well fertilised, while manure was needed for other plots. They wanted to know how many cattle should be kept in a paddock and for how long to ensure the best level of soil fertility, and what was the best crop succession to follow after manuring. The researchers agreed that they would address these questions first. During a second workshop in July 1999, details of the experiments were discussed and everyones task was defined. The researchers were so impressed by Samuel Toh's analysis and presentation at this workshop that they gave him the nickname "The Professor".
The experiments were carried out on the fields of four farmer innovators. They make their own recordings although this does not mean that they are the only ones involved in experimentation. They receive considerable support from the Fon and the villagers.
After they have dealt with the issue of maximising the benefits of manure, the researchers were keen to address their own priorities, such as examining the nutritional quality of the nightshade leaves, studying how increases in the cattle population was affecting the environment, and evaluating the forage species available to cattle. As long as farmers are also interested in these questions, participatory research can continue for the benefit of both local farmers and the larger world of research and development.

Paul Tchawa, Chris Reij and Ann Waters-Bayer, ISWC Programme

appropriate routes were chosen. As the land is prone to erosion and the canal sides could cave in, the farmers planted live hedges to stabilise them. When they had to cross a deep gorge or major watercourse, they used hollowed-out logs as pipes to link the two steep banks.

Community control

The new technology also led to social innovation. A management committee was set up in the community to arrange the distribution of the water to the different plots and to solve possible conflicts. Water is distributed on the basis of strict rules set by the farmers themselves. If the rules are not respected fines are levied. Farmers who have not contributed to digging the canals must give the management committee 20 litres of palm wine, a basket of maize flour and a cock if they want to irrigate their plot.

This innovation is characterised by people coming together because of a certain problem, the simplicity of the means used and a great potential for improving income. There was no outside intervention in building and managing this new irrigation system. Farmers in other parts of the village still seek the innovator's support to be linked to the network. Vitsuh conveyed this request to the Indigenous Soil and Water Conservation (ISWC) programme. As a result, a geometrician joined Vitsuh, helped survey the entire system and helped him improve and extend it.

Mutual inspiration

This case shows that, as isolated as some farmers' innovations may seem at first glance, there may be close and logical connections between them. In Babanki, one innovation triggered a series of innovations. The explosion in nightshade production led to a high demand for cattle manure and a more than two-fold increase in the number of cattle kept in the area. To reduce the cost (in terms of materials and time) of enclosing the animals overnight, some farmers have begun to experiment with live fencing. Under the in contract with the herders, the farmers have to feed the cattle for one month and some have started to plant fodder grasses.

Chain of innovations

Babanki farmers developed a chain of innovations:

- Night-paddock system
- Contracts between farmers and herders
- New harvesting tool
- Irrigation system
- Live fences for paddocks
- Growing fodder grasses

The relationships between the sedentary farmers and the mobile Bororo herders used to be tense, because the cattle sometimes damaged the crops and farmers expanded their fields into grazing areas. The contracts between the Babanki farmers and the Bororo for enclosing the cattle overnight on farmers' fields for a month each year has improved the relationships between the two groups.

It is also interesting to note that the links between innovations also link innovators, and they admire and respect each other. The development and mastery of an innovation by one person stimulates others. As a farmer in Babanki said: "After fertilising a patch of ground, you lose a lot if water cannot reach it". The farmers obviously do not regard these innovations as isolated developments. It is therefore not surprising that Samuel Toh, Phillip Ndong and Christopher Vitsuh support each other actively in developing their innovations. ■

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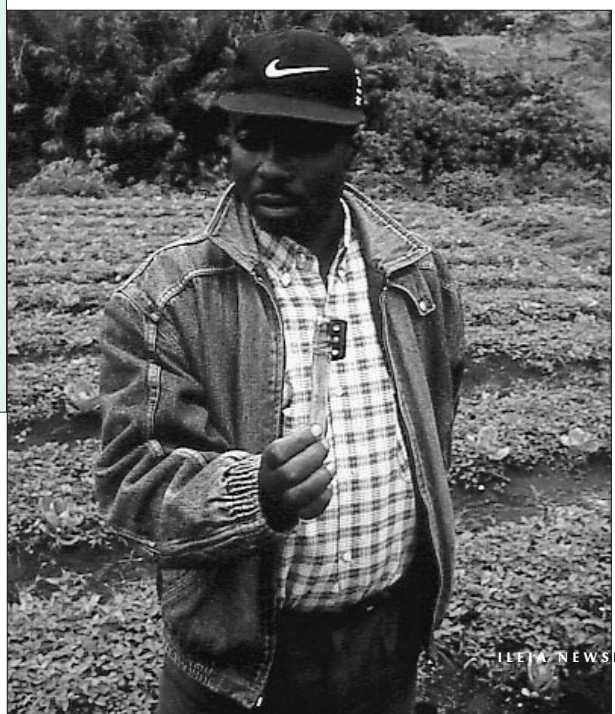

Photo: Chris Reij

Phillip Ndong showing his innovation, a razor-blade knife to cut nightshade leaves quickly and efficiently.

Photo: Ann Waters-Bayer

Upright stones in 'devil's tie': local innovation for riverside terracing.

Devil's tie bedevils water: an Irob innovation

Asfaha Zigta and Ann Waters-Bayer

Irobland lies on the steep mountainous escarpment that descends from the plateau of Eastern Tigray (2500 m) to the Danakil depression (-100 m). In Yohannes' home near Alitena, annual rainfall is 300-400 mm, from mid-June to mid-August. The area is rich in rock. Alitena is situated beside a river that flows year-round and carries soil-laden water from the plateau. In the 1960s, Yohannes started building a stone wall in one of the curves in the river parallel to the riverbank, to divert water and soil into the space behind the wall. He saw this as a way of creating and irrigating land. In this 800 m² river plot he grew fruit trees (mainly orange), vegetables (mainly cabbage) and maize.

When Yohannes first tried to claim land from the river, he made a wall like the wall of a house and used large flat stones piled on top of each other (see illustration). But when the river flooded, the water lifted the stones and washed them away. He tried again, and the same thing happened. Then he thought if the water lifts the stones, I can try to set the stones upright before the water mets them. He chose a rocky outcrop in the steep wall of the riverbank as a starting point for building an upright line of heavy flat stones, one standing against the next with larger and smaller stones alternating with each other. He wedged more upright stones in a second storey above the first line, until a small wall was built. He did this as an experiment, to see what the floodwater would do with the wall. He observed that the water roared over the top of the stones but did not dislodge them; Yohannes had outwitted the river by using the force of its own water to push one stone against the other and, in effect, tie them together through pressure. This type of riverside wall became known locally as *seytan madewa* (devil's tie), named after the complicated tie, very difficult to open, that closes the goatskin bag that contains the precious gifts intended for an Irob bride.

Yohannes' field protected by the devil's tie was close to a major long-distance footpath. Over the years, many farmers passed by and saw what he had done. If Yohannes was in the field when they stopped, they sometimes asked him to explain what he had done. The principles were immediately obvious to most farmers, who were accustomed to working with stone to manage soil and water.

In the 1970s, a church-based project deliberately built on the techniques and innovations of the Irob. Yohannes was given the responsibility of supervising community work in building footpaths, wells and check dams around Alitena. When building a large check dam he noticed that floodwater poured over the top and undercut the dam. He suggested using a devil's tie to prevent this. At the point where the water hit the soil below the dam, large flat stones were pounded in upright, slanting towards the top of the dam. The stones broke the force of the descending water and dispersed it, so that some remained in the field while the rest flowed over the next dam down the valley.

Whenever Yohannes supervised teams of community members working on check-dams, he advised them to build the devil's tie wherever appropriate. Many started using the same technology for their own smaller check dams on the terraced fields near their homes. People in nearby villages also observed this technology and use of the devil's tie not only in riverside walls but also below dams spread throughout Irobland.

The devil's tie is an example of indigenous engineering that could stimulate similar innovations in other parts of Ethiopia. In less mountainous areas, it may be difficult to find a rocky outcrop to support the downstream end of the wall of upright stones and other means, such as a cement block, may have to be used. If creative farmers trying to claim land from rivers in other areas met with Irob experts in building the devil's tie, ideas for appropriate adaptation would doubtless emerge. Development agents could help by bringing such farmers together. Also formally-educated engineers could benefit from studying the technical aspects of this ingenious innovation.

Tragically, two years of war has destroyed much of what Yohannes and his fellow farmers painstakingly built up over decades. After the land mines have been cleared, the Irob will have to summon all their creativity and strength to pick up the pieces and reconstruct. ■

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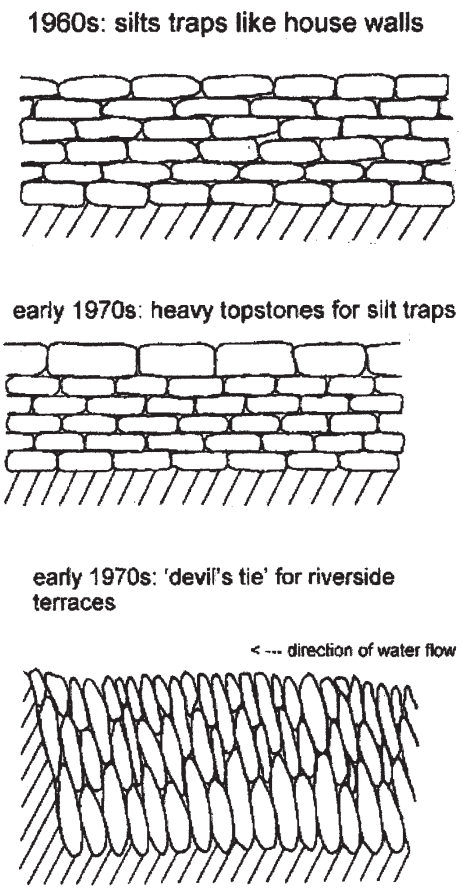

How communities assess local innovators

Yohannes GebreMichael

As part of my doctoral research I studied indigenous soil and water conservation (SWC) practices in Northern Shoa and Southern Wello in Ethiopia. The study covered six rural communities with either high or low levels of government extension support in SWC. A total of 371 household heads (including 10% women) were asked to name at least three local farmers who were innovative in SWC and to explain why they had chosen them. In the survey, an "innovation" was defined as something new, started within the farmer's lifetime - either a completely different way of doing something or a modification of an existing technique.
A farmer innovator is not necessarily a "model" farmer. He or she creates or tries new ideas without these having been recommended by extension.

Top innovation

More than 70% of those interviewed thought that, nowadays, every farmer was an innovator, in the sense of trying out something new. When a farmer innovates, the basic idea may no longer be new to the community, but it is new to that farmer, who experiments with it to adapt it to the specific conditions of his or her farm. Less than 5% of the interviewees could not identify any innovative farmers in their community.
In each community, 5-10 outstanding innovators were named. Most were mentioned by several farmers in the same locality. The interviewees said these farmers were chosen because they had:

- few gullies in their plots
- well arranged and integrated physical and biological SWC techniques
- good-quality SWC work, requiring little maintenance
- safe drainage of excess water so that it did not damage neighbouring plots
- a healthy crop stand.

More innovators were identified in the areas with low compared to high extension inputs. This was probably because the government campaigns introduced standardised SWC techniques and did not encourage adaptation to different conditions.

Characteristics of innovators

Most innovators were elderly (over 50 years). Some middle-aged innovators were ex-soldiers who had been resettled in the area. Their exposure to other parts of Ethiopia possibly gave them ideas to try out in their new surroundings. The level of formal education was not correlated with the degree of innovativeness. Family size was also not decisive. Many innovators were single or had only small families. They did their SWC in a way that did not demand a lot of labour at once. They spread it over several months or years.
The farmer innovators were ranked locally as "rich" (46%), "medium" (33%) and "poor" (21%) on the bases of their livestock and land holdings. Some farmers explained that the rich can innovate more because:

- they have their own draught oxen and can release family labour for SWC work;
- they can use manure from their stock, adding to the positive effect of the SWC work;
- they are usually elders, more experienced in experimentation and better able to assess the potentials and limitations of SWC techniques;
- they have many plots with different agro-ecological conditions, demanding different innovations.

All interviewees agreed on two basic features of innovators: they work hard at farming as a full-time job, and they have an ethic of devotion to the land.
Many of the innovators' plots were located on steep slopes, at run-on sites, in depressions and near big gullies, i.e. at critical sites where physical SWC structures are indispensable. Land security had little influence on the propensity to innovate. At such sites, short-term survival would be impossible without good land care because the seed would be washed away. It was in the farmers' immediate interest to minimise erosion in the current year, no matter whether the land would be theirs in future years.

Innovators and community values

Farmers who had innovated in ways that could harm the community were not socially recognised. For example:

- In one village, the community criticised some young farmers who planted marginal hillside plots with eucalyptus trees. From past experience, the farmers feared that re-afforested land would be re-claimed by the government.
- In another area, a middle-aged farmer had increased his yields by using fertiliser and imported seed but was criticised through the *Edir* (a traditional institution) because other farmers did not want his success story to be used as a reason to force them to buy inputs at high interest rates - a current government policy.

Only about 4% of those interviewed said they did not know of any innovative farmer in their community.

Photo: Martin Moll

It can thus be seen that farmers were assessing local initiatives according to their value to the community. Research and development agents often assess innovations according to the yield increase they bring to individuals. It was obvious from this study, however, that community members have other criteria. ■

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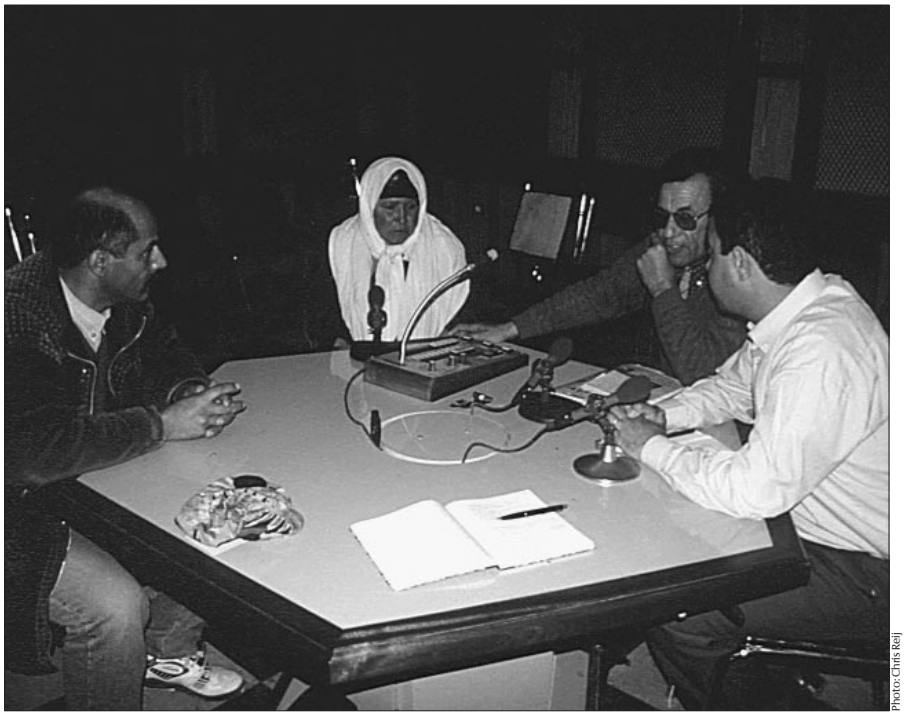

Photo: Chris Reij

Mrs Mbirika in the radio studio.

