Dear Readers

This issue highlights processes of farmer’s involvement in LEISA Knowledge building and sharing. An important source for international experiences was UPWARD (User’s Perspectives with Agricultural Research and Development) publication dealing with Participatory R & D for SA and NRM. Also, we have included experiences of NGOs and Public agencies in strengthening participatory research and innovation.

We would like to share with you that after serving with distinction, Ms Anita Ingevall, Director, ILEIA, has gone back to her former employer (Swedish Ministry of Foreign Affairs) as Senior Advisor in Sustainable Agriculture. We deeply and warmly appreciate her excellent leadership in stabilizing and enhancing the network of LEISA Magazines with focus on quality and relevance. We look forward to her continued support in strengthening the momentum.

We are happy to inform you that the new Director, Ms Edith van Walsum has taken over as Director, ILEIA from 1st January onwards. She has spent more than fifteen years working in rural Africa and Asia and was associated with ILEIA’s work now and then. She worked extensively in India, as Head of the AME programme till 2001 and also as freelance consultant. In fact, LEISA India was launched during her leadership. Her familiarity with Indian context should strengthen our crusade to promote LEISA more strongly and effectively.

The Editors

LEISA is about Low-External-Input and Sustainable Agriculture. It is about the technical and social options open to farmers who seek to improve productivity and income in an ecologically sound way. LEISA is about the optimal use of local resources and natural processes and, if necessary, the safe and efficient use of external inputs. It is about the empowerment of male and female farmers and the communities who seek to build their future on the bases of their own knowledge, skills, values, culture and institutions. LEISA is also about participatory methodologies to strengthen the capacity of farmers and other actors, to improve agriculture and adapt it to changing needs and conditions. LEISA seeks to combine indigenous and scientific knowledge and to influence policy formulation to create a conducive environment for its further development. LEISA is a concept, an approach and a political message.

14 From piloting to scaling up

Dindo Campilan, T.L. Lama, S.R. Ghimire and Oscar Hidalgo

Potato is an important food crop in Nepal. But average yields are very low, and successful production faces many difficulties: bacterial wilt disease, for example, can result in losses of up to 90 percent. In 1993, UPWARD started a research project aiming to help farmers manage this disease, recognising that technical solutions alone are not enough. So an integrated, community managed strategy was piloted, with interesting implications and results for the community involved. Since then, further efforts to scale up the learnings have employed the Farmer Field School approach. By involving the national government and different NGOs, these efforts have been successful in reaching more farmers.

AME Foundation promotes sustainable livelihoods through combining indigenous knowledge and innovative technologies for Low-External-Input natural resource management. Towards this objective, AME Foundation works with small and marginal farmers in the Deccan Plateau region by generating farming alternatives, enriching the knowledge base, training, linking development agencies and sharing experience.

AMEF is working closely with interested groups of farmers in clusters of villages, to enable them to generate and adopt alternative farming practices. These locations with enhanced visibility are utilised as learning situations for practitioners and promoters of eco-farming systems, which includes NGOs and NGO networks. www.amefound.org

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ILEIA is the Centre for Information on Low External Input and Sustainable Agriculture. ILEIA seeks to promote the adoption of LEISA through the LEISA magazines and other publications. It also maintains a specialised information data base and an informative and interactive website on LEISA (www.leisa.info). The website provides access to many other sources of information on the development of sustainable agriculture.
Participatory varietal selection and promotion programme 18

Yogesh K. Dwivedi

Discusses farmers' involvement in selecting and assessing suitable varieties in Participatory Crop Improvement Programme in Gujarat. The participatory processes not only resulted in developing varieties, most acceptable to farmers, but also enabled popularising these varieties in the adjoining areas.

The Kamayoq in Peru: farmer-to-farmer extension and experimentation 22

Jon Hellin, Carlos de la Torre, Javier Coello and Daniel Rodriguez

One of the most effective ways to address farmers' needs is through a farmer-to-farmer extension approach that also encourages farmer experimentation. This is clear from Practical Action’s work in Peru. The Kamayoq are farmers selected by their communities, who receive specific training and then return to their villages to train neighbouring farmers. They work with other farmers to develop solutions to local agricultural and veterinary problems, generally following a Participatory Technology Development approach. Positive results also include an increase in self-confidence among the Kamayoq and those working with them, something which further encourages local experimentation.

Farmer Functionary Research - an innovative methodology for transfer of technology 28

Nisha Aravind, Vinod Mathew, D. Rakhesh, Swapna T.R and Jinesh J. George

Sustainable agricultural practices are more knowledge intensive requiring holistic understanding of crop ecosystems. This calls for strengthening capacities of farmers not only to build their own knowledge but also spread to fellow farmers. To achieve these twin objectives, the Krishi Vigyan Kendra in Kerala, has adopted a Farmer Functionary Research Approach for training farmers in crop ecosystems and developing them as master trainers.
Knowledge building processes

Editorial

The concept of LEISA is constantly being developed as are the practices within the LEISA system. Farm practices for sustainability are much more context sensitive and knowledge-intensive than conventional approaches. More often, with focus of formal research on specialization and fragmented knowledge approach, the farmers concerns and abilities are not adequately addressed or integrated.

Farming communities for centuries have been responsible for the development of local practices well suited to their environmental and social context. They continuously adapted their practices with keen observation and innovation, thereby significantly building traditional knowledge for local use.

With changing lifestyles and external influences affecting successive generations, this knowledge is eroding with not enough attention being paid to preserve it and use it. While this is happening, the physical conditions, social and economic circumstances are changing faster than ever, the resources are getting degraded and scarce. Meanwhile, the competition for limited resources is increasing. Farmers are struggling to keep themselves abreast with these changes and make necessary adaptations to succeed. In complex rural environments, farmers are facing changing rainfall patterns, lack of access to markets, and increasing demands from the effects of globalisation.

In these situations, it is even more necessary to be able to constantly gain access to new information and knowledge, build and improve knowledge, and use it to adapt improvements to suit local conditions. Therefore, farmers not only need to improve their own understanding of alternative technologies and processes but also require adequate managerial abilities. As the entire production system cannot be changed in one go, farmers need to make mutual adjustments to incorporate new practices into their existing systems in steps.

Moreover, small and marginal farmers livelihoods are linked to farming. They need alternatives which are holistic, cheaper and less risky. They often need much more time to learn, experiment, and adapt them before they can decide when and how to use them. There is a need for farmers to have much more knowledge of crop ecosystem as a whole and the integrated farming system perspective.

Farmers will use new technologies only when they try and are convinced that these are useful for their overall farm management. Moreover, to move towards sustainability, options for natural resource management and utilization need to be combined and practiced. Gradually, they could integrate various farm enterprises in stages to move towards sustainable agriculture based on LEISA principles. This type of context specific LEISA knowledge is neither static nor readily available. This requires deliberate efforts to nurture and build capacities through participatory knowledge building processes.

Such processes facilitated by enablers involve the practitioners organized into groups, learning together, trying out options, jointly evaluating the results and sharing the learnings. These participatory processes of knowledge building would lead to empowerment of the communities, restore their confidence, ignite their innate innovative potential and prepare them to deal with new situations.

Participatory research

LEISA practices are highly location specific requiring holistic understanding of various biological processes leading to sustainable yields. This presupposes active participation of various stakeholders in the pursuit of knowledge generation as relevant to the local situations at various stages of development process. Inclusion of various stakeholders is necessary to promote meaningful exchange of knowledge and cross learning. In these processes, while the basket of options for practitioners widens, enablers become more sensitive to the concerns, preferences and needs of those whom they are addressing. Thus, participatory research methods become more meaningful to the end users of the technologies or innovations.

In the last twenty years or so, some efforts are being made in trying to involve farmers in field research. However, most formal research related to agriculture is still carried out at large research institutions. The extent to which farmers are involved in setting the agenda, in taking part in experiments, or in monitoring, evaluating or using the results varies a lot, but is generally very limited. Also, the efforts seem to be more focused on validating field results, with farmer’s involvement. However, there are sporadic efforts made by projects and civil society organizations in involving farmers at various stages right from problem identification. This has been possible through processes like PTD and FFS beginning with PRA. These processes enable active involvement of farmer groups in the learning processes while integrating traditional and modern knowledge. These processes heighten their interest and ability, are more empowering and fostering innovative spirit leading to location specific and context sensitive alternatives. However, these efforts are limited.

Thus, small scale farmers, with specific reference to knowledge, do face ‘exclusion’ at different stages and levels in research agenda setting, problem definition, knowledge generation, validation and sharing. The successes, are often, very limited or happen in isolation. Much greater effort is needed to get such information out to others, scale up and create a body of useful knowledge.
Effective approaches

Effective research and development approaches for low external input agriculture are based on making effective use of indigenous knowledge, optimal use of local resources, and linking and working together as organisations or individuals, in order to access other resources and types of knowledge. Additionally, research and development should be based in farmers’ expressed priorities and needs, and be multi-disciplinary and sensitive to day to day realities faced by the farmers.

Participation by farmers at all stages of the research and development process is the ideal situation. But in practice, participation is limited to certain stages. For instance, particularly in crop research programmes, where planning time-frames are short, it is more in a consultative process adopted in several stages. In such cases, though one stakeholder group takes the lead in setting the agenda and experimental design, emphasis is on consultation and gathering information from practitioners, in terms of identification of preferences, constraints and opportunities, setting priorities and evaluating results. For instance, the PCI programme in Gujarat (Yogesh, p.18) adopted Participatory Varietal Selection wherein farmers were involved in identifying, selecting and evaluating varieties suitable for their region. Participatory processes are more effective generally when a development agency or an NGO working in the area is also involved. For example, NGOs like RDT (Abdul Kareem, p.25) and ASA (Yogesh, p.18) played a crucial role in eliciting participation from farmers in crop research programmes.

On the other hand, participatory approaches aimed at community empowerment, enable people to develop skills and abilities to become more self-reliant, and to make decisions and take actions essential to their development. Such empowerment processes include methodologies like PTD, FFS, FFRA , are highly process intensive and take longer periods of time. For instance, the Farmer Functionary Research approach followed by the KVK in Kerala (Nisha Aravind, p. 28) enabled farmers to become informed decision-makers, making them useful research partners in field based research. Another example is illustrated by Ranjan Panda (p.12), how the confidence building process was effective in helping the local communities to come together to prioritise their own needs and address them together.