Local innovation and wider development in Tunisia: Gafsa regional radio

Noureddine Nasr, El Ayech Hdaidi and Ali Ben Ayed

The Indigenous Soil and Water Conservation (ISWC) project in Tunisia is coordinated by a team from the Institut des Régions Arides (Arid Zones Institute), a research organisation working in central and southern Tunisia. Here there are regional radio stations in the cities of Gafsa, Tataouine and Gabès.
The project selected Gafsa for two reasons. First, two-thirds of the innovators identified live in the zones covered by this station and second, the new programme "Agriculture and Innovation" could replace a programme on "Agricultural Extension".

The new 2-hour programme went out on the same day and at the same time as the old one and the presenter of the earlier programme (El Ayech Hdaidi) took over responsibility for the new one, which helped to maintain the link with listeners. A sociologist from the Arid Zones Institute worked with him.

Bringing stakeholders together

When "Agriculture and Innovation" started in March 1999, it was itself an innovation. It was the first time that a radio programme in Tunisia systematically invited farmers to present their knowledge and experience. Usually it was researchers and technical advisors who passed on information and recommendations to farmers. Agricultural extension in Tunisia meant teaching and training farmers, not listening to and learning from them.
The radio programme not only invites farmers to present their innovations. It also involves researchers, training specialists and development agents in debates about the innovations. Sometimes, these stakeholders in development sit together in the studio, but specialists can also call in by phone. This means that innovators do not need to travel long distances to the radio station to share their ideas with others. Several radio programmes were presented in this way from a distance. Sometimes, innovations from different regions were presented in the same broadcast. Innovators and listeners with telephones can take part in the debate from anywhere in the region.
To stimulate the participation of as many listeners as possible, the contents of each programme is announced in the weekly magazine of the National Union of Agriculture and Fisheries. The Arid Zones Institute also makes sure that all regional Departments of Agriculture in central and southern Tunisia know what will be in the next programme and invites staff to take part.
In its first year, 100 farmers (85 men and15 women) presented a wide range of innovations, including economising on water use in cropping, soil fertility management, fruit-tree husbandry (grafting fruit trees on the root system of a shrub which indicates good soil fertility and soil humidity), small livestock rearing, breed improvement, and bee and poultry keeping.

Prizes for good listeners

To encourage the listeners to follow the programme closely and to get some feedback, a system of prizes was introduced. Once every two weeks, a prize of 50 Tunisian dinars (about US$ 45) is awarded to a listener who has responded by mail to a question posed by the presenters. The questions are usually about the innovators and innovations. Sometimes, listeners are invited to report on new innovations. This has proved a good way of identifying additional innovative farmers, both men and women. The prizes are provided by the project and by research and development institutions and local organisations.

Letters to the radio

After each broadcast, the radio station receives 20-30 letters from listeners, mostly from rural areas and especially from women (90%). In the case of the older, usually illiterate women, the letters have been written for them by their school-going children or by younger women in the village. The letters include:

- answers to the presenters' questions about the innovations discussed;
- information from listeners about new innovations, often asking if they can be described on the radio. Innovations

identified in this way include techniques for planting cactus and fig trees, local remedies for diseases of fowl and small livestock, and managing rainfed vineyards to produce table wine;
- requests for more details about specific innovations, because the listeners want to try them out;
- descriptions of how listeners tried out innovations presented on the radio; these include hatching chicken eggs in piles of dry manure, grafting prunes and peaches on the roots of jujubier (*Zizyphus lotus*), planting olive trees on cactus paddles, and drip-irrigation using plastic bottles;
- suggestions of new topics for the radio programme, such as pruning fruit trees, growing early crops under glass, artificial insemination, milk production, and keeping poultry and rabbits;
- congratulations and encouragement to the presenters;
- proposals of field visits or interviews.

Some listeners have suggested starting a parallel TV programme to show the best innovations.

Impact of extension by radio

A survey was made to evaluate the impact of the radio programme. The mail received was analysed for content. The men and women who had presented their innovations on the radio were visited to find out whether they had continued to develop their innovations and whether other farmers or extension agents had visited them. The listeners who had received prizes were visited. Farmers in villages along the Gabès-Gafsa and Gafsa-Maknassy-Mazouna roads were interviewed at random in places where farmers frequently meet, such as shops, reforestation sites and local extension-service offices. The programme had four major types of impact.

Provided incentives for innovators to continue innovating

For most of the men and women farmers who had presented their innovations on the regional radio, the experience had been an important social incentive. After the broadcast, several innovators continued to develop their innovations or started to develop new ones. For example:
- Mr Béchir Nasri, an innovator in Médénine Region (Nasr et al. 1999), invented a new system for pumping water from cisterns and a new technique for conserving wax honeycombs in beehives; he is now working on a technique to filter sediment from runoff water in order to avoid deposition in cisterns;
- Mr Khlifa Dadi, an innovator in Mareth Region (Chahbani & Nasr 1999), developed new irrigation techniques which economise on the use of water. These are adaptations of an innovation he saw during a visit to another innovator featured on the radio;
- Mrs Mbirika Chokri and Mrs Naziha El-Fahem (Chahbani & Nasr 1999) have increased their production efforts since they were on the radio. Mrs Naziha produces chicks and supplies them to about 10 other women who want to raise poultry using a micro-credit scheme developed by a project in Mazouna as a result of her radio presentation.

Encouraged visits to innovators

Since speaking on the radio, most innovators have been visited by other farmers and agricultural technicians. During his presentation, one innovator who distils cosmetic plants made an appeal to other farmers to grow these plants on a contract basis. A few days later, he was visited by a group of farmers. This visit was organised by the Presidential Pilot Project on Agricultural Extension based in Gafsa, which records all broadcasts of "Agriculture and Innovation" for use in their extension workshops. A few months later, when the farmer was interviewed on radio again, he mentioned that he had already signed production contracts with 20 farmers. Four innovators (including one woman) were visited by the Director of the Gafsa Regional Department of Agriculture. These visits were incentives to both the innovators and the extension agents, and indicate that new relationships are developing between farmers, development workers, research scientists and policymakers.

Adoption and adaptation by listeners

Analysis of the survey results and of the letters to the radio station showed that several listeners had adopted and, in many cases, adapted the innovations presented on the radio. For example, more than 50 men and women farmers were trying out the bottle-method of drip irrigation, and 5 women were hatching eggs in manure.

Changed attitudes

The radio broadcasts have also started to influence the attitudes of researchers and development agents. When the ISWC programme started in Tunisia in August 1997, the approach of seeking out local innovations as stimuli for rural development was strongly criticised and some research and extension staff even ridiculed it. After the first innovators had been identified and particularly since the radio programme started, it is evident that there is growing positive interest in this new approach.

Mass media and innovation

Listeners request that the regional radio programme be continued and extended to other regional stations and to national radio. This can be done only when development agencies and, in particular, farmers' organisations accept responsibility for and "ownership" of these radio programmes by making contact between local innovators and the radio station, encouraging farmers to listen to the programme, and so on. It is important that other mass media (the press and TV) also be used systematically to convey the message that men and women farmers are taking initiatives in developing useful technologies and improving their livelihoods. ■

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Photo: Chris Reij

Mrs Mbirika incubates chicken eggs in cattle dung

Innovation by Tunisian women in dryland farming

Noureddine Nasr, Bellachheb Chahbani and Ali Ben Ayed

At the beginning of the Indigenous Soil and Water Conservation (ISWC) project, training was given in Participatory Rural Appraisal and Participatory Technology Development (PRA/PTD) in different regions to facilitate identification of farmer innovators, men and women. One-day workshops were also held at the Ministry of Agriculture's regional department headquarters. Some 160 staff members took part. After these workshops, most of the innovators identified were men.

Identifying women innovators

In the local culture, it is difficult and often unacceptable for men to talk with village women. The ISWC team at the Arid Zones Institute consisted of men, so 15 women were recruited and trained to make a special study. These included teachers and students returning to their villages for the summer holidays. They collected data on women's role in farming and food processing and identified 31 women innovators. Most were found in Gafsa and Sidi Bouzid regions, where population density is highest and agriculture diverse and intensive.

The 31 women were all married and between 23 to 84 years old. Most were in their 30s and 40s and had little formal education. Most came from mountainous areas where, until recently, there were few opportunities – especially for girls – to go to school. Over 70% (all those over 40) were illiterate. However, with the recent spread of electricity and education in rural areas, the women have more contact with a new culture through radio, TV and their school-going children.

Spheres of women's innovation

The women innovate in activities that concern them directly. The main economic activity of all but one of the 31 women was farming, especially livestock keeping. Most also practise handicrafts. Women were innovating in animal husbandry (11 women), cropping (7), handicrafts (6), use of medicinal plants (3), efficient use of energy for charcoal making and improved stoves (2) and processing sheep and goat milk (2).

Handicrafts include making carpets and other products out of wool and weaving mats and other household items from alfa grass. Natural dyes are extracted from leaves, roots and bark. The oldest innovations – in handicrafts and medicines – are rooted in local knowledge but adapted (in design, materials, use) to the new socio-economic context.

The crop-related innovations include fig-pollination techniques and using plastic bottles for irrigation. Mrs Rgaya Zammouri in Médenine region, over 70 years old, uses 1.5 litre bottles to irrigate watermelons and melons. She buries each bottle upside-down in the soil. The cork has tiny holes in it made with a needle and the water infiltrates slowly near the roots of the plant. She fills the bottles from a cistern fed by run-off rainwater.

Hatching eggs without a chicken

Eleven women (35%) innovated in livestock keeping, specifically with sheep and goat feeding, and poultry, rabbit and bee keeping. For example, Mrs Mbirika Chokri, a 70-year-old farmer in Gafsa region, specialises in poultry and incubates chicken eggs in dry cattle dung. She puts the eggs with some straw in plastic bags to preserve humidity. Each bag has 16-20 eggs. She puts the bags in small holes dug in the manure and covers them with cardboard and a thin layer of manure. Each day she opens the bags to check the temperature of the eggs and to turn and aerate them. From day 20, the eggs start to hatch. She puts the chicks into a box to protect them from the cold and feeds them couscous, vegetables and bread. The idea came 5 years ago when one of her chickens, with eggs about to hatch, suddenly died. She put the eggs into a dung pile and they hatched after a few days. She decided to repeat this technique till she mastered it. She did not share her idea with neighbours, but accepted the ISWC team's request to present it in the "Agriculture and Innovation" programme on Gafsa regional radio and later on television. It aroused widespread interest among other farmers.

Potential for spread

Livelihood systems in central and southern Tunisia have changed radically in recent years. New production systems have replaced the traditional pastoralism and links between the countryside and urban markets are much closer. Rural women need more cash to satisfy new needs. Women innovate both to increase their income and to reduce their workload. For example, economising on water for irrigation reduces the time and energy needed to fetch water. Several women stated that their innovations came from their own idea or a chance discovery. Often, their innovations are practical and low-cost, and have good potential for spreading.

More Tunisian researchers, development agents and policymakers at regional and national level are coming to recognise women's innovation. In 1999, researchers and several women innovators began collaborating on experiments. The challenge is to improve and expand this approach in Tunisia and beyond. ■

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Three models of extension by farmer innovators in Burkina Faso

Aly Ouedraogo and Hamado Sawadogo

Farmers in the Sahel zone of Burkina Faso have developed a method of rehabilitating degraded land. It is an improvement on the traditional planting pits known as *"zaï"*. On barren land, the farmers hack holes into the hard soil surface, fill the holes with organic matter and sow a few seeds of grain. A specific type of termite may be transferred to the pits, to speed up the decomposition of organic matter. Sometimes a tree seedling is planted or a tree seed is directly sown in the middle of the cereal plants. When the grain is harvested, the stalks are cut off at a height of about 1 m and this protects the tree seedlings from grazing animals. Over the years, this locally-improved traditional technique has led to the establishment of well-wooded farmland (Photo 1).
Many farmers have experimented with variations on the *zaï* theme, trying out different techniques to improve soil fertility and trying out various crop varieties and woody species to take advantage of the better conditions. A few farmers have taken the initiative to promote the spread of *zaï* and its various improvements. Here, three "extension models" developed by farmer innovators are described. These models are, in themselves, local innovations.

"Market-day" model

In the village of Gourga, 4 km west of Ouahigouya, the capital of Yatenga Region, Yacouba Sawadogo uses a "market-day" model to promote the spread of the *zaï*. He started improving the traditional planting pits around 1980. The *zaï* have since become recognised - also by scientists - as the most cost- and time-efficient technique in the Sahel for rehabilitating strongly degraded land.

Since 1984 Yacouba has been organising market days to share his experiences with *zaï*. These started as small events, but now each market day involves representatives from more than 100 villages. The events are organised twice a year. The first market day is held shortly after the harvest, and the farmers bring samples of the crop varieties (millet, sorghum, cowpea and maize) they have cultivated in their *zaï*. Yacouba stores this seed on his farm. The second market day is organised just before the rainy season. Farmers can then select the species and varieties they would like to plant in their *zaï*, taking into account the improved growing conditions.

Each market day has a specific theme. For instance, during the last market day, the accent was on growing sesame. An earlier theme was the use of *zaï* for growing trees through a system of direct seeding. At each market day, there is also a display of the local tools used to dig the *zaï*. This allows farmers from outside the region to see for themselves which tools can be used and to find out where they can buy them.

Yacouba receives many visitors. This costs him a substantial amount of time. The solution he has found to this problem is to request something from each visitor. People who come from abroad are asked to plant a tree, and groups of farmers from elsewhere in Burkina Faso or West Africa are requested to dig some *zaï* on his land. This works out as a sort of on-the-job training. The main problem, and one that has yet to be solved, is that Yacouba does not have very good seed storage facilities.

"*Zaï*-school" model

In the village of Somyanga, Ousseni Zoromé initiated the "*zaï*-school" model. In 1992 he started training some local farmers in how to make a good *zaï*. He chose the poorest possible site, immediately next to a major road between Ouahigouya and Ouagadougou, the capital city. The farmers managed to achieve a millet harvest of 400 kg per hectare on this very poor land. Anyone travelling along the main road saw this immediately, because it was a year of extreme drought and many crops had failed. The Minister of Agriculture also saw the plot and called in a team from national television to film it. Ousseni Zoromé, who had received no external support except some fuel for his old motor cycle from the regional department of agriculture, began to create new groups, which he calls "*zaï* schools". Each group has to collectively rehabilitate a piece of degraded land. In this way, all participants are trained on-the-job. There are currently 21 *zaï* schools with a total of more than 1000 members, and their numbers are increasingly rapidly.
The *zaï* schools are now organised into a regional union and Ousseni is seeking external support to expand and improve them. Each group has to pay a contribution of 5000 FCFA (US$8) to become a member of the union.

"Teacher-student" model

In the village of Gourcy, Ali Ouedraogo, a very experienced farmer innovator, has invested heavily in improved traditional

Yacouba Sawadogo has used the zaï to directly seed the trees and shrubs he wants on his fields.

Photo: Chris Reij

planting pits (*zai*) in combination with compost production, tree planting and the protection of naturally-regenerating trees and shrubs. He is training individual farmers in five villages around Gourcy and visits them regularly, showing them how things should be done, giving them advice and exchanging ideas with them. His "students", in turn, train other farmers in improved *zaï* techniques.
Some of the students do not simply adopt what Ali suggests, they go on to adapt and experiment with his original ideas. For example, one farmer felt that the *zaï's* Ali made were extremely large and required a great deal of work and physical strength to develop. Not everyone was able to this. The farmer therefore started to modify the layout and dimensions of the *zaï* to suit his capacities.

Voluntary extension

One interesting fact is that these farmer-led extension models were all developed on the initiative of the farmer innovators mentioned above. These farmers receive no remuneration for their time. At the most, they receive some limited external support for travel from local NGOs and individuals. Yacouba, for example, received a small, new motorcycle through his "Association for the Promotion of *Zaï*" (consisting entirely of farmers) so he could reach more villages. These farmers have no links with the government extension service, with the exception of Ousseni Zoromé's regional union that did receive some organisational suppport.

Moving towards wealth

The farmers in Yatenga Region and also in other parts of the densely populated Central Plateau of Burkina Faso are becoming increasingly interested in *zaï.* Under such dry conditions, this is not surprising. The pits collect and concentrate runoff water, and they allow farmers to use small quantities of manure and compost very efficiently.
All three of the above-mentioned farmers have many more trees on their fields than they had 20 years ago. Yacouba Sawadogo has used the *zaï* to directly seed the trees and shrubs he wants on his fields. In this way, he has created a forest of 12 ha with a considerable diversity of woody species. Since he can now feed his entire family even in drought years, Yacouba has shifted the accent from growing cereals to growing trees. When Ousseni Zoromé started to reclaim a large expanse of barren land in1983, there were only 9 trees remaining in these fields, now there are at least 2000. Ali Ouedraogo grows trees mainly alongside the stone bunds on the contours and in this way he has created windbreaks in his fields.
The use of *zaï* allows farmers to expand their resource base and to increase household food security. These three farmer innovators developed their own extension models because they are keen to share their experience with other farmers who, in turn, are keen to learn. ■

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Farmers started to modify the layout and dimensions of the zaï to suit their conditions

Photo: Chris Reij

Pelum Association

→ GROUND UP

PELUM is a network of civil society organisations operating in East and Southern Africa. Pelum members work to facilitate learning, networking and advocacy in sustainable agriculture, natural resource management and household food security in order to secure community development amongst small holder families in the region. Members learn through linking their experiences of alternative approaches to agriculture and participatory development.

PELUM'S key startegies are information sifting and distribution, networking, short- and long-term training , off-farm seed saving and advocacy. It runs workshops, trains community development workers, identifies and distributes good books and articles and facilitates networking within the Association itself and among like-minded organisations.
PELUM has just begun producing a quarterly magazine **GROUND UP**. The latest edition is entitled **MAKING A DIFFERENCE WITH INNOVATIONS** and focuses on the theme of "sharing innovations". As the editorial reminds readers farmers have been innovating since time immemorial and today they are no less innovative than in the past. They contribute to innovations both as the sole creators of a final innovation and as contributors (often undervalued and unacknowledge) to improved innovations of researchers and inventors. Farmers are often the source of the (raw) information - derived from their indigenous knowledge and experiences - used by "outside" researchers, engineers and inventors in the process of developing "new" technologies. PELUM argues for a strengthening of partnerships between farmers and researchers making sure that farmers' contributions are openly acknowledged.

GROUND UP can be ordered from: The PELUM Associatin, Box MP 1059 Mt Pleasant, Harare, Zimbabwe. Subscriptions cost US$20 per year.

Bringing Farmer Innovation to policy levels

Photo: Will Critchley

Lobbying for policy support to local innovation

Mitiku Haile

In 1996, the "Sasakawa Global 2000" campaign was launched in Tigray. This offered farmers a package of external inputs on credit and has focused on the better-watered areas. More and more farmers are being drawn into this scheme. Some farmers observed yield increases, especially in the initial years when rainfall was favourable.

Many farmers, however, are withdrawing from the scheme. They found that inputs were too expensive given uncertain rainfall and yields, and the lack of transport and marketing facilities. Some farmers question the suitability of chemical fertilisers for their conditions and want to use manure and other organic resources to enhance soil fertility. In pest management, many farmers find that Global 2000 methods ignore their indigenous techniques. The development agents (DAs) working directly with these farmers and Mekelle University, which offers development-oriented training began to recognise that farmers want extension to consider their own knowledge and creativity in land husbandry. It was evident that the approach to extension needed to be re-considered.

Research disregards potential partners

Agricultural researchers in Ethiopia usually set their own agenda on the basis of their own assumptions. With the recent decentralisation of research, the scientists were supposed to focus on alleviating the constraints to agriculture in their particular region and to solve local problems. However, no consideration was given to the fact that farmers might want to take part in the search for local solutions. Farmers have, of course, been experimenting on ways to manage soil, water, plants and animals for centuries, long before formal research began. They have developed an intimate knowledge of their environment and found new and better ways to manage local resources. Any research on agricultural intensification needs to consider this local knowledge and innovation.

Biased agricultural training

Agricultural education in Ethiopia, with few exceptions, has paid little attention to local knowledge. Course content and structure have been based on western concepts and large-scale commercial systems of production. The Ethiopian agrarian system is, however, highly fragmented and dominated by smallholders who are orientated mainly to subsistence. Education and training need to be transformed to reflect this reality and raise admiration for the farmers' abilities to produce under adverse conditions.

ISWC-Ethiopia recognised the need for policy change so that local knowledge and innovation would become the basis for formulating agricultural extension, research and training programmes. Therefore, besides identifying farmer innovation, extending promising local innovations and promoting participatory research to validate and develop them further, ISWC-Ethiopia tried to influence relevant policies.

Several targets

Different activities in lobbying for policy change were targeted at various levels of decision-making in several institutions:

- ***Baito*** (local council) The *baito* is the lowest level of government and together with the community it determines land use and management. ISWC-Ethiopia works closely with the Tigray BoA in organising village-level workshops, in which *baito* members become aware of the importance of farmer innovation.

- **Extension agents, specialists and supervisors** Through training sessions, field-level seminars and dialogue, extension staff in various positions are shown the processes and dynamics of local innovation. They are led to recognise innovations in their extension areas and the contribution of innovators to improving land husbandry. They are encouraged to integrate innovators into their extension work.

- **Research scientists and policy-makers** Researchers from Mekelle University, Mekelle Research Centre and the Ethiopian Agricultural Research Organisation and policy makers from BoA and the Ministries of Agriculture (MoA) and Education (MoE) are exposed to local innovation in land husbandry. They are drawn into discussing their policies on research and education.

- **The media** Representatives from the mass media are approached to spread information about innovative farmers and about promising innovations to a wider audience.

Strategies to invite policy dialogue

The major strategy is to arouse curiosity and enthusiasm among DAs, researchers and policy makers about local innovation.

DAs in particular have been quick to recognise innovators and invite them to be partners in extension. Researchers are challenged by DAs and farmer innovators to look more closely at certain innovations and, together with farmers, to work on them further. Policy makers are stimulated to recognise the importance of local knowledge and innovation in strengthening the extension system and in guiding research to help farmers improve what they already know.

ISWC-Ethiopia decided to pursue Participatory Technology Development (PTD) by introducing the concepts and spirit gradually on a wide front. Progress is slower than would be possible by focusing on a pilot area, but we will not face the problems of trying to scale up from a few isolated experiments. We do not impose PTD. Instead, researchers are challenged to open dialogue at every possible opportunity. We emphasise forging a functional link between researchers, DAs, *baitos* and innovators.

This emphasis has guided the choice of members in the ISWC-Ethiopia Steering Committee, which discusses and approves the annual project plans. Influential and committed persons were chosen who could foster partnership between stakeholders. The members include the Head of the BoA and individuals from research institutes and NGOs who have long experience in land husbandry research and development.

Examples of lobbying activities

Various types of activities were designed to influence policy either directly or indirectly. For example:

- **Network shops** bringing together researchers, DAs, policy makers and innovators have been organised at Regional, Zonal and District levels, and a national workshop is being planned; field trips to innovators are included;
- **Media coverage** the TV, radio and press are invited to make the achievements and aspirations of innovators more widely known; recently, journalists have, on their own initiative, visited innovators and interviewed them in their villages and at village-level workshops, as well as at fairs and conferences, such as the Anglophone Africa workshop on farmer innovation held in Mekelle earlier this year;
- **Newsletters** dealing with farmer innovation and written in the local Tigrigna language are produced twice a year for the farming communities, *baitos* and DAs;
- **Research reports, proceedings and journal articles** are written and distributed to researchers, BoA and MoA staff and policy makers;
- **Personal visits** are made to Government Ministries, Embassy officials and NGO heads to brief them about project approaches and activities;
- **Travelling seminars** bring farmer innovators, DAs and researchers to the sites of innovation and give innovators a chance to interact with village-level policy makers.

Some signs of change

Thus far, three years after the programme started in Tigray, we see signs that local innovation in land husbandry is being recognised and promoted.

Integration into BoA activities. Village-level seminars, during which villagers assess local innovations, are now being organised as part of BoA extension activities. Views of innovators are taken into account during land-use planning at village level. The BoA now organises awards not only for Global 2000 farmers but for local innovators (often, farmers who do not accept Global 2000). Innovators are involved in regional field days to show what they have achieved on their land and so gain recognition by researchers, DAs and policy makers. This encourages the innovators, creates opportunities for them to disseminate their innovations and stimulates discussions between different actors in agricultural development.

Increased openness in extension. Extension approaches and packages are becoming more open to local knowledge. DAs are recognising - and some are even documenting - farmers' informal experimentation in land husbandry. Concerns raised by farmer innovators are no longer hushed-up but brought to higher levels by DAs and the innovators themselves e.g at conferences. In the past, only farmers involved in the Global 2000 scheme were invited to regional farmers' conferences; now farmer innovators are invited too.

Official support to local initiatives. The BoA supports local initiatives, such as the activities started by communities to divide up rights to sloping land among community members. *Baitos* have responded to innovators' concerns about their rights to use improved land (see Box).

Change in attitude of researchers. Some researchers recognise that farmers do experiment and can be partners in research. A few are exploring farmers' innovations further in technical terms and are arranging PTD experiment with farmers. However, this aspect moves very slowly.

Incorporation into university teaching. A module on PTD has been incorporated into the "Research Methods" course given to all students of agriculture at Mekelle University. Several national and international MSc and PhD students are making field studies on farmer innovation and experimentation. Students doing their compulsory 5-month practical attachment are increasingly interested in documenting indigenous knowledge. In-service students from the BoA, NGOs and development projects are keen to continue examining local innovation when they return to their posts. Some of them even use their own resources (time, energy and material) to document innovations.

Local innovation for food security. Particularly in the drier areas of Tigray, farmers and DAs are criticising Global 2000 technology and find it unsuitable. DAs in southern Tigray actually challenge the targets being set for bringing farmers into the scheme. Now the Integrated Food Security Desk is exploring the potential of farmer innovation in identifying appropriate technologies for the 16 most drought-prone districts of Tigray.

What next?

The various activities have been documented and a database of farmers' innovations has been established. However, it is still necessary that the documented observation be critically analysed in the field. This will help identify successful innovations that can already be disseminated and promising innovations that could be improved. It will be especially important that more researchers are attracted to support experimenting farmers in assessing and further developing their own innovations. It is our challenge now to maintain the dynamism of the process and to move into PTD on a broad basis. ■

Mitiku Haile, President, Mekelle University, PO Box 231, Mekelle, Tigray, Ethiopia (mekelle.university@telecom.net.et)

How we influenced policy: testimony of a woman innovator

During our travelling seminar, we visited a fellow farmer in Southern Tigray in Raya Valley, where there was a very big and wide gully. It was not considered useful land during land allocation. A farmer had worked on the gully and made it productive, but when he started to grow crops there, the *baito* took the land over, saying he had enough land and that this reclaimed gully should be distributed to others. We saw this problem during the seminar and discussed it. The *baito* in Raya Valley reviewed the mistake it had made and gave the land back to the farmer. This is how we influenced policy.

Ms Leteyesus Gobena, ISWC Anglophone Workshop on Farmer Innovation in Africa, February 2000, Mekelle, Ethiopia

Promoting Farmer Innovation

Will Critchley and Verity Nyagah

The objective of the "Promoting Farmer Innovation" (PFI) programme is to help formulate a radically new research methodology, while demonstrating the developmental benefits of improved land husbandry in dry areas. The programme began in 1997 in Kenya (Mwingi District), Tanzania (Dodoma Region) and Uganda (Soroti, Kumi and Katakwi Districts).

PFI has been working to establish partnerships of governmental and non-governmental agencies that will focus on farmer innovation. The programme is managed by the UNSO-UNDP Office to Combat Desertification and Drought and is linked to the Governments' National Action Programmes (NAPs), which have been developed under their commitment to the Convention to Combat Desertification (CCD) (see *LEISA Newsletter* 16.1 pp 6-7). PFI has turned out to be a classic case of learning by doing and consists of tailored training accompanied by fieldwork. A "10 steps" framework (Figure 1) was drawn up to guide field activities.

First lessons

On-the-ground identification of farmer innovators (FIs) by extension workers was surprisingly quick and easy. Forming clusters of FIs has proved a good way of organising interaction between innovators and providing a focal point for activities. There is a growing awareness, however, of the potential problem of creating exclusive clubs of "favoured" farmers. PFI is not primarily a programme to help innovators themselves; it's about stimulating innovators to share ideas with their fellow farmers.

Another lesson from the field is that many innovations are already good enough, and attractive enough, to be spread. Other farmers quickly take up these "best-bet" innovations. Thus, joint experimentation by farmers and researchers and adding value to innovations is not necessary in all cases. After all, farmers are the best judges of what is useful to them. If they find an original innovation interesting they will accept or modify it further themselves. Under PFI, certain innovations have spread rapidly (types of compost making; deep-pitting systems for planting sugar cane and cassava, etc) and have outstripped the programme's capacity to technically validate these techniques.

Documentation

A regional review workshop held in Dodoma, Tanzania, early last year in Dodoma, brought together policy makers, extensionists, researchers and innovators from all three countries. The issues debated and experiences analysed were captured in a book that has proved a remarkably useful awareness-raising tool and reference document on innovation. A professional video on the programme is serving the dual purpose of being a "virtual field visit" and raising awareness at all levels. English and French versions are currently in use; a Swahili version is being prepared.

Challenges ahead

There are immediate, and longer term, challenges for PFI:

- More attention should be given to *monitoring and evaluation* (M&E) at innovation level, and to develop such systems with farmers. M&E systems that both farmers and technical staff are comfortable with and that simultaneously yield user-friendly and functional data are not easy to design.
- The second main challenge is to bring *research agencies* more fully into the picture, to complete the farmer-extensionist-researcher triangle, and to strengthen the processes of innovation validation and joint experimentation.
- The third challenge, *impact assessment*, relies very much on the previous two. The impact of the programme must be assessed in the light of cost effectiveness.
- The fourth outstanding issue is how to *involve more women* (and youngsters) in the programme. Initially, there was a strong focus on male farmers. After a sequence of gender studies and sensitisation workshops, more innovations by women farmers were identified.
- Another set of challenges relate to investigating issues such as: ***What stimulates "innovativeness"*** the best? and ***How can we enhance this process?*** These are central to any innovator programme.

Institutionalisation

The ultimate challenge is institutionalisation, both through vertical integration into Government (and NGO) policy and by horizontal integration through partnerships on the ground. Institutionalisation is, encouragingly, well underway. For example in Kenya, PFI now has a formal alliance with FAO's Farmer Field Schools (FFS) programme, entitled "PFI-FFS". In Uganda, the FI methodology has been made explicit in the government's budget policy statement. In Tanzania, Dodoma's Regional Commissioner has given farmer innovators a key role to assist Government extension agents as resource persons. Institutionalisation, however, must be achieved in a non-threatening way: not by hard selling, but by gentle persuasion based on achievement and credibility.