Who is participating in whose process? Often participation is related to how the roles are defined for various stakeholders. For instance, who sets the research agenda, how the problem is defined etc. They all do affect the process. These defined roles and relationships do have an influence on the outcome and applicability of the research. Research agendas set by outsiders normally differ from farmers’ priorities. Hellin, Bellon and Badstue (p. 6) examine these and other points, stressing the difference between research which is functional and that which aims to be empowering, how practical it is to integrate both, within the context of an international research institution. The article by Araya and Gebre Michael (p. 20) gives interesting insights into the different priorities of farmers, scientists, and extension workers, not to mention the young, old, men, women and those with more or less experience. They show the different perceptions and reasoning behind the choices and priorities given to new, local and modern ideas by different stakeholders. This shows that participation can be a complex issue. But, it is essential to be recognized that it is crucial at many levels and stages in the development and scaling up process. More so, when it is firmly believed that knowledge processes need to be based and strengthened through shared perceptions, understanding and abilities to put to use.

Contribution of farmers’ innovations

The fact that farmers innovate and experiment is not new. Also, it is known that they are few in number. Farmers are known for trying new ways of farming and innovating new practices. SRI method of paddy cultivation is a striking example wherein farmers have been adapting and innovating new practices forming a basis for new knowledge, for formal institutions to build upon. Thus, farmers experimentation could be a starting point for building new knowledge. Narayana Reddy (p.27) cites several practical alternatives, Chalasani Dutt (p. 29) in his diary describes an innovative technology of ‘vertical agriculture’ making it possible to grow ten types of vegetables in limited space available on the roof tops in urban areas.

Today, many organisations do recognise this aspect and are working to document and support the development of farmer innovations, which goes a step further than just encouraging participation in research. The next step could be to examine how best to support and sustain these processes, examine application of such knowledge, the role of outsiders in strengthening, validating or scaling up such innovative practices.

Moving ahead

Knowledge is not a resource which gets depleted when shared with others. In fact it gets enriched, when widely shared, be it across people, institutions or a wide network of organizations with built in feedback mechanisms on its application and use. The feedback mechanisms have evolved in a limited sense but the sharing mechanisms have become more diverse in recent times.

The mechanisms for knowledge sharing include the most traditional forms like farmer to farmer sharing to the most sophisticated forms using ICTs. Successful examples of ICT use include the e-choupals developed by corporate houses and the Village Knowledge Centers initiated by NGOs, reflecting the participation of interested stakeholders in identifying and disseminating useful knowledge.

By being involved in the process of integrating what they know with a wider basket of options that could be tried out, small-scale farmers are part of the knowledge generation, validation and spread processes. These processes do lead to restoring their confidence, improving their self worth as knowledge carriers in influencing others. More importantly, they become capable of asking right questions, choosing alternatives, making sound decisions and be able to face new situations.

Generation of knowledge is a process which is and needs to be ongoing, but that further steps also need to be taken to exchange, make the knowledge available to all, and most importantly, to act on this knowledge. In this issue of the LEISA Magazine we look at how knowledge about LEISA concepts is currently generated, shared and used by a variety of people working towards improved livelihoods in rural areas.
The Green Revolution, and more recent work on agriculture and rural development, has led to increased yields in developing countries of a number of crops, including maize and wheat. International agricultural research organisations, such as the International Maize and Wheat Improvement Center (CIMMYT), together with their national partners, played a key role in this process by developing improved crop varieties that spread rapidly in tropical and subtropical regions. The uptake of improved varieties has, however, been greater in areas with good irrigation systems or reliable rainfall. One of the reasons is that farmers living in more marginal areas are commonly faced with a range of adverse agro-ecological, social and economic conditions, including unreliable rain, low fertility soils, fluctuating market prices for agricultural products, and labour shortages. In this context, modern crop varieties (even if they are high yielding) may not be attractive to farmers unless they also possess other characteristics that farmers consider important. Maize is a good example of this, having been cultivated for approximately 6000 years in Mexico, a centre of origin. Maize stalks are used for fencing, husks for wrapping hot food and leaves for fodder. In marginalised areas, farmers also value adaptation to low soil fertility, drought, resistance to pests and diseases, and storability of grains and seed.

Science has a lot to contribute to agricultural development: farmers are eager to learn of new options and solutions to their problems, but in many cases do not have information about or access to them. For research to contribute to poverty reduction and greater livelihood security, the emphasis must be on the application of appropriate knowledge, rather than merely developing it. In order to make the products of the research process more relevant to the needs of smallholder farmers, research organisations are increasingly engaged in participatory research, whereby the research and technology development process focuses on and closely interweaves with the practical application of appropriate knowledge in real-life situations. Over the last 35 years, and in particular since the early 1990s, interest in participatory crop research and improvement has grown in recognition of its potential contribution to marginal areas with low agricultural potential. There is a need to identify crops and varieties that are suited to a multitude of environments and farmer preferences.

The participatory process involves narrowing the gap between research organisations’ and farmers’ realities by ensuring direct farmer involvement at different stages of the research process. There are two main purposes for which participatory approaches are normally used in the field of development research:

- Functional purposes, in order to increase the validity, accuracy and particularly the efficiency of the research process and its outputs. Functional purposes can, in turn, be divided into ones that inform, for example, plant breeders of the traits that they should be incorporating in improved varieties, and ones that cover farmers’ ability to manage better existing and new crop varieties;
- Empowerment purposes that enhance farmers’ capacity to seek information, strengthen social organisation, and experiment with different crop varieties and management practices. Empowerment also includes strengthening the capacity of NGOs and extension services to work more effectively with farmer organisations.

One of the challenges is to identify the comparative advantage of research organisations when it comes to participatory research: should research organisations attempt to cover both the functional and empowerment purposes of participatory research? Specifically, we need to consider:

- Under what circumstances is it reasonable to expect participatory research projects to have a direct impact on farmer empowerment?
- Should farmer empowerment be a primary objective of research organisations engaged in participatory research?
- Should research organisations focus more on the empowerment of partners such as national agricultural research and extension organisations?
- Should research organisations engaged in participatory research focus primarily on the functional purposes of that research and if so, should the emphasis be on informing breeders of the traits valued by farmers and/or enhancing farmers’ ability to manage local and improved varieties?

These are critical questions when it comes to identifying the most cost-effective ways for establishing links between scientific and local knowledge so as to generate more relevant research. CIMMYT’s experience with participatory crop
research in Mexico provides some answers to the above questions.

**Participatory maize research in Mexico**

CIMMYT carried out participatory crop research in the central valleys of Oaxaca in southern Mexico, an agro-ecologically and ethnically diverse region recognised as being within the centre of maize genetic diversity. Farmers in this region have a long tradition of cultivating maize and have maintained a diversity of local maize varieties. These varieties have considerable value for agriculture because they have contributed to the development of improved, drought-tolerant maize varieties that are popular elsewhere in Mexico and in other parts of the world.

Modern maize varieties have had an almost negligible impact in the central valleys, and while their virtual absence may or may not have helped to conserve maize diversity in the region, it indicates that scientific research has not provided farmers in this region with new varieties that address farmers’ needs. The objectives of the research carried out by CIMMYT were to examine the possibilities of maintaining or enhancing genetic diversity by increasing the benefits from growing local maize varieties while simultaneously providing scientists with information on the traits valued by local farmers.

The project included a participatory study of regional maize landrace diversity. This included the recording of local crop and soil taxonomies, and the collection and planting of different types of maize. Based on farmers’ votes, the project selected a subset of 17 different maize varieties, spanning a wide range of the regional maize genetic diversity. Farmers were able to learn about each variety’s performance at different stages in the crop cycle. Anyone who wished to do so could buy seed of the varieties that interested them and plant it in order to compare the material with their own local varieties under their own production conditions and management. The project also organised training sessions on maize reproduction along with seed and grain storage: different technologies were introduced, including a simple metal silo for storage, a technology little known in the area.

Through this research project farmers gained access to seeds and information about a range of maize diversity present at the regional level. A considerable number of farmers welcomed this opportunity. The training on maize reproduction, seed selection and management motivated some of them to try new management and storage techniques. Male and female farmers were trained in seed selection and storage practices, conducted experiments and gained access to new storage technology. Farmers who evaluated a selection of the 17 varieties in comparison with their own local ones verified that the “experimental” maize types worked well under their circumstances, and some were even considered to be better than some of the local maize varieties.

Farmers reported that they valued the training sessions and as a result they felt more motivated to try new management and storage techniques. In several cases, participating farmers had not been familiar with certain aspects of maize reproduction. While farmers knew that pollen from one plant had an impact on another one, most of them did not think of this as a sexual reproduction process. Many of the techniques for maize improvement can only make sense if one understands maize reproduction as a sexual process. Once understood as such, several farmers were keen to try new management techniques. The silos for seed and grain storage also proved to be very popular with local farmers.

Meanwhile, the project contributed substantially to scientists’ understanding of local maize agriculture and shed light on some of the traits that scientists should be focusing on in future crop breeding programmes. The research yielded important insights and large amounts of data regarding local maize agriculture and maize-based smallholder livelihoods, especially local seed selection and seed management practices, farmers’ knowledge of maize reproduction, and the importance of consumption characteristics. In this regard, the results of this research contributed significantly to the improved understanding of the mechanisms of local crop genetic resource management in a broad sense, those who are involved in it and the challenges they face.

The project assisted researchers in CIMMYT to identify key traits that can be the focus of crop breeding programmes. Farmers mentioned a large number of desirable traits, which can be divided into three categories: agronomic (including yield stability, drought tolerance and resistance to pests and diseases), consumption-related (quality issues related to local maize preparations such as tortillas and local maize-based drinks) and economic, such as the grain characteristics that meet market demands.

This improved understanding of farmers’ use and management of local crop genetic resources, in turn, has served to inform and guide further research both by national and international institutions, and has served as reference for development practitioners, academia and policy makers. Moreover, it has yielded important insights into different options for on-farm conservation of crop genetic resources. At the same time it has brought attention to a series of issues that are of importance from a farmer point of view in relation to maize and maize agriculture, and which may have important implications for the design and feasibility of further research or development interventions.

**Participatory research: what role for agricultural research organisations?**

The participatory crop research in Oaxaca was successful in terms of its functional and empowerment purposes: the interaction with farmers provided maize breeders with invaluable information on the traits that are of local importance. Farmers, in turn, learnt about maize reproduction and post-harvest storage, thus enhancing their ability to manage existing and new maize varieties. The Oaxaca example also demonstrated that while the participatory research
Participatory research initiatives carried out by research organisations often have insufficient presence on the ground, and do not involve the required interaction with farmers.

benefited scientists, only a relatively small number of farmers, albeit several hundred, actually benefited directly.

This should not come as a surprise: most participatory research initiatives carried out by research organisations do not have the sufficient presence on the ground, and do not involve the required interaction with farmers, to generate and support direct empowerment of more than a relatively few farmers. This would necessitate a longer-term and more direct interaction with farmers than that usually associated with how research organisations operate (many research projects only last between 3 - 5 years). In addition, the impacts of most participatory research carried out by research organisations on farmers’ innovation capacity and livelihoods are seldom sufficient, in themselves, to justify the expenditure of the research process.

The most effective way for participatory research processes to benefit a greater number of farmers is by close coordination and collaboration with organisations that are better placed to link farmers and researchers due to their relatively long-term contact with farmers. These organisations can include extension services, farmer organisations and NGOs. As these organisations focus on development rather than research, they are better placed to ensure that research results reach greater number of farmers and that in the process more farmers are empowered. Research organisations, therefore, need to give more attention to the empowerment of partner organisations: sharing with these organisations the insights and improved varieties generated by the targeted participatory research process.

Make objectives clear

Participatory crop research and improvement can undoubtedly contribute to improved understanding of farmers’ crop genetic resources management, and lead to better targeting of research and policy as well as practical recommendations for development interventions. The benefits of using participatory approaches in agricultural research are first and foremost their ability to bring to the research process new and important perspectives. These can help to achieve:

• Quicker and more widespread diffusion of technologies better suited to farmers’ needs;
• Better targeting of research and technology development;
• Lower costs of technology development;
• More efficient extension; and
• More appropriate policies.

At the same time, participatory research is also likely to contribute to local capacity building and, in the case of the individuals who take part in the process, to greater self-confidence and increased knowledge. However, unless the research process involves strong components of applied development interventions, or takes place in close coordination with practical development interventions (e.g. action research), the potential for impacts in terms of empowerment should be expected to be limited. Hence, rather than being a direct causal agent of actual empowerment and innovation at the farmer level, the role of participatory research may be principally to produce information, test methods and approaches, which in turn, feed into the generation of empowerment tools and initiatives. Meanwhile, others actors such as government or NGOs, have comparative advantages in relation to the role as direct causal agent of empowerment processes.

In summary, while both the functional and empowering purposes of participatory research are desirable and important, one should be clear about the principal purpose of using participatory approaches in any particular situation, whether primarily to improve the efficiency and the impact of agricultural research, or primarily as a means for empowerment of farmers as a worthwhile development outcome in itself.

This choice has important consequences for how we target participatory research and measure impacts.

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Visit our website: http://india.leisa.info
Peasant-led participatory research for managing chilli disease

R. Raj Bhansali and Arun Kumar

Jodhpur district situated in the western part of Rajasthan is densely populated. Popularly known as “Sun City”, it is the Gateway of Thar Desert. More than 20% of the cultivated area is under irrigation. Intensive agriculture is common in irrigated lands where commercial crops like cotton, chilli, cumin and groundnut are grown.

Osian Tehsil, an administrative block in the district, is well known for chilli cultivation. Chilli, grown for more than 70 years, occupies half of the cultivated area. However, high incidence of pests and diseases, particularly, the Leaf Curl Virus (LCV) and die-back disease, has resulted in high pest management costs. Continuous application of pesticides has resulted in vectors like whitefly (Bemisia tabaci) developing resistance, over a period of time. All these factors have led to gradual reduction in the cropping area. Even the popular land race, Mathania Red, known for its bright red colour and low pungency, is now on the verge of extinction.

Several institutions like the State Agriculture Department, Central Arid Zone Research Institute, Jodhpur (CAZRI), the Indian Council of Agricultural Research (ICAR) and the State Agricultural Universities are working at various levels to combat the dreaded diseases of chilli and to conserve the famous Mathania Red chilli cultivar. However, these have had limited impact owing to the absence of farmers involvement. Hence, CAZRI wanted to demonstrate the use of Raw Cow Milk (RCM) for managing the LCV disease in chilli, through the participatory research programme.

Peasant-led participatory research

Initially, farmer’s field in Mathania village of Jodhpur district was selected for management of LCV with RCM. A pilot study was conducted which resulted in more than 30% control of LCV disease with increase in fruit size and the number of fruits. After seeing the results of the pilot study, farmers from neighbouring villages got interested and were willing to take up trials on their plots.

In view of excellent results obtained with RCM and the enthusiasm expressed by other farmers, rigorous “On Farm” trials were initiated under Peasant Participatory Research programme in prime chilli growing villages. Interested and enthusiastic farmers were selected for the second phase of experimentation from Mathania, Tinwari and Balarwa villages. These were medium to rich farmers having irrigation facilities and who could afford to conduct on-farm trials on their plots. Farmers contributed their land for trials and labour facilities and who could afford to conduct on-farm trials on their plots. Farmers contributed their land for trials and labour for spraying RCM. Institutional inputs provided to the farmers included chilli seeds treated with RCM and logistical support. Treatments were executed, demonstrated and monitored.

Male members generally dominated the programme as they are the decision makers, particularly where adoption and implementation of new farm technology is concerned. But farm women having a major role in specific activities in farming as well as in animal husbandry were involved in operations like seed treatment, root-dip, transplanting, weeding and harvesting. Having a woman scientist in the team, however, would have enabled more active participation by women.

Farmers were convinced with the use of RCM as an ecofriendly pest management option. Besides, they willingly accepted the use of RCM for disease management for various other reasons as well. As rearing livestock was one of the main professions of farming community in the region, there was adequate supply of rawmilk for farmers to use as a pest management measure. Farmers were already using it in other vegetables and crops. Besides, cow milk was easily available with no health or environmental risks. Moreover, selling milk was no more remunerative owing to lack of milk marketing facility. All these factors encouraged farmers to use cow milk for the management of plant diseases, which also saved huge expenditure on pesticides.

Kishan Mela / Mirchi Divas were organised which helped in building better understanding among farmers and scientists on technology development and adoption. Such events also enabled dissemination of useful technologies. Clearly, farmer to farmer sharing and learning about integrated chilli cultivation spread faster among the chilli cultivators. In addition, the local press (e.g., Rajasthan Patrika, Dainik Bhaskar and many other newspapers) also played an important role in widespread dissemination among chilli growers.

Validation of local innovations with scientific experimentation adds value to local knowledge. Adoption of such new knowledge could be possible via “On Farm” research and demonstration. People’s participatory research is highly dynamic, demand based, cost-effective, eco-friendly and enables better adoption of alternative practices. The main focus is to forge sustainable linkage between the innovators, farmers and consumers, which forms the “Golden Triangle” of peasant-led participatory research. Moreover, traditional approaches of communication along with new methods of mass communicating tools for farmer-to-farmer exchange could greatly help in spreading the knowledge and its adoption.

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Cattle production in Central America is a source of stable income for livestock farmers. But in the eyes of environmentalists it is responsible for increasing deforestation. This contradictory picture emerged in the 1970s, when land allocated to agricultural production increased dramatically because of the increasing demand for meat, milk and other products. As a consequence of this huge demand, along with cattle production under unfavourable farm management conditions, serious environmental problems evolved. These included land degradation, and in particular, the degradation of pastures. In the region, more than 50 percent of pasture land is now degraded.

In 2003, the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) and organisations in three countries (Guatemala, Honduras and Nicaragua) began a project aiming to work with cattle farmers to find solutions to low productivity and environmental degradation. Partnerships were created between key stakeholders - farm families, local leaders and some crucial institutions- who have been involved in designing and testing alternative ecological, social, economic and political approaches for improved land use. By using a participatory approach, the project aimed to go beyond “local participation”, because a livestock production system is much more complex than a crop production system.

The case of El Petén, Guatemala

The region of El Petén in Guatemala is known not only for its tourist attractions -the Mayan cultural sites- but also because it is a very important agricultural region. Located in the north of the country, the population of this region has been expanding rapidly for some time now, due to a high natural population growth and increasing numbers of migrants coming in from other areas of the country. This region started to become an important production area in the late 1960s, when the national government promoted colonization to reduce the social conflicts in areas with less potential. More and more immigrants became involved in crop and animal production, using forest lands, and currently, more than 50 percent of the agricultural land is used for cattle production.

Most farmers in this region have long-standing experience in cattle production, but because of changing environmental and social conditions, some of the practices used are no longer appropriate. Farmers used to practice slash-and-burn methods of farming, but due to the population increase, such extensive production practices are no longer viable, fallow periods have been reduced, and more forest area is being cleared for agriculture purposes as well.

In 2003, the project team identified local partners in El Petén who were affected by these ecological and production problems and who were interested in participating in the project. After initial visits to the pilot area, the team identified two farmer groups: PETENLAC, a farmer cooperative founded in the early 1990s, and an informal farmer group, that we referred to as Ejido. The members of PETENLAC own their land while members of the Ejido group are farmers who rent land from the municipal government. The cooperative used to process milk into products such as cheese and cream, but now only functions as a milk collection centre. For the project, we regarded members of PETENLAC as medium-scale and those from the Ejido group as small-scale livestock producers.

PETENLAC farmers have, on average, about 84 hectares of land and own between 14 to 340 animals; the average land area allocated to animal production in three Ejido communities, El Zapote, La Sardina and La Pita, is 33 hectares, while animal ownership ranges from 7 to 98 animals. It was important to work with both different groups in order to be able to observe possible differences in group dynamics for participatory learning and experimentation. Aside from that, the focus of the project was on rehabilitation of degraded pastureland, hence working with farmers who own larger farms would give the project more chance to assess any impacts on the natural surroundings.

The members of PETENLAC and the Ejido group who finally participated in project activities were the result of a “natural” selection process. First, all members of the different communities were invited to a presentation of the project, where it was emphasised that the focus would be on research and training, requiring active participation by the farmers. The intentions of the project were explained in more detail during a follow-up meeting, when only those who were really interested attended. This was followed by a series of discussions and meetings where farmers were involved in diagnostic activities, including a problem identification exercise related to their farms.