Harnessing and supporting farmer innovation is no panacea, but few can dispute its place in building a better and more productive rural environment. ■

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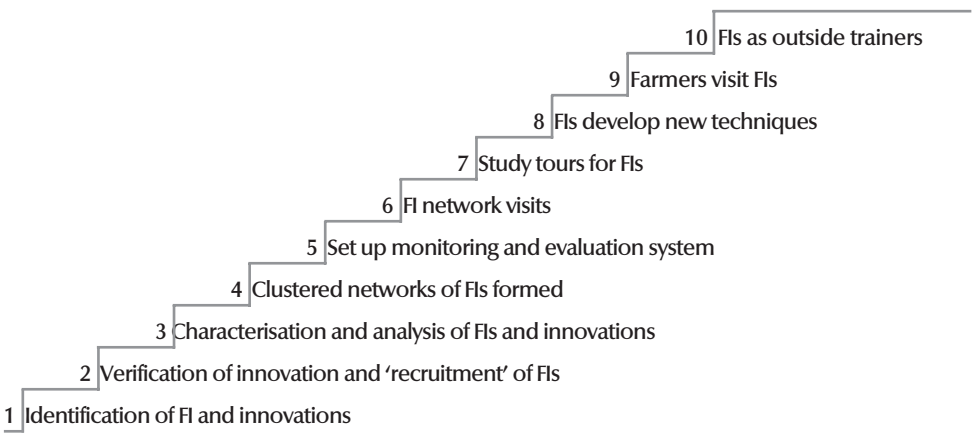
- **Promoting Farmers Innovation** (video 26 min. in English Swahili and French, USA$15, inc postage) RELMA, PO Box 63403, Nairobi, Kenya; Fax: +254 2520762; Email: relma@cgiar.org ; Internet: www.relma.org
Book and video available from Lia de Groot, Resource Development Unit, CDCS-ICC, Vrije Universiteit Amsterdam, de Boelelaan 1115, 1081 HV Amsterdam

Figure 1 Ten Steps in the PFI Methodology



Towards a social movement of farmer innovation: *Campesino a Campesino*

Henri Hocdé, Jorge I. Vasquez, Eric Holt, Ann R. Braun

The "*Campesino a Campesino*" (CaC) or Farmer-to-Farmer programme was founded in Nicaragua in 1987 by the National Farmers and Cattle Ranchers Union (UNAG). It started with exchange visits between farmers from Nicaragua and Mexico in order to promote and diffuse appropriate technologies among poor farmers. The programme was a reaction to the top-down transfer-of-technology model that prevailed in Nicaragua during the 1980s promoting expensive technology packages involving improved varieties, irrigation, imported chemical fertilisers, pesticides and agricultural machinery. The programme sought to improve soil fertility, productivity and living standards, while reducing production costs and external dependency. The method has taken root throughout Central America and is applied by many NGOs and in some R&D projects. Over 10,000 farmers identify in one way or another with CaC and thousands more have been influenced by it (Holt-Giménez 2000), as they believe that farmers are capable of developing their own sustainable agriculture.

Farmer promoters

The key elements in the CaC approach are the "farmer promoters" and the mechanisms of communication used (Hocdé *in press)*. Farmer promoters are volunteers who conduct experiments in their own fields and share their knowledge and experience with others. Each takes responsibility for guiding a group of experimenting farmers from his/her community and visiting them regularly to help with planning, implementing and interpreting their experiments. They also organise exchanges between farmers and give training on topics determined by their own accumulated experience and concrete results that range from soil conservation, cover crops, husbandry, forestry and organic agriculture to cropping systems and diversification. Farmers themselves define the research agenda, manage the experiments and assess the results, either individually or in groups. Generally, they do not apply formal scientific methods such as the use of control plots or replications. Today, there are 700 farmer promoters working throughout Nicaragua in a wide range of agro-ecological and socioeconomic contexts.

Experimentation and communication

The farmer promoters' basic functions are to find technical solutions to problems in smallholder agriculture and to communicate them to neighbouring farmers who are also seeking solutions. In order to have credibility as communicators, promoters need to have tested recommendations on their own land. The two functions and processes -experimentation and communication- are therefore interdependent. Promoters do not recommend technical recipes or packages, but rather give suggestions and ideas to stimulate experimentation by others. A promoter's main tool for convincing others is through mentoring and setting an example rather than through the organisation of workshops or training events *per se*. The goal of CaC is to promote a culture of enquiry and experimentation among smallholder farmers.

Enhancing sharing and dissemination

Sharing and disseminating knowledge horizontally is a central responsibility of each promoter. Each communicates intensively with other farmers as well as with other promoters using traditional communication media such as sociodrama, theatre, poetry and music. A diversity of mechanisms such as fora and exchange visits are used and a wide variety of Participatory Rural Appraisal tools are used.

Exchanges are visits organised by promoters involving farmers, promoters and communities. They may involve small or large groups and may last between one and several days. In this way, farmer experiments are exposed to the critical eye of a variety of people, each with his or her own perspective. These are intensive training and learning opportunities and their pedagogical content can be considerable. During exchanges, participants explain and discuss results, methods and procedures, often amid criticism, argument and debate. Each participant analyses the strengths and weaknesses of his or her ideas and results before the group. The atmosphere of mutual reinforcement and encouragement permeates these events and helps motivate farmers to continue experimenting. Learning from mistakes is encouraged, as is the idea that each person follows his/her own problem-solving path. The art of facilitating these situations consists not only of creating a constructive and productive atmosphere, but in helping to bring out these ideas and synthesise them in such a way that the design of new experiments is oriented and guided . This requires that promoters be highly skilled in facilitation techniques.

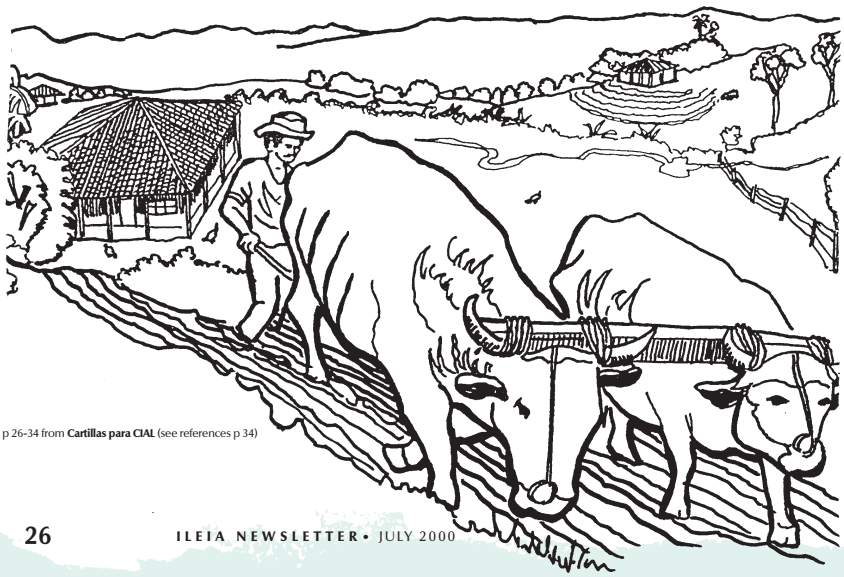
Radical changes

The CaC process can result in a radical change in the mental map farmers' have of their role in the process of technology generation and diffusion. Through involvement in the programme, farmers realise that they are capable of experimenting, offering solutions, communicating and transmitting technological options to others (Merlet 1995).

The CaC process builds enthusiasm, self-confidence, pride and hope for the future (*Programa de Campesino a Campesino* 1999). Motivation grows as creative capacities are tapped, and the attitude of dependency on external actors diminishes as farmers begin to identify themselves as experimenters. The most radical of the farmers involved in the programme view it as a way of breaking the monopoly of technology-development process held by agricultural professionals.

Technological lessons

The following lessons were derived. Farmers' research themes tend to concentrate on agronomic, animal husbandry and technical issues, not on socioeconomic aspects. In some cases, the advent of a



Drawings p 26-34 from **Cartillas para CIAL** (see references p 34)

We still have much to learn!

While more than 10,000 farmers and dozens of NGOs are part of the *Campesino a Campesino Movement*, hundreds of thousands more are not. The question is if CaC works so well, why hasn't it spread more? A recent, region-wide, participatory study (Holt, 1999), involving 40 institutions and 2,000 agroecological and conventional farmers, concluded that the obstacles for scaling up agroecology or 'sustainable agriculture' have less to do with technologies and methodologies than with national policy contexts and institutional behavior. But to further "scale out" sustainable agriculture, it also needs to be "scaled up" into existing agricultural policy frameworks. Some important constraints for up-scaling are:

- There has been little documentation and *systematization* done in a way that actually provides feedback to practicing technical advisors, promoters and farmers. This limits institutional learning, resulting in many projects "re-inventing the wheel". Furthermore, lateral learning by government and private sector institutions is generally poor and inconsistent, resulting in little headway for CaC outside of the informal social networks connecting remote villages and the NGO world.
- Not only is most formal agricultural research largely out of touch with sustainable agriculture and the farmers who actually practice it, comparatively few professionals are being trained in agroecology or in working with small farmers. This limits their ability to address agroecological problems, design effective on-farm agroecological experiments and accompany farmer innovation.
- Many NGOs adopted CaC participatory methodologies. However, this has not always led to greater farmer input or control over the program itself neither has farmer-led development necessarily become a guiding approach for NGOs. NGOs are still primarily accountable to donors, and few of them have direct mechanisms for accountability to farmers. The combination of "participation" and one-way accountability prevents clear strategies for farmer organization and empowerment.
- Despite its important program presence in one of the largest farmer's union in Central America, CaC has not been very successful in scaling-up its agenda within national and regional farmer organizations. Basically, promoters from CaC have been unable to penetrate decision-making circles dominated by medium and large-scale producers interested primarily in conventional agriculture. CaC remains a "special project" directed at smallholder clients, not a policy-setter or decision-locus for organizational policy.
- There are many policy mechanisms that could be brought in to improve conditions for sustainable agriculture and farmer-led development. However, the lack of effective political will on the part of governments and research centers makes this a remote possibility. Developing this political will depends largely on pressure from civil society. Unfortunately, the trans-institutional nature of CaC has not lent itself to forms of organization that could exert pressure on governments or research centers. NGOs are organized to implement projects not pressure governments. Farmer organizations can and do put pressure on governments, but not for policies that favour sustainable agriculture over, or even as much as, conventional agriculture.

Perhaps the most pressing lesson is simply that agriculture in general will change not only when farmers change, but when farmers and their allies are capable of changing the institutions that hold change back. We still have much to learn about just how to do that.

Adapted from: Holt-Giménez E. **Scaling-up sustainable agriculture: lessons from the Campesino a Campesino Movement in Meso-America.** Paper for workshop on "Going to scale" 10-14 April 2000, IIRR, Silang, Cavite, The Philippines.
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solution generated by promoters leads to excessive promotion of the technology over an ongoing search for solutions to other limiting factors. The strong emphasis on low-external-input techniques can be a barrier that dissuades some farmers from participating in the CaC movement, thus impeding its growth. More systematic agroecological learning and information on experiences from outside the farmer community, e.g. innovations developed by farmers operating in similar conditions or from scientific research, could provide new options for experimentation.

Methodological lessons

Farmers' concepts of the experimental process are different from those of formal researchers. For example, farmers may not limit what they regard as experimentation to plots specifically designated for that purpose.

The relationship between CaC initiatives and the formal research sector have traditionally been limited, with a few notable exceptions. Opponents of CaC approach contend that most formal researchers consider the experiments conducted by farmer promoters as an extension mechanism rather than as bonafide research. Advocates of the CaC approach complain that promoters have found few useful elements in the technical solutions offered by formal research. Overcoming the mutual reservations between promoters and researchers would undoubtedly constitute a leap forward, thereby improving and enriching the work conducted by both. Potential gains from the joint development of realistic solutions to concrete problems in farming lie not only in the better design and management of experiments, but also in the increased diversity of options that would become available.

Historical significance

Beside the technical and methodological limitations, Eric Holt-Giménez also mentions important policy and institutional constraints (Box). Despite all these limitations, the CaC experience constitutes an important reference point for both the farmers themselves and the formal agricultural services, in terms of demonstrating the potential of smallholder farmers as researchers and communicators. This approach is of historical significance, because it made a significant break with the conventional models of knowledge and technology transfer, rejecting passive knowledge banking in favour of active knowledge acquisition and generation.

Towards a social movement

A number of initiatives in or outside of Nicaragua are supposedly applying this approach. Innovation processes are social and collective actions. They are stimulated when a group of people share the same sense of purpose, learn to manage hazards and uncertainties, apply resources to develop their creative skills and socialise their results. The experience in Central America clearly shows that the old myth about creativity and innovation being a special gift reserved for geniuses has been overcome. The results reveal that we (all of us, not only farmers) are capable of being creative. The key factor is to support social processes that unleash the inventive skills of people and their organisations in order to create a permanent movement of innovation driven by the rural population. ■

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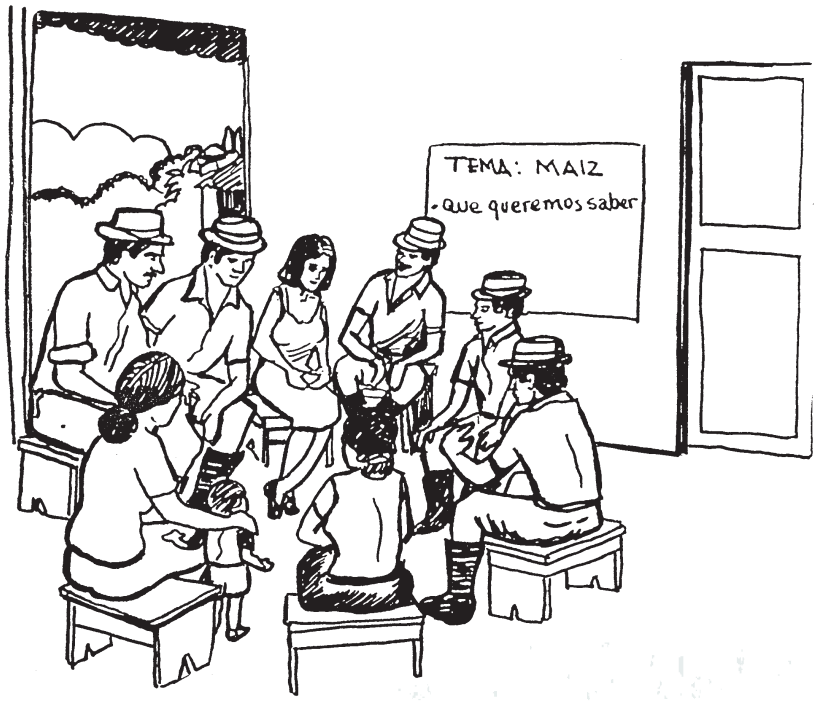

Farmer experimentation: a challenge to all!

Henri Hocdé, David Meneses, and Byron Miranda

PRIAG or the Regional Program for Reinforcing Agronomic Research on Basic Grains in Central America was an European Union-funded regional collaborative project between EU and the six countries of Central America (1991-1999). Its mandate was to improve the efficiency of the national research and extension systems and make them more responsive to farmers' needs.
It built on an approach known as 'farmer experimenter' (FE) in order to strengthen farmers' capacity to investigate and innovate at the local level, and to enhance their capacity to dialogue with researchers and extension agents. In this way they could create their own specific space and role in the research-extension-farmer chain. By strengthening farmers' capacity to produce, identify, obtain, modify, adapt, share and use information, agricultural technologies can be developed and spread.

PRIAG had teams (researchers and extension workers) in Panama, Guatemala, El Salvador, Nicaragua, Honduras and Costa Rica. Annual work plans were negotiated between farmer experimenters (FEs), formal researchers and extension agents and PRIAG also helped farmers organise, communicate and facilitate their experimentation. For PRIAG, farmer experimentation is a combination between experimentation, communication and organisation.

The first condition to secure this goal is to establish a climate of confidence between FEs and professionals and make it possible for farmers to speak for themselves. PRIAG devoted considerable attention to ensuring there was effective communication among FEs. This articles demonstrates this development in a Central American perspective and goes on to discuss the scaling-up of the process.

Farmers' testimonies

For several years, the Ministry of Agriculture (MAG), Costa Rica assisted by PRIAG has promoted a "Farmer Experimenter" project in two regions, Brunca and Huetar. In 1998, it decided to publish on this process both to reveal farmers' innovating skills and to show how the extension agents involved were willing to change their working methods and to see farmers as producers of technological innovation and agents of dissemination.

With this in mind, it was proposed to draw up a document that would contain the technical and economic results of farmers' experimentation and their views on their role as FEs. The important thing was to give them a chance to speak for themselves.

Field agents in the lead

The task was not entrusted to researchers from universities or foreign research centres. Despite their limited writing skills, grassroots extension agents working directly with the FEs were given the task.

In both regions, local MAG staff set up preparatory 2-day workshop attended by 20 field agents from the region and some interested researchers. Participants began by discussing the implications of the task before them, discussed how they could best help the farmers in their area to write up their own testimonies as FEs, and explored how this should be organised. They all agreed that the final text should be short -between 4 and 6 pages- illustrated, and pleasant to read. Each testimony should have the same structure, but individual style and creativity would be encouraged. The PRIAG facilitator proposed a structure for the testimonies. Field agents set guidelines for interviews and the order of the final text. These focused on four aspects:
My life. Who are we, my family and I? Where did we come from? Why and how did I become involved in experimentation?
My experiments. What am I proving? How did I design my experiments? What do I observe and measure?
The benefits of experimentation. What did my family, association and community gain from being a FE?
Dissemination of results. What would I recommend to other FEs from my area, my country and Central America?

Not an easy task

Each agent chose one or two farmer experimenters from their own area. They were free to choose their own way of obtaining information from the farmers in order to document experience. Some made long interviews, others made three or four visits and tape recorders were also used. Some presented the guidelines, explained the reason for the work and left the tape recorder with the farmer until the recording was ready for transcription. They used their own creativity to decide on the most appropriate method. The work aroused considerable interest among most FEs. The confidence established over the years between the farmers and the field agents was a crucial factor for success.

The field agents were enthusiastic about the task, but faced many difficulties. They realised that it was not enough simply to gather information during an initial interview. They had to complete and enhance farmers' statements, refresh farmers' memories, ask relevant questions, find the best illustrations, identify the titles that would most appeal to readers and highlight the main ideas. Most of the field agents confessed that this was far from an easy task.

Farmers found it fascinating to talk about their origins and were very voluble in this respect. Obviously, it was difficult for them to analyse their own experiments and the future of these initiatives. The field agents were amazed to learn what farmers thought about them and to see it written forthrightly in black and white.
"Previously we had no interest in technical advisors, we thought they were lazy and that their experiments were a waste of time ... now we understand the meaning of the experiments and have no desire to see our advisors go away."

My life

FEs describe themselves as humble men and women working in adverse situations, risking their fragile economies, but eager to move forward to create a new and better future. Some regard themselves simply as curious, experimenting observers who talk about their observations and in this way get ideas for future experiments. Others see themselves as being disseminators or as being more interested in organising farmer experiments.

The bulk of these testimonies show clearly that the farmers live a very hard life. They relate how farming was introduced on this young frontier less than 50 years ago. They tell of migration, the number of farms they farmers went through before they established themselves on their present holding, the impressive size of their families (as many as 19 siblings) and the desolate state of the roads. In just a few pages readers get a clear picture of the true circumstances in which farmers live and work and can be brought close to the way farmers feel. Technical documents, reports and socioeconomic studies are unable to provide this sense of immediacy.

Through these testimonies, one realises that farmer experimentation is deeply rooted in the daily struggles of small-scale farmers. They reflect the reality of all FEs in Central America, and confirm the latest document published by the *Campesino a Campesino* Programme in Nicaragua (UNAG, 1999).

My experiments

It is evident that, in the eyes of the FEs, farmers' experiments go beyond setting up trial plots and studying and interpreting concrete results. The FEs stress the process as a whole and the impact it generates: creating an atmosphere of confidence between each other, generating a community movement, even though they still do not know where it will lead. *"FEs have become personalities"*, said one. They have acquired tremendous self-esteem and fuller awareness. They insist on the fact that they can now teach their neighbours and their children. They feel useful and the meetings, workshops and exchanges have broken their isolation.

Finally equal

The climate of confidence also had a positive effect on MAG field staff, researchers and others involved. Farmers who had previously tried to avoid them because they felt they were wasting their time now extended their friendship and sought their help. Relationship were now 100% better.

The oddest thing was the difficulties encountered in launching the task of getting testimonies. The approach provoked amazement. The testimonies were a sharp rebuke for those who felt there was no need to interview farmers because field agents had been working in this area for the past 10-15 years. They proved the farmers' force, conviction, faith and high sense of commitment to building a better world. They also showed the limits and bias in the knowledge of many MAG staff.

PRIAG financed the publication of some of these testimonies and delivered them to the farmers personally. The farmers use these documents as instruments to encourage others to accept the challenge to innovate. They had to try and find solutions to their problems themselves because they could not expect the solutions they needed to come from outside. They were proud to see their names and photographs in a book and to feel that, at long last, they were on an equal footing with the researchers who visited their farms.

Communicating innovation

Exchanges between FEs, local, regional and national meetings, fairs, congresses for FEs, written or visual testimonies (photos, TV, videos), regularly published magazines, local radio programmes, calendars, almanacs, T-shirts, caps and specific training workshops reflect the unlimited types of actions being invented and implemented in Central America to disseminate information on farmer innovation. There are many interesting examples.

Radio broadcasting

Panamanian FEs got involved in a radio programme in which they transmitted the results of their experiments themselves. In addition to their role as FEs, some of them have taken on the responsibility – together with MAG agents - of becoming radio correspondents. Equipped with a portable tape-recorder provided by PRIAG, they record their stories and send them to the main town in the region for the Sunday radio programme.

Filming own experiments

Farmers became involved in producing a video of their experiences. The idea originated in the Baja Verapaz region of Guatemala, where a group of 60 FEs attending a training workshop had just watched a technical film. When it came to analysing the film, several of them diplomatically stressed the importance of what they had just seen, but expressed concern about always having to watch the experiences of others. They suggested talking about their own experiences as FEs. They were then invited to answer the following question: "What images of your own activities as FEs would you like to see on the screen? Explain your reasons and argue your point." This was a long task that required several sessions, but a script was produced, the desired pictures were decided upon and filming dates were set. This resulted in the videos mentioned below.

Publications

In Nicaragua, many valuable experiences regarding the work of FEs are worth recording and making available to others. The monthly magazine Enlace, published by SIMAS (Central American Information Service on Sustainable Agriculture), has been reporting the history of one or several innovations in each of its issues since 1990. SIMAS also made up a "methodological basket" and distributed the publication to a large number of organisations and peasant outreach workers in the country. Its objective was to offer as many of the methodologies used by various Central American outreach workers as possible in the interests of promoting farmer experimentation.

Exchange fair

In 1997, the *Campesino a Campesino* Programme of UNAG in Nicaragua organised an "experience-exchange market" involving farmers and indigenous peoples in agricultural frontier areas. This was a meeting point for 140 innovating farmers from Central America. For two days, the participants displayed their work, using panels of photographs they had taken themselves. Each participant offered and asked for information as if they were actually in the main marketplace.

Television

Groups of FEs supported by the NGO Unicam in northern Nicaragua are also great believers in photographs seeing them as a practical and inexpensive way of showing their work to neighbours. As they become more involved in communicating

their innovating activities, many farmers lose their fear of speaking in public and, every so often, they surprise others by appearing on television in Esteli, the region's capital city. *"Are these farmers really capable of standing in front of 150 people and talking about their experiences, using numbers, drawings and everything?"*

Farmers' diary

For the past few years, the National Extension Bureau of the MAG in Costa Rica has been publishing and distributing a type of log-book to farmers. Known as "My farm book", it enables farmers to keep daily records of their activities and to calculate their costs at the end of each month. Inserts with stories of innovative projects undertaken by farmers in different regions are interspersed throughout the book.

Ownership essential

Documenting and distributing information is one thing, but the use made of these documents is something else. A well-worn photograph much used by the innovating farmer is worth much more than a video of

impressive quality that is confined to an air-conditioned room, a thesis containing congratulations from the awarding committee or a published article shelved by readers. The important thing is for innovators to do things for themselves and to be able to boast about their actions: *"I took these photos, I showed the video of our experience, I distributed primers, I handed out our testimonies…."* and so on. Ownership is an essential part the sharing, experimentation and communication that characterised all farmer innovation activities.

Broadening the process

In 1994, the Huetar Norte Regional Office of the Ministry of Agriculture and Livestock (MAG), assisted by PRIAG, introduced its technical advisors to a new working method with the aim of improving services and establishing closer relationship between advisors and farmers. A team of farmers and advisors set out to identify FEs, explore their innovating skills and to find out about their experiments. The team then went on to evaluate the impact of these innovations and experiments on production costs, pesticide use and environmental and soil degradation. Workshops were held for FEs and technical advisors. Experiments, results and experiences were discussed and plans made for further experimentation.

To broaden the scope of farmer experimentation, the working models were put into practice throughout the region Huetar Norte. The First Regional Congress for Innovating Farmers in the Huetar Norte Region was organised in August 1999. At the end of the event, the eighty participant FEs elected a regional, legal and permanent committee with the clear mandate to reinforce the research capacity of farmer organisations. It calls itself the Regional Committee of FEs of the Northern Zone (-CRAEZN). The Committee comprises five representatives of farmer organisations and two agronomists (one representative from the public sector (MAG), and one from the NGOs). An advisor from CIRAD supports the group.

A clearly defined mandate

The following mandate was given to CRAEZN:

- promote the creation of a Technical Experimentation Committee (comprised of FEs) in grassroots organisations
- negotiate and obtain economic and other resources in order to encourage and support the experiments conducted by farmer organisations, and create sustainable self-financing mechanisms to improve farmers' experiments
- draw up a regional farmer experimentation programme
- design projects that combine farmer experimentation with agro-industries and other economic activities
- provide training on farmer experimentation to farmers and agronomists
- organise the negotiation, collection, processing, management and dissemination of information on farmer experimentation
- promote the exchange of experiences between producer organisations through, e.g., discussion fora, field trips and local, regional and national congresses
- identify all farmers who are conducting experiments.

A significant step forward

Although this new initiative can be considered a continuation of other activities carried out in Costa Rica in the last decade, it is a significant step forward in qualitative terms. First of all, it was designed by the farmers themselves, representatives of producers' organisations and experts from the public and NGO sectors of the Huetar region. Second, in order to put farmers in charge of research and technology development, it focuses on farmer research methods and research financing controlled by producers' organisations rather than agricultural support services. Consequently, it is supposed to get more capacity to solve problems and influence public policies.

A challenge for all!

This new situation poses a challenge for researchers and technical advisors because it demands a radical change in their working methods. It means they will have to be more creative, communicative, tolerant, patient and capable of listening and sharing information and knowledge and apply these same values in drawing up and designing projects and realising their joint ideas and dreams. Field agents and researchers have to become facilitators committed to the educational process, combining the knowledge and experience of farmers and field agents in a ***learning dialogue***. This involves moving from a linear pattern of communication to a relationship of mutual cooperation where the contributions of each actor in the knowledge system are clearly acknowledged. ■

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"This is my own innovation": the history of Limpo grass

Henri Hocdé and Mauricio Chacón

Livestock keeping is important in the Huetar Atlantica region among large- medium- and small-scale farmers and began 40 years ago with the felling of primary forest. Pasture soils are generally shallow with low fertility and farmers have suffered several setbacks in recent years. One of these was the introduction of Ratana (*Ischaemum indicum*). This "improved" variety is now the main grass in the region but it has turned out to be unproductive and low in quality. It is also coarse, resistant to humidity and difficult to eradicate from pastures.

A new grass takes root

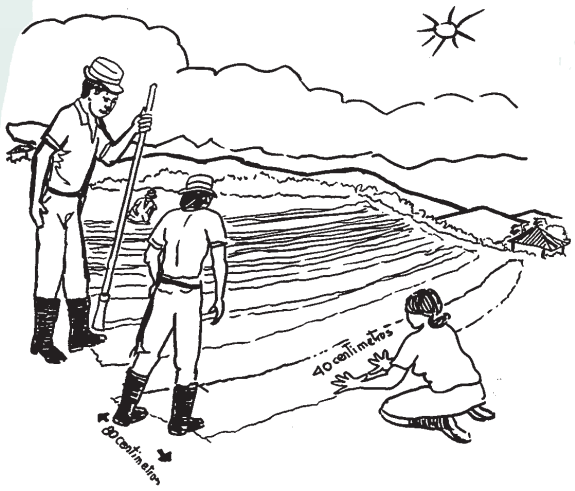
During the 1970s, a local farmer brought a new grass from the United States and cultivated it on his farm for 3-4 years without anyone noticing. He then gave up farming and gave samples of the grass to a nearby Experimental Research Station. Here it was tested and eventually discarded in 1982. In 1981, a technical advisor from the Ministry of Agriculture (MAG) took a small sample of this grass to Pueblo Nuevo and handed it to Mr. Nardo Herrera who, having planted it on a damp part of his farm, prepared to test it in his own way. William Ratana, a neighbour who bred and fattened cattle, watched how this grass grew. He noticed that it never disappeared and that it could withstand flooding. He liked it and, in 1992, he invited a recently arrived technical advisor to his farm and asked his opinion.

Limpo grass

The extensionist had never seen anything like it. He took the sample to the university for classification. Researchers discovered that its scientific name was *Hemarthria altissima* or *Moralta vigalta,* it came from Africa and grew in humid areas. The extensionist passed on this information to William Ratana who decided to plant the Limpo grass on a hectare of flood-prone land, near a road, where Ratana had been grown and which was nearly always covered with weeds. Today, he grows 7 hectares of Limpo and is satisfied with the results. *"I watched the Limpo grass covering the ground aggressively, the cows producing more milk, calves growing fatter, the Ratana disappearing and the cultivated area increasing."*

Innovating farmers' workshop

In 1995, MAG staff organised the "*First innovating farmers' workshop on grassland of Huetar Atlantica*". Eighty farmers participated and six gave talks on their experiences as innovating farmers. William Ratana presented his Limpo Grass experience as "his own innovation". The extensionist helped him prepare his presentation. Willam showed photographs of the grass at different stages of growth, in different fields and of pastures developed under different management regimes. Above all, he spoke of the benefits of the grass as he saw them and had no difficulty in communicating his experiences to the workshop even though he had never spoken in public before.



William Ratana distributed the sack of Limpo planting material he had brought with him to the farmers attending the workshop. Neither his neighbours or the other farmers there had heard of the grass before. He is now testing five other grass varieties on his farm: *Briachiaria brizanta, B. dictyoneura, B. radgans, B. humidicola and Panicum maximum*.

Comparing and sharing experiences

In July 1999, technicians held another farmers' meeting to discuss Limpo grass. Twenty-farmers who had experimented with it attended and they told how they had used it in their own specific agroecological situation (altitude, fertility, size and type of farm). They reviewed their 4 years of experience in the context of plagues, diseases, acceptance by the cattle, deficiencies and tolerance. This information will be used to prepare a practical manual.