Our approach

A participatory approach to learning and capacity building is the heart of this project. This entails programming a number of events and activities in accordance with farmers’ needs, their interest to learn from technical people and other farmers, and their willingness to share knowledge. Although the project’s aim is to look for alternative land use options in degraded...
Pasture areas, it did not start by introducing solutions and/or possible technologies that could alleviate the existing problems. Instead, it began with a prioritisation exercise of problems related to livestock production system. Using a “problem tree” analysis, farmers examined their own situation and identified factors causing the problem, as well as their short and long term impacts. In doing this, participating farmers got a broader perspective of the problems experienced, which helped in the identification of various research activities that could be implemented in farmers’ fields.

After the identification and prioritisation of problems faced by farmers, different activities were implemented by the project in collaboration with farmers. The Farmer Field School (FFS) approach was used; this implies that farmers do not simply listen to lecturers, but they are encouraged to experiment, discover and try to understand the different aspects of a problem through practical work and good observation. For example, the presence of spittle bugs (Prosapia and Aeneolamia species), a common pest found in pastures, was identified by farmers as a major difficulty. This was the first problem that the project focused on. Through a number of trainings, farmers learned about the pest’s life cycle, and about ways of controlling it. They made observations in their farms and learned how to monitor the pest population and then how to control it using a fungus, Metarhizium, as a biological agent. After all these activities, another meeting was held with the farmers, and possible causes of the problems with spittle bugs were discussed. One cause identified by the farmers was lack of knowledge about other types of fodder plants that could be grown on farms and that were less susceptible to spittle bugs. As a result training activities related to pasture adaptation to different constraints were also carried out by the project.

Unlike conventional on-farm trials, where farmers’ role is often restricted to providing farmland for experimentation, FFS promotes full participation of all actors in implementing the activities. This means that farmers and technicians are involved in designing the experiments. Based on their rich local knowledge and experiences, farmers identified the types of technologies to be tested, and the plot size to be used for the experiments. Certain technologies were suggested to farmers by the project team, but the farmers were not always interested in experimenting with those ideas. In such cases, the project would establish a demonstration plot with the consent of one or more farmers. This was the case with a leucaena fodder bank which was tried by one farmer. Only after this technology was proved successful, did other farmers become interested in testing it on their farms as well.

**Participatory processes**

The farms became “learning places” where farmers, along with researchers and field technicians, discover and learn how technologies work in the area. Again, not all farmers participating in the project are directly involved in on-farm trials. Only those who volunteered, and that we referred to as “experimenters” or “innovators”, were the ones testing some technologies on their farms. However, all farmers who are taking part in the project are involved in the evaluation of the experiments. This is particularly important since this approach allows for the incorporation of local knowledge in the interpretation of experimental results. For example, in the evaluation of the different improved pastures, the criteria used were determined by local farmers. These evaluation criteria were decided upon after asking the farmers, through focused group discussion, how they select pasture for their animals. Through these criteria set by farmers, participating farmers could easily relate to the experiments, and the feeling of ownership of the experiment was increased. Using farmers “language” or terminology, and including local knowledge, combined with technicians knowledge, played an important part in the projects’ success.

The learning process included regular visits to other on-farm trials where farmers could share their experiences and the problems encountered during the experiment. Each farmer-experimenter can compare his plot with that of other farmers and appraise his own performance. In one such case, a farmer-experimenter considered his experiments to be “failing”, after observing the “progress” made by a colleague. He decided to do his own trial again, taking into consideration what he had observed on the other farm, as well as what other farmers had mentioned as key elements for success, i.e., timing of planting and weeding practices. Finally, this farmer managed to conclude a successful experiment and he was pleased with the results.

Another interesting aspect of the participatory approach to experimentation in this project was that many participating farmers involved some of their children in the activities. Most of the local farmers are illiterate, and they were often accompanied in workshops and meetings by one of their older children. Such a son or daughter would then take notes for their parents, and can read and fill the evaluation forms during monitoring activities in the field. A lot of discussion between the parent and the child occurs during such type of activities, and this facilitates the transfer of knowledge between the older and the younger generation.

**Important questions**

While the implementation of this project has been successful, there are still some critical questions related to collaborating with farmers on the rehabilitation of degraded pasture land. For example, are we helping farmers to improve their pastures in a sustainable way with the methodology that we are using? Are we increasing their knowledge to allow them to make better decisions for their farms? Are we using an appropriate approach for sharing lessons learned among our local partners? And can we also influence policy makers based on the current project approach? Although further analysis is necessary, we believe we have made a good start and are on the right track.

The methodology that we are using is not new, nor is an end in itself. Instead of offering farmers solutions to problems they face, we persuade them to present their ideas on how these problems could be resolved. We encourage them to be innovative in finding alternative practices that could be tried in their fields. We do not provide them with recipes, but, where relevant, we suggest some technologies that could also be of interest in confronting their problems. In the end, it is the farmer who makes the final decisions.

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Empowerment processes – from hopelessness to informed decision making

Ranjan K Panda

Not much ago, say half a decade before, if any government official or politician visited Khamarbadmal, people would ask him to construct a road. Now, they would ask for a water harvesting structure. In this tribal village, NEED and not SCHEME is now the basis of planning - thanks to a local initiative, which tried to do what is important, often, conveniently ignored - involving people in planning their own development.

Only fifty kilometers from the district headquarters, Khamarbadmal village is located in Jujumura, one of the most underdeveloped blocks of Sambalpur district in Orissa. There are only thirty three families in the village, out of which, twenty are scheduled tribes, four scheduled castes and the remaining nine are backward classes. Forest occupies more than sixty per cent of the total geographical area of the village. Thus, it plays a major role in sustaining the people’s livelihoods.

The land holding pattern in the village indicates that, out of thirty three house holds, twenty one are small farmers, one is landless and the others are marginal farmers. Recurring droughts have ravaged the society. People have lost the spirit to cope with their lives. It was at this stage, Manav Adhikar Seva Samiti (MASS), an NGO based at Sambalpur, intervened.

“Owing to very low literacy rate and high incidence of poverty, organizing people was the most difficult task initially”, recalls Chittaranjan Hota, the Project Co-ordinator, MASS.

When enquired, the villagers talked about lack of roads, schools and electricity. Interestingly, they never talked about the drought which was forcing them to migrate out each year in search of livelihood options. No one talked about reviving agriculture and fighting health problems. Another major issue prevalent was ‘high rate of indebtedness’ among the poor. The local money lenders who exploited them so much that whatever little earning they were able to make would go to the money lenders. Put in this vicious circle of exploitation and drought, the villagers were low on self confidence and looked hopeless.

Women make the first move

In this context, community organizers from MASS went and talked to the women. “Why not we sit and think?”, the women were asked. As soon as the women met for the first time to talk to the women. “Why not we sit and think?”, the women started to tease "were asked. As soon as the women met for the first time to talk to the women. “Why not we sit and think?”, the women started to tease.

The SHG formation took some time – almost four to five months owing to initial hurdles. However, with constant counselling and the good results they experienced, the women took initiative to keep the SHG going. When the savings grew and the women started repaying the loans taken from money lenders, the menfolk realized that something is really happening. Properties earlier mortgaged to money lenders were gradually recovered. While the families benefited economically, the socio-cultural bonding in the village got new impetus. Gradually, the men started helping their women to attend meetings, trainings and do other works related to SHG.

Crisis management

Soon, members faced an unexpected development. The goats started dying owing to a ‘mysterious’ disease. The SHG sought help of the veterinary doctor who too was helpless. All the goats died. They were shocked. Meanwhile, they had to pay back their loans. With the help of the MASS, they planned a way out. They decided to pay back the bank loan by availing revolving credit support from MASS while earning through selling forest based produce like mahua, rolling bidi, Kendu leaf collection, leaf cup and plate making. This income helped them to repay the loans.

Tackling health problems

Gradually, the SHG with the guidance of the NGO, started to become a little more confident in monitoring and review processes. In one such participatory assessment, it was realized that maximum number of loans were being availed for health emergencies. As their village is remote, there was no doctor available. Being poor and awareness being low, they were being exploited by the quacks for minor health problems. The process they adopted, in general was, trying a home remedy, then Gunia (traditional healer), then quack doctor. Before going to the doctor finally, they were spending a lot of money for their treatment. Also, sometimes they were loosing their lives. Mortgaging land and getting indebted to tackle health problems was common.

Assessing the health needs of the area, MASS facilitated a health education-training program among the poor, illiterate women of the villages. Selected women from the village and neighbouring villages attended these trainings.

Through street plays, story telling, songs, teaching and games, the primary health care education was imparted. These trained women were identified as Village Health Workers (VHW). They could learn about different health problems; the causes, treatment and mostly the preventive methods. Then the VHW would go and educate the other villagers on these aspects. Gradually, they were able to deal with common ailments like diarrhoea, malaria, cough and cold, worm infestation and sun...
stroke. As incidence of malaria, diarrhoea and TB are the indicators of health status, the VHWs took up special training on how to deal with these aspects. Also, they are able to seek advice from qualified practitioners, when necessary. On the other hand, they are seen as enemies by the quacks. This was a challenge they had to overcome collectively. The positive outcome has been reduced health expenditures of the poor families.

**Addressing livelihoods**

This hilly, forested area, which did not suffer drought just few decades ago, is now recognized as a drought prone region. Though health education helped them in dealing with certain needs, their livelihoods were increasingly being threatened. The people had very limited understanding on the problems, the consequences and the approaches required to tackle them. For instance, they had no skills to use the local natural resources like land, forest and water for improving their livelihoods. While they lost touch with the past, the present top-down approaches of development have failed them. Repeated droughts were forcing them to migrate out and leave trails of distress back home.

"Initially whenever we asked them to narrate their primary problems, they would discuss about roads, electricity, community centre, playground, etc.," recalls Sukanti Parwar, a community organizer with MASS. Though they migrated every year, suffered the pain of being forced to go out in search of employment, they would not consider that as a problem and were not paying attention to why they had to migrate in the first place.

MASS took the initiative to help people ‘re’search their traditional knowledge on drought management. The Participatory Rural Appraisals they themselves carried out in the year 2001-2002 with 500 numbers of farm families. The PRA indicated that in spite of performing daily house hold work, 18% of the women were engaged in prawn seed and crab catching, 25% as agricultural labour, 12% in animal rearing, 3% in bidi making, 33% on household work and 9% migrated to cities to work as maid servants. Womenfolk work longer periods in farm and families than men though they are accounted only as labour.

In this fragile eco-system of Sundarbans, with degrading natural resources, KVK conducted various need based trainings and demonstration programmes based on situation analysis and preference matrix. These included agro based management, post harvest management, animal rearing, nursery management, food processing and use of gender friendly equipment to reduce drudgery.

The impact assessment in the years 2006 revealed that the adoption rate of nursery management, animal rearing and post harvest management is 40 - 45% whereas in case of agro based management, food processing and drudgery reducing programme is 30-35%. As a result of this knowledge empowerment, the women have gained self confidence and better social status.

**Participation of women in different micro situation based farming system of Sundarbans**

Manasi Chakraborty and Nilendu Jyoti Maitra

Women constitute about 300 million of population in rural India. More than 75% belong to the families of resource poor. They play a major role in farming system where they are involved in domestic, on farm, allied farm and even non farm production activities.

Studies on livelihood analysis were conducted by Ramakrishna Ashram KVK at five adopted villages under Joynagar-II and Pathar Protima Blocks of South 24-Parganas in the year 2001-2002 with 500 numbers of farm families. The PRA indicated that in spite of performing daily house hold work, 18% of the women were engaged in prawn seed and crab catching, 25% as agricultural labour, 12% in animal rearing, 3% in bidi making, 33% on household work and 9% migrated to cities to work as maid servants. Womenfolk work longer periods in farm and families than men though they are accounted only as labour.

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Piloting Action Research

From the late 1980s to early 1990s, a local research institute conducted several diagnostic activities to assess serious crop losses faced by potato farmers in Kaski district. Researchers from the Lumle Agricultural Research Centre (LARC) and local farmers jointly identified bacterial wilt disease as the single most important problem facing potato farmers: losses in yield were documented as being from 10 percent to over 90 percent. Its occurrence was mainly associated with the use of infected seed, along with planting in infested soil and poor crop management practices.

Introducing a socio-technical innovation (1993-98)

Since the early 1990s, the International Potato Center (CIP), through the Users’ Perspectives With Agricultural Research and Development (UPWARD) programme, has worked with various public and private sector organisations in Nepal to help potato farming communities address disease constraints. In 1993, UPWARD and the Lumle Agricultural Research Centre initiated a research project to help local potato farmers manage bacterial wilt. Drawing on previous research, including control measures for bacterial wilt based around seed and soil health, the project team formulated an Integrated Disease Management strategy with the technology components as presented in Table 1.

Table 1. Technical and social components of the Integrated Disease Management strategy for bacterial wilt

<table>
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<tr>
<th>Key technical components</th>
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<tbody>
<tr>
<td>- Elimination of infected planting materials</td>
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<tr>
<td>- Three-year moratorium on potato cultivation</td>
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<tr>
<td>- Use of clean seed and quarantine scheme</td>
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<td>- Rouging and field sanitation</td>
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<tr>
<th>Key social components</th>
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<tr>
<td>- Reaching community consensus on IDM implementation</td>
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<tr>
<td>- Formation of a village level committee to oversee IDM implementation</td>
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<tr>
<td>- Enforcement of community-agreed incentives and sanctions</td>
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<td>- Regular monitoring of IDM implementation by community members</td>
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However, in implementing this strategy, it became clear to the project team that the proposed technical solutions were not adequate to manage the disease problem. There were crucial socio-cultural and economic factors that hindered implementation of the technology components. For example, enforcing measures to control the spread of infected seed implied restricting the use of seed potato as a cultural symbol in traditional rituals (e.g. as wedding gifts). Most importantly, carrying out the entire Integrated Disease Management strategy required full community participation, since if only one farmer refused to stop planting potato this would create conditions for the pathogen to persist in the soil and spread in the community.

During a series of community meetings and with the guidance of the project team, local farmers identified the social measures needed to accompany the technical components of Integrated Disease Management (Table 1). To oversee its implementation, a village-level committee was formed to promote incentives for participation (e.g. introducing alternative food crops during the three-year ban) and to enforce sanctions for non-compliance with the jointly agreed strategy (e.g. imposing fines on farmers found to have planted potato during the three-year ban).

Impact evaluation

Project implementation was sustained in one village for a three-year period. All of the 51 farming households fully complied with the technical and social requirements of the strategy. In contrast, implementation of the same strategy came to an early end in the second village after the committee disbanded within a year of launching the project. Among the key reasons were: farmers’ perceptions about the committee’s lack of formal authority to assume “police” powers; the resignation of key committee members due to emerging conflicts with farmers in the latter’s performance of their assigned tasks; and the inability of individual farmers to cope with pressures to meet immediate food and livelihood needs of their own households.

The contrasting experiences unwittingly provided an opportunity to compare outcomes between the two communities. Post-project evaluation carried out after three-year implementation period revealed that in the first village, bacterial wilt was completely eliminated. In comparison, a disease incidence of 75 percent was observed in the second village.

Scaling up the innovation (1999-2005)

Following positive outcomes of the community-mobilisation approach, a follow-up project was launched in 1998 that aimed to implement integrated disease management in other key potato-growing areas across Nepal. CIP-UPWARD teamed up with the Department of Agriculture through its Potato Development Section. In planning to scale up the innovation for community management of bacterial wilt disease, the project team recognised that the innovation cannot exclusively focus on bacterial wilt because farmers in potato-growing areas face several disease constraints at any one time. In many cases, bacterial wilt is part of a broader set of problems that includes...
diseases, seed supply and quality, and general crop management, which need to be taken into account. In addition, to reach more farmers more quickly, a more extensive approach needs to be employed for facilitating group learning to help farmers manage location-specific constraints to growing a healthy potato crop.

The Integrated Disease Management innovation subsequently evolved into Integrated Crop Management of potato through participatory group training, based on the farmer field school (FFS) approach.

**Institutionalisation**

While the lack of any previous experience in potato FFS was a major bottleneck, the project benefited from an earlier programme in Nepal which focused on integrated pest management in rice. The approach for rice was adapted to suit the potato crop and the constraints being addressed. For example, rather than weekly training sessions, the schedule was adjusted to fit with the growth stages of the potato crop. Because there was a wide variability in potato systems and constraints among FFS sites, each group of facilitators and farmers developed their own locally-relevant training curriculum. Thus, although they had a common focus on seed health and late blight, each FFS decided to include bacterial wilt, true potato seed, and/or crop management. From 1999 to 2003, 1320 farmers in 14 districts across the country participated in FFSs on potato Integrated Crop Management.

At the national level, the project realised that sustaining these FFS activities would require longer-term funding commitment from the government. Extension workers were keen to implement FFS, but needed funding support to travel to remote potato farming communities and to secure clean seed and training materials. On the other hand, government funds can only be accessed if there is an officially approved allocation for potato FFS from the annual budget for agricultural extension.

Thus the project published and distributed training manuals for use by local extension workers, in partnership with CARE Nepal. These materials were crucial for FFS facilitators in remote villages with limited access to information sources. The project team also joined an informal advocacy network that sought to mainstream the FFS approach in Nepal’s agricultural extension policy. Consequently, the national government officially adopted the FFS approach as part of the agricultural extension strategy, under Nepal’s national development plan for 2003-2007.

This policy support paved the way for district-level agricultural extension offices to access government funds for implementing FFS activities. Similarly, NGOs have adopted the FFS approach to extend their outreach programmes, having found this to be consistent with the principles of community empowerment and locally-driven development that they promote. Between 2003 and 2005, 130 FFS activities on potato Integrated Crop Management were implemented and funded by various organisations in Nepal. By 2005, over 4000 farmers had already taken part.

**Lessons from the experience**

An initial impact evaluation was conducted in 2002 to assess changes in farmers’ knowledge and practice. Over 80 percent of FFS participants correctly answered a knowledge test on the judicious use of chemicals, and adopted the practice of using healthy seed. The evaluation also revealed wide diffusion of innovation, where an FFS participant shared information with an average of 18 other farmers. A follow-up impact evaluation in 2005 assessed longer-term outcomes, particularly the socio-economic benefits of the FFS to farming households. Similarly, findings indicated that maintenance and use of clean seed was the most common Integrated Crop Management practice adopted by farmers two years after the FFS. Economic analysis showed that gross and net returns to land and labour significantly increased post-training as compared to before the training.

However, the evaluation revealed that producing adequate supplies of clean seed remained a continuing challenge for farmers. Thus in 2006, the FFS approach was further adapted to focus production of clean seed through true potato seed technology, which makes use of botanical seeds rather than whole tubers. With funding from the Japanese government, local Nepal partners have since then conducted a national program to conduct FFS activities, this time with a curriculum centred on using true potato seed in on-farm seed production.

Agricultural innovations successfully introduced in pilot projects cannot be expected to have the same level of outcomes and degree of relevance when scaled up beyond the pioneering farmers and farming communities. Variability in needs, opportunities and conditions require that these innovations need continuous adaptation when introduced to other communities. Scaling up also requires a careful re-examining the means of dissemination and sharing. While the community mobilisation approach was shown to be effective in introducing an integrated socio-technical innovation, scaling up efforts required other learning mechanisms in order to reach more farmers.

**References**


An earlier version of this article was published in Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook (see Sources section). Enabling Nepal Farmers to Grow a Healthy Potato Crop.
The use of natural resources near the city of Iquitos, in the Peruvian tropical Amazon basin, is far from sustainable. Due to the high demand from the city for products from the forest, as well as increases in population, life in the rural areas has become very difficult for the local people. The products which they used to extract for their own consumption, such as fish and bush meat, are scarce nowadays. This results in malnutrition, mainly due to the lack of protein in the daily menu. Aiming to improve the livelihoods of the inhabitants, the NGO Asociación por la Amazonía (APA) started an EU-funded project in the river Momón in 2004, promoting sustainable natural resource management.

Alternative sources of protein
After the first rural appraisal it became clear that the problem of malnutrition was enormous; an alternative source of protein had to be found. In the first year of intervention, the NGO opted to promote poultry production. Every family could receive a number of chickens, which were meant to serve as the main source of protein. The first results were promising, but a wide range of diseases soon killed the majority of the newly introduced birds. A second attempt at improving the daily diet was to start producing beans. Villagers in different communities responded positively to the idea of growing beans, but it was difficult because of the insects. During a first meeting, villagers were asked to propose pest control techniques which they would like to try. The list of potential measures to try to control pests was enormous, ranging from manual methods (picking up all larvae) to the use of cooking oil and chemical pesticides (see Box). This showed that the farmers had done their own experiments with other crops.