Fast dissemination

Local farmers are generally hesitant to introduce new grasses because of the high investment involved (about US$200/ha). Nevertheless, Limpo grass is spreading fast. It can be found in livestock farms from the San Juan River in the northern part of the country to Talamanca in the

south. It has partly replaced Ratana. It is good for producing milk and meat and although it responds well to chemical fertilisers, it can also be grown without them. It recovers quickly from flooding and prefers damp, fertile soils although it cannot withstand acidity or permanent flooding.

What did scientific research bring?

From 1987 to 1996, 250 types of grass and 204 varieties of legumes were subject to scientific screening at the Experimental Research Station. They were examined by local experts and researchers from prestigious international centres and all varieties were evaluated by technicians and researchers. The two that proved to be the most outstanding were *Brachiaria brizantha* and *Arachis pintoi*. The former cannot resist humidity and is eliminated by fungus; the latter spreads very slowly. Most of the FEs in the region knew about this collection but, according to them, all planting material of these species had been lost.

Farmers use other indicators

When evaluating the different materials, researchers in the station placed priority on biomass production and resistance to plagues and diseases. The livestock-keepers, on the other hand, take more than ten factors into consideration: resistance to humidity; yield; rusticity, hardiness; duration; resistance to diseases, plagues, rains and drought; ability to recover after cutting; aggressiveness and competition with weeds; sowing facility; propagation; acceptance by different animal species and the capacity to cover the soil.

The research station probably had promising varieties that might interest livestock-keepers. How many varieties were lost because of mistaken research and extension strategies? How much was invested in pasture research that had no positive result?

Growing benefits

Livestock-keepers in the region benefited little from the research stations work. However, through the tenacity of an experimenting livestock-keeper re-enforced by the vision and creativity of an extensionist worker, Limpo grass - that had been present in the research station for nearly a decade and finally discarded - was introduced onto some 300 ha. Limpo grass can support twice as many livestock as Ratana and as a result farmers have been able to double their meat production and make a profit of about US$ 200/ha. Annual profits equivalent to US$ 60,000 are already being made throughout the region as a result of the knowledge of Limpo shared at the first FEs workshop. How many benefits to-morrow?

Supportive technical advisors

The moment when Limpo grass began to spread in this area is well defined. The starting point is precise, the names of the responsible livestock-keepers are well-known, and working mechanisms implemented by extensionists very clear. Rapid dissemination was boosted by agents who encouraged the monitoring of farmer experimentation, organised a second farmers' meeting and promoted farmer cross-visits. These extensionists fought against the guiding principles of their institution. They stopped giving talks on grasses and started to organise events at which farmers were allowed to talk and discuss their doubts, achievements, results and misgivings with extension workers.

Change in working methods

As a result of these promising experiences, the group of extension agents began changing their working methods. First of all, as professionals, they understood the need to document these types of activities. Second, as they become convinced that farmers form part of the chain that creates knowledge, they are reversing the conventional research organisation system. Gradually, they started to encourage farmers in the region to use their ability to observe, experiment and share, and to form groups of FEs. Third, they have started to gain more confidence in the value and usefulness of exchanging knowledge between livestock-keepers, technical advisors, public and private researchers and academic centres, in order to promote local innovation. ■

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Complementary platforms for farmer innovation

Ann R. Braun, Graham Thiele and María Fernández

The essential factor in strengthening farmer innovation capacity is not technology *per se* but the construction of social processes supportive of experimentation and learning (see Braun and Hocdé, *in press*; Braun et al. 2000). This means going beyond individual experiences to diverse forms of experimenter groups using different approaches. Several experiences coexist along the farmer-led/interactive research continuum, inviting a multi-tiered approach in which networks of rigorous farmer researcher "experts," less rigorous community-based research networks, and large-scale individual, informal experimentation are integrated.

Complementary approaches

In Latin America coexisting platforms include Campesino-a-Campesino (Hocdé et al, p), DIP, PRIAG (Hocdé et al, p), CIALs and Farmer Field Schools (FFS). Until recently there has been little interaction among them. However practitioners have begun to exchange and collectively analyse their experiences. This article focuses on FFS and CIALs, two platforms that have begun to operate within the same geographic areas, often facilitated by the same organisation. Farmers, researchers and extensionists are asking how they relate to each other and what are their comparative advantages. This article compares their essential characteristics and explores how these can best be articulated.

Local Agricultural Research Committees A CIAL (*Centro International de Agricultura Tropical*) - originally developed by CIAT-Colombia - is a permanent research service operated by a rural community. Volunteer farmers apt at experimentation make up the research team. The CIAL links farmer-researchers with formal research systems. It increases local capacity to make demands on the formal system and to access useful skills, information and research products.

CIALs have four elected members and a facilitator. Facilitators are trained agronomists from supportive research centres, universities, extension services or NGOs. They can also be trained farmers who have been CIAL members. Facilitators play a key role in developing the CIAL's research competence and they feed back farmers' priorities and research results to formal research and extension services.

Building research capacity

Facilitators visit the CIAL regularly until the CIAL can manage the process alone. The facilitator helps the farmer research team conduct experiments that compare alternatives with a control treatment and with replicating experiments. Training familiarises farmer researchers with terminology that gives results credibility with formal researchers. Training also focuses on planning, management, the running of meetings, monitoring and evaluation, record-keeping and basic accounting. Working in and with CIALs means that profound changes in attitude and relationships are required on the part of farmers, rural communities and agricultural professionals.

The facilitator begins by inviting the community to a meeting where the purpose of the CIAL is discussed. Farmers are invited to analyse what it means to experiment with agricultural technology. They discuss local experiences and experimental results and the possibility of accessing new technologies from outside the community. A committee is elected if the community decides to form a CIAL.

The research fund

Research risks are absorbed by a CIAL fund owned by the community. Usually seed money is a one-off donation, but it may originate from a rotating fund managed by an association of CIALs. The committee uses the fund to acquire inputs for experiments and to compensate members for losses. When an innovation proves successful, the CIAL may add to the fund by selling the harvest or research products (eg seed). As the fund grows, the CIAL can expand its research, share earnings with participants, invest in new equipment or services, or launch a small enterprise.

The research process

An open meeting is held to determine the research topic. The first question is "What do we want to investigate?" The community prioritises topics based on the likelihood of success, who benefits, and the estimated costs.

Facilitators help the committee obtain the information required to plan experiments. Other farmers and staff of formal research and extension services are often consulted. Facilitators work with the CIALs to formulate clear objectives for each experiment. The CIAL then decides what to compare, how and when to evaluate, experimental variables, criteria for evaluating results, data needs, and measurement units.

After the experiment is completed, the CIAL draws conclusions and presents the results to the community. Analysis includes

the question: "What have we learned?" Analysis of the process is especially important when an innovation is unsuccessful, or when there are unexpected results.

Three types of experiments

Facilitators guide the CIALs through three successive experiments. An "exploratory" trial when innovations are tested on small plots possibly with several treatments, such as different crop varieties, amounts and types of fertiliser, sowing dates or densities. Exploratory trials help eliminate options that are unlikely to succeed under local conditions. Promising treatments are tested on larger plots in a second experiment. Finally, two or three top-performing choices are planted over a still larger area in the third experiment, often called the production plot.

A small-scale beginning is essential. Small plots provide experience with applying new concepts, such as replication and control. They allow the CIALs to gain confidence before moving to larger and riskier scales. Facilitators gradually reduce the number of times they visit from two per months to once every three or four months as CIALs become more proficient. They visit mature CIALs for feedback on research priorities and results, and to provide information on technology under development by formal research services. Five years ago most CIALs were experimenting with crop varieties. Now small livestock, and pest, disease, soil, water and nutrient management are also being included.

Farmer Field Schools

FFS were initially designed to address problems of pesticide dependency and to develop location-specific management expertise independent of the formal research system. "Classical" FFS for integrated pest management (IPM) of rice is now used for other crops and topics.

Developing agroecosystem management expertise means building up an understanding of ecological principles and processes and the impact of farmer management decisions. FFSs provide an opportunity for learning-by-doing based on principles of non-formal education. Extension workers or trained farmers facilitate the learning process, stimulating farmers to discover key agroecological concepts and develop management skills through self-discovery activities practised in the field

FFS involve 20-25 participants from an existing farmer group or a community. This group forms the basis for collective action and follow-up activities after the school ends. FFS hold regular meetings throughout the crop cycle. Improved decision-making emerges from an iterative process of *agroecosystem analysis* (AEA), making and implementing decisions accordingly, observing outcomes, and evaluating overall impact. This is combined with experimentation aimed at understanding agroecosystem patterns, interrelationships and structure as the basis for problem-solving and decision-making. Observation, evaluation of context, and identification of interactions among different elements in the system are fundamental to FFS experimentation. FFS farmers use drawings and other visual methods to help them understand key self-regulating feedback mechanisms. The FFS approach assumes farmer innovation is constrained by a lack of agroecological knowledge and by erroneous information produced by poorly focused extension programmes and agrochemical distributors.

FFS and CIALs compared

FFS and CIALs share underlying principles. They see farmers as experts, stress respect for local values and knowledge, build capacity through hands-on experience. Both recognise and attempt to reduce the risk associated with learning and research. Outputs are seen as public goods.

Although organised differently, they have several processes in common. Facilitation styles and the role of motivation are similar. Both aim to strengthen farmer experimentation and innovation, but in different ways. CIAL experiments are relatively formal: most are controlled comparisons involving several technological options. Evaluation methods have been adapted to local levels of literacy, using symbols and simple classification and tabulation procedures. Farmers set their own evaluation criteria without influence from professional researchers.

To ensure systematic evaluation of technological options, CIALs are made up of a small group of specialised farmer-researchers, chosen for their reputation as experimenters, and trained to further develop their research skills. FFS unlike CIALs do not focus on identifying solutions from a range of technological options. They develop the communities capacity to better manage ecological relationships. FFS are not directed at a specialised group of farmer-researchers, but try to ensure a permanent learning process by targeting a relatively large and heterogeneous group.

FFS have been effective in addressing problems in agroecological systems that are well understood (eg. irrigated rice in Asia). Where understanding of system components and interrelationships is less developed (eg in the case of non-native crops which lack systemic self-regulation mechanisms), local capacity to evaluate different management options (technologies) is important, and controlled experimentation necessary. The demand for technological options implies the need for strong links with formal research. Here CIALs have a comparative advantage. In line with this demand, second generation FFS have begun to include controlled experimentation, the evaluation of technical options and have established ties with formal research.

Complementarity and synergy

FFS focus on agroecological education while CIALs concentrate on establishing a community-based research service linked to the formal research system. FFS are limited in time to one or two cropping seasons; CIALs are permanent. FFS experimentation is mainly qualitative while CIALs concentrate on experimentation through controlled quantitative comparisons. FFS build agroecological knowledge that could make CIAL research more meaningful. CIALs can generate locally adapted technological options to strengthen the FFS. Both can be established in the same area or community, although the sequence of establishment and linkages should be carefully planned (Braun et al. 2000).

Combining FFS and CIAL

In many countries the value and relevance of agricultural R&D for small farmers is being questioned. FFS and CIAL promote closer engagement with rural society, building local institutional structures and processes for agricultural development. They make R&D more relevant by putting farmers at the centre of development processes and make possible fundamental transformations in agricultural R&D systems. Financing and implementing organisations increasingly see them as viable new alternatives. Under these circumstances we believe that there is considerable potential for making wider use of both platforms and encouraging further evolution and synergy of both.

■

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PROLINNOVA (PROmoting Local INNOVAtion)

Ann Waters-Bayer

Promoting farmer innovation was one of the main themes at the recent Global Forum on Agricultural Research (GFAR) held on 21-23 May 2000 in Dresden, Germany. Over 400 participants from farmer organisations, NGOs, national and international research centres, and private industry concluded that a participatory approach to innovation development in agroecology should be widely promoted. Over the past year, NGOs from both developing and developed countries had discussed by Email and met in Rambouillet, France, to draw up a concept paper for a programme to promote innovation by farmers and their communities. This paper was enhanced further by incorporating comments solicited from various other NGOs by Email. The revised paper served as basis for discussion in Dresden.

A learning network

The main objective is to strengthen research and development partnerships and methods to promote local innovation in ecological agriculture and natural resource management (EA/NRM). A long-term aim is to institutionalise Prolinnova approaches into national programmes of research, development and education. The programme is envisaged as covering six major components:

- Identifying and documenting local innovations and innovation processes related to both agroecological techniques at field/farm level and institutional innovation in collective management of natural resources at landscape level
- Promoting farmer-extensionist-scientist partnerships to further develop local innovations and to scale-up innovation processes
- Training potential collaborators in these participatory approaches and methods
- Promoting the incorporation of Prolinnova into the teaching and research activities of institutions of higher learning
- Jointly analysing the approaches and methods used in the above-mentioned processes and their impacts
- Promoting regional and global R&D networks and the sharing of information on EA/NRM based on local innovation in similar agroecological zones or similar types of techniques or institutions.

Most activities will be implemented through national and regional sub-programmes, defined semi-autonomously and directly funded by different donors. These sub-programmes will be linked at a higher level, using mechanisms for sharing and mutual learning, such as web-based databanks, E-conferences, workshops, exchange visits and publications. Prolinnova will be essentially a learning network.

Apart from encouraging the launching of new programmes to promote farmer innovation in the various regions, Prolinnova will also seek collaboration with relevant existing programmes, databases and publications, e.g. Honeybee, ILEIA, ISWC, PFI, PRGA, and encourage their active involvement in the network.

Links with InterDev and PolicyNet

The Prolinnova initiative has been developed along with two other initiatives:

- InterDev, aimed at developing an internet-based system for documenting and sharing local innovations, initiatives and practice-proven techniques of EA/NRM; and
- PolicyNet, aimed at addressing policy and institutional issues to support local innovation processes, by way of relevant research and information dissemination.

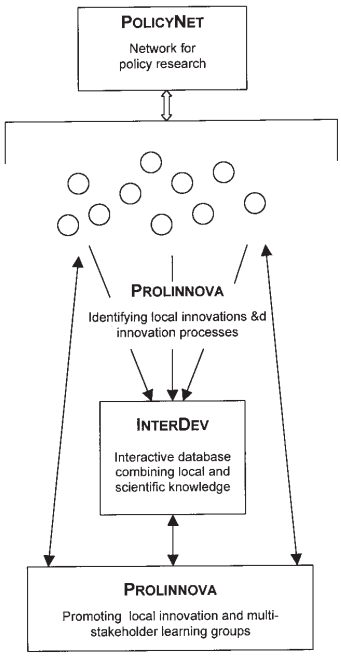


Figure 1: Mechanisms of knowledge management to promote innovation in ecological agriculture and natural resource management

InterDev will be an important platform for collecting and making available the lessons from Prolinnova, while PolicyNet will be vital for creating the political and institutional "space" to allow Prolinnova to blossom.

Initial inventory and consultation

The Rambouillet Group is currently developing an action plan to put the concepts into operation. Start-up activities include an inventory of existing programmes and databases on local innovation in EA/NRM and a consultation process with potential partners to review relevant experiences, analyse these jointly and identify gaps where supportive mechanisms can be introduced or strengthened. On this basis, partner institutions will design a more detailed Prolinnova programme.

This issue of the *ILEIA Newsletter* has already moved ahead in compiling experiences of discovering and promoting innovation by farmers. In the context of InterDev, ILEIA is setting up a website for continued documentation and discussion of relevant methods and processes. ■

All organisations interested in being actively involved in PROmoting Local INNOVation in AE/NRM are invited to contact Laurens van Veldhuizen, ETC Ecoculture, PO Box 64, NL-3830 AB Leusden, Netherlands (l.van.veldhuizen@etcnl.nl).