After a long discussion, the group decided to try using a repellent made with spearmint (Mentha spicata, fam. Lamiaceae), and also to try using an extract of the barbasco plant (Lonchocarpus nicou, fam. Fabaceae), which is used locally to fish in the rivers.

Asociación por la Amazonía established contact with the local university, where several studies had been done on the use of repellents and plant species used for pest control. Their entomologist was willing to participate and provided the necessary technical details for the preparation of the spearmint and barbasco solutions. But it was not so easy to convince other staff of a full participatory approach: they all had a very traditional view on how to do research, and were only familiar with trials on experimental fields, where all conditions are perfectly controlled. Doing research under field conditions was a completely new approach for them, and the fact that the participating farmers would apply their own repellents in their own experimental plots was a step too far. Their reasoning was not new: the analysis has to be statistically sound and they have to be able to publish the results, for which all trials and applications have to be similar. Coming to an agreement, the team decided to include two students in the trials. They could spray all fields and help with the preparation of the solutions, thus guaranteeing some continuity and similarity throughout the whole experiment. This was to serve as an assignment for their thesis, which would count towards the students obtaining their B.Sc. degree in agronomy.

Trying things out
Each of the ten participating families made a small plot of 20 by 20 meters available, where two different varieties of beans were sown. The plot was divided into three different parts: one

Some of the possibilities for controlling pests mentioned by the Momón farmers

**Manual methods:** Pick up the larvae of the ants by hand. Capture the leaders of a row of ants.

**Repellents:** An extract of the yuguilla fish, smoked eel, strong fermented cassava beer, cooking oil, a mixture of salt and pepper, old motor oil, old batteries, human discharge, fishbone of the carachama fish, yeast, kerosene, an extract of the barbasco plant, an extract of spearmint, blood of a woman.

**Chemicals:** Lorsban (chlorpyriphos), Sevin (carbaryl), Aldrin (aldrin), Tamarón (metamidophos)

**Others:** Greet the ants every morning and ask them to leave the crops, make a fence around the crops, fill up the nests with petrol and blow them up.
Despite her students, the university entomologist became convinced of the usefulness of a participatory approach, results: disappointing, but in fact the bean trials led to many positive consumption is limited. The result of the process may seem surprising, no other farmers, either in these or other villages, are currently growing beans, so local bean controlling insects. However, no other farmers, either in these primary forests were cut for the first time had less damage by the leaf-cutting ants than those grown in secondary forests. And one of the bean varieties gave much better results than the other. At the end of the process, all participants were convinced that growing beans is a possibility in their area, and that doing so could improve their daily meal.

Overall results

Two years later, however, only some of the participants of this experiment are still growing beans. All of them have quite good yields, without using barbasco or any other product for controlling insects. However, no other farmers, either in these or other villages, are currently growing beans, so local bean consumption is limited. The result of the process may seem disappointing, but in fact the bean trials led to many positive results:

- Convinced of the usefulness of a participatory approach, the same NGO continued with its project and started promoting the construction and use of local fish ponds, with the same objective of improving protein consumption. Ponds were built using local materials, and then filled with young fish of local species. Special emphasis was put on local knowledge and on the participation of all villagers. Results have been positive, as fish caught in the rivers grow well in the ponds, they are not prone to diseases, and taste much better than beans.

- Those who participated in the experiment and grew beans became very active in the promotion of the fish ponds, recognising the need to add protein to their daily diets and the possibilities of doing so using their own resources and abilities. Awareness of these possibilities came alongside increased self-confidence and recognition of the benefits of working together.

- Despite her students, the university entomologist became convinced of the possibilities of working together with farmers and the rural population, realising how her profession could contribute to poverty alleviation and rural development. She developed a special interest in the exchange of information with farmers, surprised at the fact that the exchange of information and the development of new knowledge could easily take place during the same exercise. Her continuous participation showed that academic professionals can be convinced of a participatory approach if they see that the knowledge which results from such an approach is directly applied by farmers (in contrast to what commonly happens with their work).

Participating farmers visit each other’s experimental field and discuss the results of their trials.

This experience showed that it is possible to develop and try out new technologies by doing participative research. If local knowledge is seriously taken into account, and if research is oriented at a problem that the people themselves define, then this population will most probably be very willing to participate in the experiments. The outcome, however, may differ entirely from what is expected at the beginning.

PTD experiments are a “real-life” attempt at trying something out, and not just an appraisal or an identification of problems. As such, constraints commonly found in the field, such as time limitations, lack of resources, or difficulties with the local agricultural calendar, will have a large impact on the way the whole exercise works out. At the same time, a participatory process implies including different actors with different expectations and interests, all of which need to be considered. In this case, for example, we had students who wanted to obtain a B.Sc. degree, an NGO interested in completing its project, farmers who wanted to maintain a good relationship with the NGO, and researchers who wanted to publish their results. The effect that all these different expectations will have on the process is hard to predict.

Furthermore, the work of APA showed that a “real-life” experience is necessary to find out and analyse the technical and also the cultural considerations related to the improvement of a production system. All participating farmers were convinced of the difficulties posed by insects. But just as important were the local eating habits, and the fact that farmers and villagers in general were not used to eating beans. This cultural aspect became clear after the trials and the introduction of the fish ponds, but not before. The work of Asociación por la Amazonía also showed that when something does not go as expected, this provides a great opportunity for trying out new activities, and for learning things we could not have predicted or imagined. The introduction of fish culture corresponds much better with the local eating habits, and, because of their positive experience with the bean trials, most of the bean growers became very active in the promotion of the ponds. The overall result is an improved diet.

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Participatory varietal selection and promotion programme

Yogesh K. Dwivedi

After soil and water, seed is one of the most important components of agricultural production and has the potential to increase crop yield by 20-30% within a very short time, which not only eradicates problems of food security but also enhances livelihoods of poor people rapidly.

After a primary survey of the area, it was found that most of the growing cultivars are 30-40 years old, are low yielding and also vulnerable to pest and diseases. A number of open pollinated varieties (composite and synthetic not hybrid) of different crops are available in different ICAR research stations across India, which are high yielding and have resistance against insect-pest and diseases. However, very few farmers in the area have adopted improved varieties, due to inadequate exposure to acceptable alternatives.

**Participatory Crop Improvement (PCI) Programme**

Participatory varietal selection has emerged as the best method to identify farmers’ preferred crop varieties and their popularisation. The first phase of a Participatory Crop Improvement Programme was implemented by KRIBHCO (Krishak Bhatti Cooperative Ltd) in collaboration with the Centre For Arid Zone Studies (CAZS), University of Wales, UK under UK DFID’S Plant Science Research Programme between 1997-1999. The first phase programme played an important role in the introduction of Gurjari paddy variety in the area. Gurjari became the predominant variety (due to higher yield and resistance to disease and insect) in the area within 2-3 years, and reduced the area of the popular local GR-17 variety from 60% to 10%. Despite its better cooking quality, GR-17 has a longer maturity time and is more susceptible to insect and pest attack. However, Gurjari itself has problems of poor cooking quality and low market price, and therefore the need to continue varietal trials was felt. Subsequently, the second phase of the programme was commissioned, and is being undertaken by Action for Social Advancement (ASA), an NGO and CAZS in 12 villages of Godhra district of Gujarat.

The project was financially and technically supported by Centre for Arid Zone Study (CAZS), University of Wales Bangor under DFID’s Plant Science Research Programme.

Farmers as the main stakeholders were also the co-researchers in the programme in terms of evaluating various varieties. They not only spared their land but also managed FAMPAR trials on their own. Crop management practices were decided by the farmers and ASA was only a facilitator. Project has provided them only seed of new varieties based on their preferred traits. Farmers undertook participatory crop evaluation methods like Farm Walk. Pre & Post harvest Focus Group Discussions, Matrix Ranking and yield data collection facilitated by ASA.

**The roles and the process**

As project implementing agency, ASA was involved in selection of village, selection of farmers, identification of farmers’ needs, and in discussions with farmers evolved a basket of options based on their own preferences. Procurement of seeds was jointly undertaken from various research institutions. Several exposure trips were organised. Farmers participated extensively in meetings, field days and evaluation processes.

The project was conducted with over 200 households in 12 Villages. The project worked with three broad categories of the farm households namely upper, middle and lower classes with distinction of participating and non-participating households. Villages were categorised into following types based on the type of interventions, namely, PVS (Participatory Varietal Selection), IRD (Informal Research & Design), NPV (Non Project Village) and CV (Contact village). The degree of project inputs in terms of technical collaboration and trial management and monitoring varied. The PVS villages had highest degree of inputs from PCI project team, while IRD villages received only the tangible inputs like seeds.

Firstly, the head of the village or Sarpanch was appraised about the project, its objectives and benefits. Youth belonging to the same area and community were identified as community organizers. This was followed by several village level meetings. A series of meetings were organised to explain farmers the purpose of the programme. This resulted in several farmers agreeing to participate in the programme.

The PCI programme has four phases:

**Identifying farmers’ needs in cultivars:**

The range of attributes that farmers prefer in a variety differs widely from area to area and farmer to farmer. Besides agroclimatic conditions, socio-economic issues also influence a farmer’s selection of crop varieties. Better-off farmers have more resources, and their crop and varietal choice will be significantly different in comparison to poor farmers. A survey revealed that available crop varieties, which were recommended for the area by the State VRC, did not meet farmers’ preferred attributes in cultivars. The baseline survey of 1997 and Focus Group Discussion (FGDs) held with 10 project village farmers, indicated that varieties like GR-3, GR-4, GR-11, GR-17 and Jaya (15-35 year old) were used by farmers because of the absence of alternatives. These varieties are not only low yielding but are highly susceptible to insect-pest and diseases. During the discussions it was concluded that owing to consecutive years of drought, farmers are looking for early maturing crop varieties which the existing public agencies are unable to provide.

**Search among existing research and released varieties:**

After the farmers’ requirements have been identified, a search was carried out to identify and collect appropriate cultivars for inclusion in the selection programme. The varieties include national, state or regional releases, both recent and old, and also pre-release materials at an advanced stage of testing. Sixty five varieties of maize, paddy, wheat, mung, gram and black gram have been tested so far, from 35 research stations of 12 states. Twenty varieties of paddy from 18 different research stations and agricultural universities of different states have been tested. They constituted the available options.
Experimentation on its performance in farmers’ fields:
A total of 2000 FAMPAR (Farmer Managed Participatory Research) trials were conducted for 6 crops. In paddy, we have conducted 500 FAMPAR trials of 14 varieties. Four paddy varieties were identified and preferred by the farmers: Mahamaya of IGKVV Raipur Chhattisgarh, PR-116 of PAU Punjab, IR-64 of IRRI Philippines (in irrigated conditions), and Pusa-834 of IARI Karnal Haryana (in poor irrigation condition). These were compared to local varieties GR-17 and Gurjari. Three paddy varieties - Vandana of CURRS Hazaribag Bihar, Heera and Vanprabha of CRRI Cuttack Orissa are also in the pipeline, suitable for the poor farmers in drought-prone areas.

Analysis of results
Farm households reported strong preference for the Rice varieties namely Mahamaya and Gurjari over their existing variety GR-17. The yield increments are as high as 50% in some villages. Similarly, in case of wheat, K-9107, Raj-3077, Raj-3777 and GW-496 were preferred over the popular cultivar Lok-I. The yield increments are up to 30-35%.

Farm households reported decrease in the cost of production of paddy due to shift from GR 17 to Gurjari or Mahamaya up to 25%. The cost savings is in pest control and irrigation. Also owing to early maturity and harvest, it was possible to grow crops like wheat and chickpea subsequently. Early sowing of these crops saves one pre-sowing irrigation in wheat and early emergence irrigation in chickpea. Early sown crops further accrued advantages in terms of reaching early and high premium markets, escaping from pest attack and in terms of improved quality.

Besides, these direct benefits to farmers, there are environmental gains in terms of decreased use of soil and water polluting agro-chemicals, regeneration of micro-eco-system, balance of pest-predator cycle, reduced threat to human health by not using the agro-chemicals too frequently and unsafe ways.

On-farm crop diversity
The PCI has not only increased the potential for production but shows even great promise for increased on-farm crop biodiversity. This can be gauged from the fact that project has introduced and tested over 34 new wheat, 24 rice, 13 chickpea and 9 maize cultivars in less than three years time. The farmers maintain their own seed material to some extent.

 Farmers seed cooperative for seed supply
Sustaining the seed supply of farmer preferred crop varieties, carrying forward varietal selection approaches, promotion and wider dissemination after the project end is a major challenge. For this reason, a farmer’s seed cooperative, named Panchmahudiya Seed Production and Marketing Cooperative, was formed in 2000. In its first year, the cooperative produced and marketed 300 qtl (business of Rs 3.5 lakh) of seed of 4 identified paddy varieties. The seed quality can be better controlled. The profits of business cannot be taken by seed company or Sahukar, rather, they will be distributed amongst member of the cooperative. In Nepal, the NGO, LI-Bird, has successfully implemented this concept of seed cooperative under the same research project.

Constraints
The PCI programme falls short to achieve the quick spread of the “farmer-preferred-project–promoted cultivars”, despite, having demonstrated the actual advantages to all sections of community. In one village, it was found that varieties that were identified by PCI first phase and liked by farmers had disappeared due to unavailability of seed from existing seed supply sources of the area. Farmers lose their seed either through deterioration of quality (due to such external factors as storage or mechanical mixing), or because they have to sell or consume their whole seed due to financial problems. However, our study indicated that by 2001, newly introduced varieties had travelled to 25-30 non-project villages, through farmer-to-farmer spread, equalling a geographical spread of 60-80 kms.

Lessons learnt
The PCI programme has tremendous potential and, with little input requirement, can improve the economic status of farmers in very short time. The PCI methodology and small seed cooperative approach can be replicated in any part of India with any type of farmers very easily. Also, in many cases, the project has learned that the varieties which have been accepted by farmers, are not the ones that have been formally released, notified and recommended by the State Agricultural Universities (SAU) and State Department of Agriculture. Despite the well-organised formal structure for popularising new varieties, it takes 4-6 years for a new variety to reach a farmer’s field. Concerted efforts are therefore required to integrate participatory approaches into breeding programmes; and varietal release procedures need to be reformed in response to the results of farmer participatory interventions. These changes in organisation, methodology and policies are pre-requisites for the development of adaptable technologies for harsh environments.

Most importantly, the PCI programme has reinforced that farmers are better decision makers in their socio-economic environments and that they should be allowed to take crucial decisions while opening up the basket of choices for them.

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Local and “modern” innovations: what interests whom?

Hailu Araya and Yohannes GebreMichael

Ethiopia is one of the nine countries involved in the international network PROLINNOVA (Promoting Local Innovation). The Ethiopian programme, called PROFIEET (“Promoting Farmer Innovation and Experimentation in Ethiopia”), decided to set up teams of governmental and NGO people in different agro-climatic zones. In Tigray, the Northern Typical Highlands (NTH) team was formed between the Mekelle University, the Tigray Bureau of Agriculture and Rural Development (BoARD), the Institute for Sustainable Development (ISD), the Relief Society of Tigray (REST), the Adigrat Diocese Catholic Secretariat (ADCS) and the Tigray Agricultural Research Institute (TARI).

This Northern Typical Highlands team brings innovative farmers together around common interests so that they can solve their local problems faster than when working on their own. It also brings them together with formal research and development agents who want to support local innovation processes.

The team takes farmers’ innovations as starting points for Participatory Technology Development processes and extension. An exhibition of local and “modern” agricultural innovations revealed that smallholders and formally educated people from research centres and technology workshops have quite different interests. In this article we describe some of the local innovations exhibited and how farmers and other people involved in research and development differently perceive the local and “modern” technologies.

Farming technology exhibition

As part of its regular activities, the Tigray Bureau of Agriculture and Rural Development, together with the “Improving Productivity by Marketing Success” project of the International Livestock Research Institute (ILRI), organised the Agricultural Technologies and Marketing Strategy Exhibition. This was held in the second week of March 2006 in Mekelle, the capital of the Tigray region. Many government agencies, NGOs, private firms and Ethiopian and international research organisations took part. Some organisations brought farmers with whom they are working: either “model farmers” showing introduced technologies, or innovative farmers showing their own technologies. Of the roughly 2500 participants, more than 200 were innovative and model farmers.

As far as we know, this was the first time in Ethiopia that smallholders’ technologies were displayed side-by-side with “modern” technologies developed by research and private enterprises. The exhibition also included a five-day workshop, where many papers were presented and discussed.

In one part of the exhibition, experts from the Bureau of Agriculture and Rural Development and farmers from the various districts of Tigray presented different agricultural products, such as pulses, oilseeds, spices, vegetables, fruits and honey. Some processed items, including dairy products, were also exhibited and sold. Many people were buying and sometimes eating the products on the spot. There was also an exhibition of appropriate technologies related to beekeeping, water pumping, irrigation, ploughing, biogas production and much more. These were demonstrated by farmer innovators,

Box 1: Improved beehives and queen rearing

There is a long tradition of beekeeping in Tigray. Traditional hives are made of wood, dung and mud. A few years ago, the government extension programme and REST, a local NGO, introduced wooden top-bar beehives. In the village of Maysuru, in the Aherom district, REST field staff met a female farmer who has been actively experimenting and innovating in beekeeping. Giday Aregay is in her late 40s and has eight children. Because her husband has been ill for many years, she is responsible for supporting the household through farming and beekeeping.

Giday’s oldest son, a schoolteacher, bought her a modern hive for 450 Birr (approximately US$ 50). She earned 200 Birr with the first honey harvest and became convinced that beekeeping could bring a good income. At the same time, she wondered why the hives had to be so expensive, so decided to try making one out of local materials. She measured the “modern” beehive with a stick and then made a replica out of cow dung and mud.

She experimented with frame spacing and discovered she could harvest more honey using fewer frames than in the modern hive. She harvested 40 kg honey from her adapted beehive, 5 kg more than from the modern one. She attributes her better honey harvest and higher production of bee colonies to the insulating effect of the mud and dung during the cold and warm season. She also built hives for queen-bee rearing. Today Giday has 15 beehives: seven to produce honey and eight to produce bee colonies, for which there is a high demand on the local market (each colony sells for 450–500 Birr). Honey and bee colonies are now her main source of income.

Photo: Hailu Araya

The Mekelle exhibition

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extension workers, private firms and NGOs. Information was provided through photos, videos, brochures and pamphlets. Many of the visitors to the exhibition were attracted by the exhibits of beles processing (Opuntia sp.), solar technology and silk worms. Farmers, in particular, were interested in what other male and female farmers presented: technologies they had developed themselves. These included, for example, water-lifting devices, subsurface drainage systems, drip irrigation techniques, improved beehive and queen rearing techniques (see Box 1), a single ox plough, or a wild bee domesticating process for obtaining medicinal honey (see Box 2).

Differences in interests and perceptions

It was very interesting to observe how systematically the farmers took in the new information that the exhibition provided. Interviews with many participants and observations during the exhibition revealed that, during a first round on the first day, the farmers looked at all innovations, whatever their origin. At first they were interested only in the technologies, and not in developers of each technology. During second and third rounds on the first day, they sought information about the person or institutions behind each technology, and also gathered other farmers’ views. First they met with farmers they already knew, and then started talking with other farmers. They discussed the technologies exhibited: which ones looked easy to apply, asking if anyone had tried the technology and what their experiences were.

On the second day, the farmers selected and focused on the new technologies —whether “modern” or local innovations—that interested them particularly. After the second day, they spent their time trying to find out more about the skills and inputs needed for the technologies they had selected. They visited the exhibits according to their importance: giving most time to the technology which they found most important. After they had gathered all the information they wanted, they felt the was a waste of time to stay longer at the exhibition and workshop. They stressed that the exhibition was very useful for exchanging experiences and learning about new technologies.

But having locally-developed and “modern” exhibits side by side also helped us to see that the interest shown by farmers was not the same as that of other participants. Researchers, agronomists or other professionals were reluctant to visit what smallholders had developed and were interested in. They appeared to be drawn by the newness and attractiveness of “modern” technologies, and looked mainly at their productivity in quantitative terms. The few farmers with some formal education visited both types of technology almost equally.

The majority of farmers present, on the other hand, were drawn to those innovations most useful for small-scale farming. They were interested in the technologies they regarded as effective, easy to apply and inexpensive. They appreciated technologies that lead to higher production, but also asked about the market for the products, especially for more perishable ones like tomatoes. Besides productivity, they wondered about other qualities of the technologies and the knowledge behind them. They asked the local innovators numerous questions: how did you learn this? How long did it take to make it? Are the materials you used easy to find? Does your family understand and like this? What main problems did you observe? What is the cost? When the farmers saw the “modern” implements produced by industrial workshops, they appreciated them but did not ask as many questions as the agricultural professionals did.