Advancing PTD: a study and workshop

A growing number of organisations have become engaged in agricultural research and extension that involved farmers at all stages in the process and that are designed to strengthen local capacities to experiment and innovate. Many have developed variations on the "classical" PTD approach: using novel entry points (e.g. indigenous innovators), trying to speed up the process and developing new methods. Some promising efforts have been made to institutionalise PTD within large research, extension and training organisations.

In view of the heightened interest in promoting local innovation (Prolinnova), it is high time to document, compare and analyse these experiences, and to learn from them. The proposed study during 2000/2001 will culminate in a workshop in late 2001.

The organisers – IIRR (Philippines), CIIFAD (USA), ETC (Netherlands) and tINNOVATEc (Switzerland/Germany/Netherlands) – are keen to learn of advances in PTD that help advance the development and scaling-up of PTD. We are seeking new cases from people who have learned from and improved the PTD practices pioneered in the 1980s and early 1990s. Cases should cover several years' experience, and can come from both the South and the North.

If you would like to join this learning activity, please contact ETC Ecoculture, expressing your interest and including a short abstract of the case you would like to contribute. Contact: Ellen Radstake, ETC, POB 64, NL-3830 AB Leusden, Netherlands (office@etcnl.nl).

IF YOU WANT TO KNOW MORE

Indigenous agricultural revolution *by Richards P. 1985. 192p, ISBN 0-09-161321. London, Hutchinson & Co.*
The author demonstrates that many of the most successful innovations in food-crop production over the last fifty years or so have indigenous roots. There should be less emphasis on '-teaching' farmers how to farm and supplying 'improved' inputs, and more emphasis on how to foster and support local adaptation and inventiveness.

Farmer experimentation and innovation: a case study of knowledge generation processes in agroforestry systems in Rwanda *by Biggelaar C den. 1996. Community Forestry Case Study 12. Rome: FAO/FTTP.*
A study of how farmers conduct their own experiments and generate knowledge related to tree growing. Knowledge production by farmers was oriented to its immediate use but also to a future beyond the farmers' lifetime.

Soil recuperation in Central America: sustaining innovation after intervention *by Bunch R & Lopez G. 1995. Sustainable Agriculture Gatekeeper Series 55. London: IIED.*
This study shows that aiming to ensure the sustainability of specific technologies may be counterproductive. Much more relevant to farmers' well-being is an attempt to sustain the process of innovation. Productivity will climb only if local-level innovation continues.

Farmers developing technology: the researcher's role revised *by Lopez G and Bunch R, ILEIA Newsletter Vol.16, No.1, p.22-23.*
In Central America farmer experimenters are taking over some of the roles conventionally associated with researchers. The authors have been facilitating farmer experimentation in the hope of finding profitable ways of using micro-catchments for water harvesting. On the basis of these experiences they challenge researchers to support the farmer experimenter movement and adapt their roles.

Traditions and innovations in land husbandry: building on local knowledge in Kabale, Uganda *by Critchley W, Miiro D, Ellis-Jones J, Briggs s & Tumuhairwe J. 1999. Nairobi: RELMA.*
Describes the process and results of a 4-year participatory research programme on soil and water conservation in Uganda. The approach evolved from studying local practices to collaboration between farmers and researchers in developing and disseminating innovations.

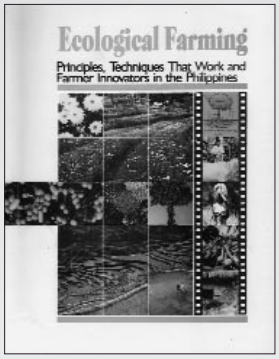
Client-driven change and institutional reform in agricultural extension: an action learning experience from Zimbabwe *by Hagman J, Chuma E, Connolly M & Murwira K. 1998. Agricultural Research and Extension Network Paper 78. London: ODI.*
Describes the ongoing institutionalisation of a participatory approach to innovation development and extension in Zimbabwe. The process requires far more than simply training staff in participatory methods. It needs also commitment from all actors, sound strategies, flexible methodologies, a conducive atmosphere for learning, and a focus on human relationships.

Participatory innovation development and diffusion: adoption and adaptation of introduced legumes in the traditional slash-and-burn peasant farming system in Yucatan, Mexico *by Guendel S. 1998. 133 p. ISBN 3 8236 1292 1. Margraf Verlag, PO Box 105, D-97990 Weikersheim, Germany. (shorter version available from GTZ Tropical Forest Research Project, TOEB@gtz.de).*
Mayan peasants in Yucatan face decreasing productivity in their slash-and-burn (*milpa*) farming system and lack alternative income sources. A system of green manuring with legumes (*mucuna, canavalia*) had been successfully introduced elsewhere in Central America and appeared suitable for the Mayan farmers, but few had adopted it. Sabine Guendel explored reasons for this lack of adoption in three case studies, in which intervening organisations took different strategies to promote the innovation. Her methodology facilitated analysis by the farmers of the functions and potential roles of cover crops within the *milpa* system. A clear picture emerges of how the historical *milpa* system changed in the last century to the current "traditional" one. The comparative analysis revealed that, when farmers were given the opportunity to experiment with an innovation and incorporate their local knowledge, they developed ways of increasing the innovation's contribution to food security and income generation. The methodology of participatory innovation development by farmers, NGOs and researchers is described in four phases: appraisal, convergence, experimentation and reflection. Farmer-to-farmer diffusion of new ideas was found to be much more difficult within communities than between them. The book gives little information about the status of the innovators in their community and their relationship with other community members, which may have helped explain the differences in their behaviour. The research gives considerable weight to local perspectives: farmers' assessments of the process and results of innovation development are often expressed in their own words. This gives the text a particular liveliness. (AWB)

The new frontier: farmers' responses to land degradation *by Amanor K. 1994. London: ZED Books/UNRISD.*
West African farmers faced with land degradation as a result of monocropping made adjustmenst by experimenting with regenerative technologies in agroforestry and managed fallow. Argues for a new structure of R&D that seeks to strengthen the independent research capacities of farming communities.

Farmer participatory extension training workshop: summary of workshop contributions and outputs *edited by Koma YS, Seng S, Solieng M, Shams N, Samram T, Brouwer H. & Bunna K, 2000. 108p. Centre d'Etude et de Développement Agricole Cambodgien (CEDAC), PO Box 1118, Phnom Penh, Cambodia. Email: Cedac@camnet.com.kh*
The first documented discussion on experiences with agricultural extension in Cambodia and the concepts and global experiences of farmer participatory extension.

Ecological farming: principles, techniques that work and farmer innovators in the Philippines *by Padilla HJ. 1999. AGTALON, Nalsian, Manaoag, Pangasinan, Philippines.*
In the introduction the author explains how farmers in the humid tropics can collaborate with nature. The main body of the book is on farmer-proven ecological farming techniques from Luzon, Visayas and Mindanao. The practical cases on farmer innovations deal with many different topics such as nutrient, water and pest management, integrated farming, vegetable growing, forced feeding technology, herbal veterinary remedies, etc. The book is a strong testimony of the creativity of farmers. (CR)



From process to innovation: land use intensity practices among smallholder rice farmers in eastern Nigeria *by Igbokwe EM. 1999. Indigenous Knowledge and Development Monitor 7 (1): 3-7.*
Examines how smallholders select components of technical packages from extension to use in their own experimentation. Farmer innovations included yam/rice rotation and making mounds to incorporate organic matter in rice fields. Argues that the contact-farmer approach of the T&V system overlooks local innovation.

Farmer First: farmer innovation and agricultural research *edited by Chambers R, Pacey A & Thrupp LA, 1989. 218p, ISBN 1-85339-007-0. London: Intermediate Technology Publications.*
Starting with farmers' own capacity for innovation, contributors from the agricultural and social sciences, ecology, economics and geography, make the case for a farmer-first mode to complement the traditional 'transfer of technology'. One of the classical books on farmer innovation and participatory development.

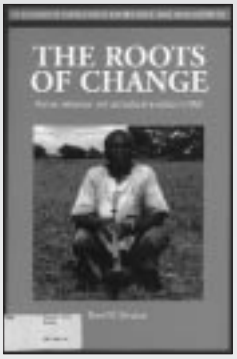
Women's role in technical innovation *by Ilkkaracan I & Appleton H. 1995. New York: UNDP/ITDG.*
A source book on women and innovation in food technology: 23 case studies address women's IK, innovation by women's, and collaboration between women and outside agencies supporting technology development.

Farmer innovators in land husbandry. *ISWC/PFI. Newsletter available from: Chris Reij, CDCS, Free University Amsterdam, De Boelelaan 1115, NL-1081 HV Amsterdam, Netherlands Email: cp.reij@dienst.vu.nl*
Joint newsletter of the action-research programmes "Indigenous Soil and Water Conservation in Africa" and "Promoting Farmer Innovators", reporting on the methods used and the experiences in the 8 countries involved. Includes also articles describing individual farmer innovators and their innovations.

Looking for innovation: post-war agricultural change in Niassa Province, Mozambique *by Levin S. 1996. Wageningen Agricultural University.*
Based on a 3-month study in a remote area of Mozambique, this highly readable thesis clearly explains methodological constraints to systematically documenting indigenous experimentation and innovation.

The neglected uplands: innovation and environmnetal change in Matalom, Philippines *by Anna Lawrence 1995. Working paper 95/11, 33p. Agricultural Extension and Rural Development Department, The University of Reading, PO Box 238, Earley Gate, Whiteknights Road, Reading RG6 6AL, UK.*
The study found that over recent decades farmers have begun to plant more trees, contour the cultivated slopes, and burn fallow less than previously. Information from nearby projects has been very important in stimulating these changes, but the relative isolation of the farming communities has also led to considerable experimentation and innovation on their own. Ecological education by the farming systems research institute has resulted in farmers more motivated to make improvements for ecological reasons rather than profit.

The roots of change: human behaviour and agricultural evolution in Mali *by Simpson BM. 1999. London: Intermediate Technology Publications.*
This study of how change occurred in farming systems in south-western Mali shows that local farmers' creativity, reinforced by social interaction, has



been the major force in the development of local production systems over the last 30 years. Explores patterns of behaviour of individual farmers and groups of farmers in generating, adapting and spreading new agricultural practices, and suggests how the creative potential of farmers and fieldworkers can be stimulated.

Joint learning for change: development of innovations in livelihood systems around protected tropical forest areas. *LISTRA. 1997. Eschborn: GTZ.*
Takes the concept of PTD beyond farm-level experimentation to the participatory development of social, organisational and technological innovations in NRM. All stakeholder groups are involved in analysing visions, problems and potentials for improving, compensating or replacing specific ways of using resources that have been restricted for conservation reasons. Options are screened in workshops, and multi-stakeholder teams experiment with new ways of ensuring a livelihood for people living around protected forests.

Issues in the utilisation of indigenous knowledge in agroforestry research *by Nielsen F. 1998. Thesis, University of Copenhagen.*
In three cases in Uganda, key issues of integrating IK into formal research are investigated. These include: farmers' knowledge generation and experimentation, farmers' networks as sources of inspiration and inputs, and the dynamic nature of IK. In farming systems involving slow-growing and space-demanding trees, farmers generated knowledge through unplanned collective experimentation.

The spirit of innovation: a key to the future: experience of the Campesino to Campesino program (PcaC) in the buffer zone of the BOSAWAS Reserve *by Rivas Espinoza A & Zamora Gonzalez E. 1998. Forests, Trees and People Newsletter 35: 14-19.*
Near a large rainforest reserve, farmers learned from other farmers how to test new crop combinations, including "fertiliser beans" as cover crops. This stimulated innovation that evolved into collection of forest seeds, community forest management and income generation from forest products.

Farmers' experiments: creating local knowledge *by Sumberg J & Okali C. 1997. 178p, ISBN 1-55587-674-9. Boulder: Lynne Rienner Publishers, Inc.*
Critical analysis of Farmer Participatory Research based on a wide literature review and a search for experimenting farmers in Ghana, Kenya and Zimbabwe. The rapid field-work revealed no evidence of research-minded farmers or informal R&D systems. Farmer experimentation could not be differentiated from farming practice. It is argued that farmers need, above all, an increased supply of "raw material" (new seed, ideas and so on) with which they can experiment with their own.

Best practices on indigenous knowledge *by Guchteneire P. de, Krukkert I. & Liebenstein G. von (eds), 1999. 183 p., ISBN 90-5464-031-6. UNESCO-MOST / Nuffic-CIRAN, PO Box 29777, 2502 LT The Hague, The Netherlands. Email: ciran@nuffic.nl ; Website: www.nuffic.nl/ciran/*
This Best Practices Database, available as booklet and on internet, is on programmes working with indigenous knowledge (IK) in natural resource management in Africa, Asia and Latin America. The focus of the database is not on the details of the IK itself but in the ways it has been adapted, applied, and disseminated. The aim of the database is to encourage researchers and policymakers to incorporate IK into their project proposals, feasibility studies, implementation plans and project assessments.

Farmers' research in practice: lessons from the field *by Veldhuizen L van, Waters-Bayer A, Ramírez R, Johnson DA & Thompson J, 1997. ILEIA readings in sustainable agriculture. 285 p. ISBN 1 85339 392 4, London: Intermediate Technology Publications.*
Several cases of farmer-led research show how farmers develop and adapt innovations, try them out in different settings, assess their value for improving farm systems, and spread the new ideas and ways of experimenting to other farmers.

Linking livelihood strategies to development: experiences from the Bolivian Andes *by Zoomers A. 1999. 108 p. ISBN 90-6832-125-0. Royal Tropical Institute, KIT Press, PO Box 95001, 1090 HA Amsterdam, The Netherlands. Email: kit-press@kit.nl ; Website: www.kit.nl*
The author argues to go beyond agriculture and to start development interventions from the indigenous livelihood strategies. Farmers often carry out multiple income-earning tasks in addition

to farming, combining and recombining and renewing these tasks in a diverse and dynamic response to ever-changing conditions. An extensive analysis of information provides the background for far-reaching recommendations about how development interventions can be better linked to the livelihood strategies – the reality – of farmers.

Innovation for development *by Engel PGH & Salamon M. 1996. Amsterdam: Royal Tropical Institute.*
This is about managing agricultural innovation processes through facilitation: creating favourable conditions plus an understanding of social and institutional learning processes. Introduces "RAAKS", a participatory methodology for enhancing innovation.

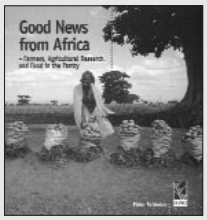
NEW IN PRINT

Participatory extension : insights from three agricultural development projects in Africa *by Schmidt P, Etienne C, Huerlimann M. 1998. 120 p. ISBN 3 908001 77 3 : SFR 25.00. Swiss Center for Agricultural Extension (LBL), CH-8315 Lindau, Switzerland.*
From an analysis of 3 agricultural development projects in Africa, this study tries to identify the main principles of effective participatory extension, as well as practical methods that can be used to implement this approach. Going beyond the field implementation, the study also addresses the wider institutional context.

Innocent farmers? *by Put M. 1998. 427 p. ISBN 90 5538 028 8 : USD 28.50. Thesis/Thela Publishers, Prinseneiland 305, 1013 LP Amsterdam, The Netherlands.*
A comparative evaluation of the "Transfer-of-Technology" and "Farmer First" extension approach as followed in the Maheswaram watershed project implemented by the Andhra Pradesh (India) government and a watershed project implemented by AWARE, a NGO in the same state.

The new middlewomen : profitable banking through on-lending groups *by Harper M. [et al.]. 1998. 124 p. ISBN 1 85339 431 9 : GBP 12.95. Intermediate Technology Publications (ITP), 103-105 Southampton Row, London WC1B 4HH, UK.*
The book describes how banks, alone or in collaboration with NGOs, can organise groups of people into 'micro-banks' that can act as independent banking intermediaries. This is a unique approach to the delivery of financial services to poor people.

Good news from Africa : farmers, agricultural research, and food in the pantry *by Schioler E. 1998. 72 p. ISBN 0 89629 700 4. International Food Policy Research Institute (IFPRI), 2033 K Street, N.W., Washington, D.C. 20006, USA.*



This booklet describes how agricultural research is achieving valuable results by propagating new varieties of grain that have led to greater yields on African farms.

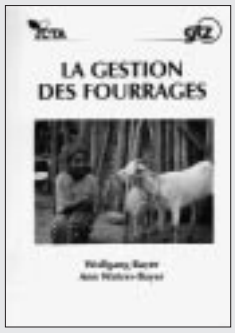
Avoiding the shortcut : moving beyond the use of direct incentives. A review of experience with the use of incentives in projects for sustainable soil management *by Giger M. 1999. 61 p. ISBN 3 906151 32 8. Centre for Development and Environment (CDE), Inst. of Geography, Univ. of Berne, Hallerstrasse 12, 3012 Berne, Switzerland. (Development and Environment reports ; 17). Spanish and French editions are planned.*
A comprehensive contribution to the debate about the use of direct incentives. It reveals that most development projects still make employ direct incentives, even though they produce disappointing results. The objective of this study is to help change this situation.

Good practices in drylands management *by Oygard R, Vedeld T, Aune J. 1999. 116 p. Noragric Agricultural University of Norway, PO Box 5001, N-1432 As, Norway. World Bank, 1818 H-Street, N.W., Washington D.C. 20433, USA.*
The booklet looks at "good practices" in the management of rangelands and dryland farming, pastoral development, community-based natural resources management, and drought preparedness. It points to many possibilities for increasing the productivity of drylands while reducing ecological degradation.

Combatting desertification : conservation and development of dryland resources. *FAO 1998. CD-ROM. ISBN 92 5 004217 5 : USD 50.00. Secretariat of the Interdepartemental Working Group on Desertification, Sustainable Development Department, Food and Agriculture Organisation (FAO), Via delle Terme di Caracalla, 00100 Rome, Italy.*
This CD-ROM is the second edition of the Multimedia collection on desertification, which is to be issued regularly and updated on the occasion of future conferences organised by the parties to the Convention to Combat Desertification. It provides a complete and comprehensive collection of materials offering bibliographies, field photos, videos and an extensive selection of FAO full text publications relating to the sustainable development of human and physical resources in drylands. It can be used on both Windows 95/98/NT and Macintosh.

Trading places, trading ideas: "Dare to share fair" on participatory development approaches *by Posthumus B. 2000. 26p. "Dare to share" Fair committee, c/o ETC Ecoculture, PO Box 64, 3830 AB Leusden, The Netherlands (Postage and handling charged)*
In October 1999 a "Dare to share fair" was organised in the building of the Netherlands Ministry for Development Cooperation. Over 40 organisations, mainly from the South, participated and presented and shared their experiences. This report gives an impression of what transpired during these two days.

Forage husbandry *by Bayer W, Waters-Bayer A. 1998. 198 p. ISBN 0 333 66856 1. (The tropical agriculturalist / Coste R (ed.)). Technical Centre for Agriculture and Rural Cooperation (CTA), PO Box 380, 6700 AJ Wageningen, The Netherlands. Also available in French, ISBN 3-8236-1309-X.*



This interesting book gives an overview of different aspects of forage and livestock husbandary with particular emphasis on pastoralists and smallholder farmers. Included are basic aspects of the farming systems, basic biology of livestock and forage resources, management of natural forage, forage as auxiliary product from cultivated land, cultivated forages, and forage conservation and supplementation. The information explains the way pastoralists and smallholder farmers organise their lives, using livestock as part of their risk reducing and diversification strategies, combining livestock with crops and other - often non-farming - activities. In this sense not only technical and socio-economic aspects are taken into account, but also gender and other characteristics of the cultural dimension of livestock keeping. The last chapter gives an overview of the research and development approaches related to livestock keeping and forage production. This methodological guide includes a combination of traditional practices with outside ideas and technologies, according to the specific characteristics and needs of the farmers. The suggestions for participatory approaches combined with the clear language, practical explanation of technical aspects, and the examples from all over the world make this book a valuable asset for anyone working with livestock and resource poor farmers throughout the world.
(KH)

Research partnerships: Issues and lessons from collaborations of NGOs and agricultural research institutions. *IIRR, 1999. ISBN 0-942717-73-2. International Institute for Rural Reconstruction, Y.C. James Yen Center, Silang Cavite 4118, Philippines. Fax: +63 46 414 2420; Email: iirr@cav.pworld.net.ph*
The workshop recognized that collaboration has been limited and documentation of efforts in research partnerships has been poor. However, successful initiatives do exist, and twelve cases form Asia, Africa and Latin America formed the basis for drawing up lessons in research partnerships. Analysis focused on the collaborative dimension – the partnership process.

Environmental indicators for agriculture. *OECD 1999. Volume 1: Concepts and framework. 45p, ISBN 92-64-17134-7. Volume 2: Issues and design. 213p, ISBN 92-64-17041-3, FF 240. Organisation for Economic Co-operation and Development, OECD Publications, 2, rue André-Pascal, 75775 Paris Cede 16, France. Also available in French. Volumes 3 (Methods and Results) and 4 are expected to be ready in resp. 2000 and 2001.*
The OECD is making a major effort to develop a set of policy-relevant indicators to assess the harmful and beneficial impacts of agriculture and policy measures on the environment. The first volume describes the main environmental concepts and the indicators that need to be calculated: the use of nutrients, pesticides, water; land conservation; water and soil quality; greenhouse gases; biodiversity; wildlife habitats; landscape; and environmental impacts related to farm management practices, the availability of farm financial resources, and rural socio-cultural issues. Volume two is on the results of the OECD York Workshop attended by leading experts. It discusses the identification and design of suitable indicators, the methodology to be used in their measurement and issues relating to interpretation. On the basis of practical experiences, there is also a discussion about how indicators can be used for policy purposes.

EL BOLETIN DE ILEIA

It is surprising what human links can be established when the results of Participatory Technological Development (PTD) experiences are made known. Recently, for example, ***El Boletin de ILEIA*** received several letters from readers in reaction to "Finding Common Ground" (***El Boletin de ILEIA*** **Vol 15-1/2**) which reported the results of the ILEIA Research programme. *Shipita* was the subject that generated the most interest. Having read about the way the value and use of s*hipita* has been rediscovered in the Central Andes of Peru readers wanted to contact the researchers who had documented and systematised the related PTD experiences. As editor of *El Boletin* I was happy I could help them get in touch with each other. We have also had letters from readers in Costa Rica, Cuba and Nicaragua who were stimulated to write about their own research experiences.

During the LEISA International Editorial Committee meeting (Bangalore, March 2000) plans were made for ***El Boletin de ILEIA,*** **LEISA India** and the **LEISA Newsletter** (from 1September 2000 LEISA International) for the coming year. It was decided that ***EL Boletin*** should have more secretarial support. This means that we can now devote more time to building up a LEISA readers' network in Latin America. So keep sending us your information, enquiries, comments, requests, opinions, complaints and, of course, congratulations!! But don't forget we need your articles, book reviews, news (for our networking page) and other contributions as well. Each issue of ***El Boletin*** is the product of a participatory process and reader's opinions play an important role in the decisions we take. ■

Teresa Gianella, PO Box: 18-0745, Lima 18, Peru,
E mail: estrems@amauta.rcp.net.pe

Editors appologise for the fact that in two recent ILEIA Newsletters the names of the authors of the following articles were unfortunately omitted. **Vol 15.1/2:** ILEIA Collaborative Research Programme (p.4 - 8); Stakeholder Concerted Action for LEISA (p. 77-80); Stakeholder Assessment of LEISA alternatives (p. 81-83) were written by Peter Laban, Bert Lof and Coen Reijntjes. In **Vol 15.3/4**: Recent initiatives (p.42-43); CGIAR: Towards gender sensitive research (p. 46) were written by Wietse Bruinsma. In **Vol 15 1-2** photos on pages 27, 28 and 29 were provided by Kalikasan; page 72, 76 and 81 photos by AME; page 79 photo by Markus Staub.

Photo: Coen Reijntjes

Farmers present their innovations to fellow farmers and researchers at the Farmer Innovators Workshop held in Doddaballpur, India, March 2000.

LEISA INDIA

In March 2000 the Editors of the **LEISA Newsletter, LEISA India** and ***El Boletin de ILEIA*** met in Bangalore, India. AME (Agriculture Man and Ecology), the organisation responsible for the production of **LEISA India**, subsequently arranged a field trip that included participation in a farmer innovators meeting. Faced with declining yields and environmental and health problems, innovative farmers had started to develop their own ways of ecological farming inspired by traditional knowledge and the creativity of nature. Some of these farmer innovators are true philosophers and through the attention paid to them by the press, radio and television they have become role models for many others.

AME has identified many such farmers in the Southern Indian states of Tamil Nadu, Karnataka and Anadhra Pradesh and has been working with them for the last fifteen years. This latest workshop was held on the farm of a legendary farmer Narayana Reddy of Doddaballapur near Bangalore city. Twenty innovative farmers from the three states gathered to share their experiences and develop strategies that would encourage innovation. Farmer innovations presented included ecological friendly landscaping, soil conservation, water harvesting, crop rotation, pest, disease and weed management and animal husbandry.

Mr. Tangaswamy, for example, specialises in agroforestry. He grows 60 varieties of fruit trees on his 10-acre farm and plants black gram, finger millet, sebania and paddy. He experiments continuously with new species of trees, crop rotation and weed management and each season brings new discoveries.

Mr. Ganapathi gradually has reduced the use of chemicals on his farm to zero and has developed his own natural ways of fighting pests and diseases in crops, animals and fish. He has increased productivity, profitability and the quality of the food produced on his farm.

Farmers attending the workshop suggested developing a network of innovative farmers in each state. This network would stress active participation of women and young people, facilitate exchange between members and train farmers interested in ecological practices.

The farmer innovators felt there was a need to document and codify innovative practices and make them more accessible to farmers. Publishing this information in **LEISA India**, local farming magazines and translating them into local languages would make this possible. Farmers felt that organisations such as AME and ILEIA should pass on the LEISA perspective to educational institutes as well. ■

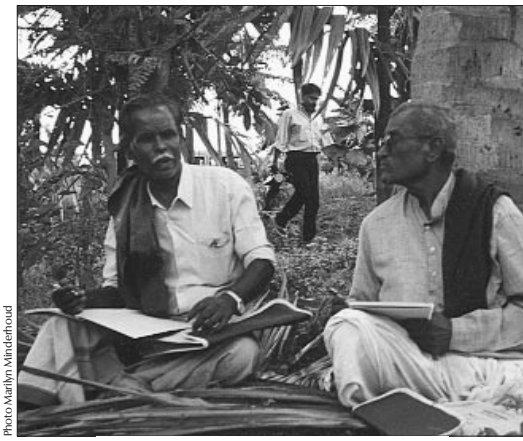


Photo Marilyn Minderhoud

Exchanging experiences during the Farmer Innovator Workshop organized by AME and held in Doddaballpur, India, March 2000.

For a full report of the farmer innovator workshop write to:

N Hari Krishna, AME, PB No.7836,
J.P Nagar, Bangalore, 560078 India,
email: amebang@giasbg01.vsnl.net.in

Photo: Fetien Abay

The challenge ahead will be to bring researchers, development agents and women innovators together to explore new ways

Women challenge cultural norms

Mamusha Lemma, Fetien Abay and Ann Waters-Bayer

Tensue Gebre-Medhin is a 30-year-old woman who farms at an altitude of some 1500 m in Central Tigray, Ethiopia. Annual rainfall is about 650 mm and falls mainly between May and August. She has 5 dependants and about 1 ha of land on which she grows sorghum, teff, maize and barley.

Ploughing with two oxen is a centuries-old tradition in Ethiopia, but has always been the domain of men. In 1981 the agricultural section of the TPLF (Tigray People's Liberation Front) trained Tensue in oxen ploughing. While her husband was still alive, she did not have the chance to apply what she had learned. After his death she had only one ox and followed the tradition of sharecropping with a man who also owned an ox. This meant she had to give half her harvest to the man. Moreover, for every two days the man ploughed his land, he ploughed only one day on hers.

A donkey-ox draught team

Tensue therefore decided to plough by herself. Her father was not happy to see her do this, because it was against the local culture. Nevertheless, he complied with her request to lend her a donkey to pair with her ox. In addition to breaking the taboo against women ploughing, Tensue thus introduced the idea of a donkey-ox draught team. This was a new system in the area, but she saw certain advantages. Oxen cost at least three times more than donkeys to buy. Donkeys are easier to manage and can live on poorer-quality feed. A donkey can be used as a pack animal to generate income by carrying goods to different markets for petty trading.

In her innovation, Tensue encountered some technical problems but found her own solutions. A donkey has no hump and is smaller than an ox. To keep the yoke in balance and to fix it securely, she put a pile of old rugs over the donkey's neck. The rugs also prevent the donkey being injured by the rubbing yoke. Another problem was that the two species do not understand the same commands. She therefore had to use different words when speaking to the donkey and the ox.

Growing acceptance

When Tensue started ploughing, many people laughed at her and some cursed her, calling her an evil wisher. Because the practice had not come from the ancestors, many villagers criticised Tensue. However, the local development agent defended and encouraged her. Confident in the value of her innovation, Tensue continued practising it, despite what others said. Last year, some women asked Tensue to train them to plough. She has even been asked to plough the land of families whose men have gone to war. The community is starting to accept her as a farmer and innovator in her own right.

Potential for poorer households

Women's innovations often indicate how local resources can be used more intensively, especially by poorer households. In addition to spreading women's innovations and encouraging others to innovate, researchers and DAs could help women improve and spread their innovations. In Tensue's case, researchers could help develop appropriate implements and equipment for donkey traction. DAs could stimulate community discussion about the pros and cons of ploughing with a pair of donkeys, a mixed donkey-ox team or a pair of oxen.

The challenge ahead will be to bring researchers, DAs and women innovators together to explore further the avenues that women are already opening up for the development of smallholder farming in marginal areas. ■

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Themes for the ILEIA Newsletter

December 2000 Vol.16-4

Ecologisation of monoculture

How can monocropping systems and monolivestock systems be made more sustainable? Can they be transformed into integrated systems? How can the quality of the production chain be improved? Articles are invited on interesting examples of: ecological intensification and diversification of mono-cropping; integrated soil fertility management; ecological pest management; product development, adding value to and marketing new products.

Deadline for contributions 15 September 2000.

March 2001 Vol.17-1

Resilience of agriculture

How do farmers prevent disaster and react to the catastrophies of drought, flood, armed conflict, disease and economic crisis? How do farmers deal with variability and risk? How can the resilience of farming and rural livelihoods be improved? What impact does labour migration have on farming systems and gender roles? How can women best adapt farming in areas of labour migration and still optimise benefits and ecological sustainability? How can gender roles be renegotiated? How can women farmers best be reached and supported? How can farming by refugees be supported?

Deadline for contributions 1 December 2000.

You are invited to contribute to these issues with articles (about 1800 words + 2 illustrations), suggest possible authors, and send us information about interesting issues, publications, training courses, meetings and websites.