Box 2: Domesticating wild bees for medicinal honey

Birhane GebreMariam is 35 years old. He and his wife have five children, some attend school and some herd goats, which Birhane also does. It was while herding five years ago that he, by chance, discovered a nest of tsedina — wild bees that live underground. This bees’ honey is used as medicine, e.g. for asthma, fever and heart ailments. The entrance to the tsedina’s underground nest is very narrow and not easily seen. Many people seek tsedina, and by digging the nest up and extracting the honey, also destroy it unintentionally. This practice has made them rare in some areas.

When Birhane was young, his mother died of a heart ailment. The medicinal honey needed to treat her could not be found on the local market. Remembering this, when he discovered the tsedina nest, he decided to move it to his farm. One evening, he and two friends dug out a cubic metre of earth which held the nest intact and moved it to the ground near his house. A year later, he started harvesting by lifting a layer of soil and putting it back again so that the hive was not destroyed.

The initial harvest was 2.5 litres of honey, which he sold for 150 Birr (approx. US$ 17). Over the years, he moved three more tsedina nests, complete with the surrounding soil, to his homestead.

Birhane now extract honey regularly, and because of his initiative, the traditional medicine is now available locally whenever needed. He has experimented with moving the hives in different seasons and harvesting at different times. He has learnt that the nests should not be moved during drought or in December/January, and that honey should be harvested only once yearly. But he would still like to learn more about the bees’ behaviour, and queen rearing. He would like to join other researchers and investigate the best location of the nests, and also look at competition and harmony between tsedina and normal bees.

There is obviously a gap between the experts and the smallholder farmers in Tigray. This creates a big challenge for groups such as the Northern Typical Highlands team, which try to bring all these actors in agricultural innovation together.

The actors in an effective innovation system need to believe in and like each other. Otherwise, they cannot combine forces to make the most of the agricultural potential in Tigray.

Observing how farmers learn from the new technologies exhibited by their peers and by modern workshops and research centres made us realise that most “educated” people in agricultural research and development understand little about what interests smallholders. They do not know what sort of things farmers want to spend their time seeing. We need to observe more closely what farmers are doing in developing their own innovations, and what type of information they seek from others to continue their own process of agricultural development. The exhibition provided a good opportunity to learn how information exchange to support this process can be improved.

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Governments have largely been responsible for research and the provision of extension services in Latin America. The emphasis has been on the transfer of technology, paying little attention to farmer innovation and experimentation. During the 1990s, however, structural adjustments led to a breaking down of classical agricultural research and extension services, to the extent that these services are now unable to address the needs of farmers living in marginal environments. In Peru, for example, the government agricultural extension programme run by what is now the Instituto Nacional de Investigación Agraria (INIA) employed 1400 extension officers in 1986, but fewer than 100 officers in 1992.

Private research and extension provision was expected to replace that previously provided by government. Few resource-poor farmers, however, are able to pay for this service and, as a result, it has generally been directed at larger commercial farmers. However, there have been a number of less well-known extension initiatives that have been able to address smallholder farmers’ development needs. The defining characteristic of these initiatives has been the training of farmer-to-farmer extension agents who both provide technical advice and encourage farmer innovation and experimentation. One such initiative is the Kamayoq in the highlands of Peru.

**The Kamayoq and provision of extension services**

Since the 1990s, Practical Action (formerly known as ITDG), a non-government development organisation, has been working in Quechua-speaking farming communities in the Peruvian Andes. Initially, the focus was on communities living in the valleys above 3500 metres. Here, the most common crops are maize, potatoes and beans. Many families also have one or two head of cattle each, some sheep and a number of guinea pigs (a food staple in the Andes). Since 2003, the focus of Practical Action’s work has broadened to include communities living at over 4000 m, where livelihoods depend on a combination of alpaca-raising and potatoes.

For over 500 years, the Quechua, like most Latin American indigenous peoples, have been undervalued and marginalised. Practical Action recognised that one of the most effective ways to address farmers’ needs was through a farmer-to-farmer extension approach that also encouraged farmer experimentation. Influenced by the pedagogic approach of the Brazilian educator Paulo Freire, Practical Action had had some experience with this approach in Kenya, where it had been involved in the training of “bare-footed” vets. In Peru, Practical Action developed a similar training approach: one that respects the cultural and social context of local farmers and which places an emphasis on active farmer participation and learning by doing.

**The Kamayoq in Peru: farmer-to-farmer extension and experimentation**

Jon Hellin, Carlos De la Torre, Javier Coello and Daniel Rodríguez

Women are active participants in the Kamayoq school and some have become Kamayoqs themselves.
In the early 1990s, Practical Action began to train a number of farmer extension agents, known locally as Kamayoq, focusing initially on irrigation techniques. The word Kamayoq actually dates from the time of the Inca Empire: they were a group of respected people who were able to predict the climate and, hence, were responsible for recommending suitable dates for sowing and other agricultural activities. In recognition of their importance, the Kamayoq were given food and land by the Inca State. The use of the word Kamayoq in Practical Action’s work reflects a link to the Quechua people’s historical past.

By the mid-1990s, Practical Action had recognised that smallholder farmers’ needs could best be met by broadening the focus beyond irrigation. In 1996, the project being implemented received increased donor funding and established a Kamayoq school in Sicuani, 140 km south of the city of Cusco, with the objective of training a group of farmers who would then be responsible for training other villagers. The school has been operating ever since. The farmers who receive training are selected by their communities, although there are a number of criteria that have to be met before a farmer can enrol at the school: the farmer has to be dedicated to agriculture, live in an agricultural community, and be an active member of that community. There is also a preference for farmers who are married and with children. There are no requirements, however, with respect to educational level, age or proficiency in Spanish. The Kamayoq are expected to return to their villages and train neighbouring farmers in many of the techniques that they have learnt at the Kamayoq school.

Practical Action has ensured that the Kamayoq do not become the promoters of off-the-shelf technologies. On the contrary, the objective is to encourage the Kamayoq to work with farmers to generate creative solutions to local agricultural and veterinary problems, a process known as Participatory Technology Development (PTD). This is important for two main reasons: firstly, active farmer participation is widely recognised as one of the key components of rural development. The confidence that comes from participation increases farmers’ ability to learn and experiment. Second, the ability to innovate is vital because biophysical, social and economic conditions change and farmers need to be able to adapt to these changing circumstances. Furthermore, farming conditions in the Andes are so complex and diverse that it is difficult to find a ready-to-use technology that needs no further adaptation.

A successful extension programme is therefore more likely to involve active farmer participation and to be characterised by joint problem solving rather than standardised solutions. This philosophy has been instilled in the Kamayoq from the beginning. The Kamayoq are encouraged to see themselves as key players in a two-way flow of information from the individuals and institutions promoting development, and from the local farmers to these same individuals and organisations. In this sense, the Kamayoq can be seen as facilitating the inter-cultural communication between the Quechua and the Spanish worlds.

The Kamayoq school

Training courses at the school take place over an eight-month period, during which there are approximately 27 training sessions. To date, approximately 200 Kamayoq have been trained, of whom 15 percent are women. At the school, training partly takes place in the classroom (in Sicuani), but mainly in different field locations so that the Kamayoq can “learn by doing”. Workshops take place in different communities, each of which has specialised in one or more key technologies. Instructors at the school include staff from Practical Action, long-serving Kamayoq and experts from regional universities in the cities of Puno and Cusco. During the training, the Kamayoq also visit INIA’s experimental stations, other NGOs working in the region, as well as large-scale farmers. Throughout their training, the Kamayoq establish contact with technical experts from the private and public sectors and with other farmers, a useful network which they can tap into when they need information and technical advice once they finish their training. This “social capital” is recognised by many as one of the greatest benefits of the whole course.

At the end of each eight-month course there is an internal evaluation. The evaluation covers the content of the training as well as the quality of the trainers. Based on this evaluation the following year’s course is revised. For example, in 1996-1997 the school focused on five technical themes: irrigation, Andean crops, horticulture, livestock and forestry. These themes were selected on the basis of the agricultural needs of local farmers. As a result of the evaluation, the course was amended, and

The Kamayoq and the search for a natural medicine

One of the biggest problems in sheep and cattle in the Andes is the parasitic disease Fasciola hepatica, commonly known as “sheep liver fluke.” This is a somewhat misleading name because the parasite is commonly found in cattle and guinea pigs, as well as in sheep. The vector responsible for the spread of the parasite is the common snail. Although F. hepatica rarely kills animals, it does incapacitate them (sick animals often weigh a third less than healthy ones). Infected bulls sell for under US$ 70 per animal, while healthy bulls sell for US$ 115 each. In the case of cows, there is a reduction of over 50 percent in milk production from infected animals. Weakened animals are also susceptible to a number of secondary diseases.

Few farm families can afford conventional medicines to control the disease. F. hepatica, therefore, represents a real threat to local people’s livelihoods. The discovery of a natural medicine to treat and control F. hepatica depended on a process of participatory research and development guided by the Kamayoq. A natural cure for F. hepatica in sheep was earlier discovered by Apolinar Tayro, a farmer from the community of Pampa Phalla who later became a Kamayoq. Between 1998 and 2000, the same farmer, along with Practical Action, national researchers and local villagers, experimented with a cure for F. hepatica in cattle as opposed to just sheep. Farmers played a direct and active role throughout. Farmers focused on a number of plants that were known to have medicinal properties. They tested medicines made from different combinations of these plants on their own infected animals. Experiments were designed to ensure that any treatment could subsequently be easily prepared and administered by the farmers themselves. The medicine, which contains garlic and artichoke, is administered to the animals in oral form. Farmers are now involved in experiments to find a cure for F. hepatica in alpacas.

The widespread use of the medicine has led to fewer sick animals, higher milk yields and diversification into a range of milk products including yoghurt and cheese. The natural medicine is also cheaper than conventional medicines. The cost of treating a sick animal with conventional medicine is approximately US$ 2.5 per animal. In the case of the natural medicine, it is US$ 0.60 per animal. We estimate that over 3000 families now use the natural medicine for controlling F. hepatica in the highland provinces near to Sicuani, and that villagers have treated approximately 30 000 cattle and 7000 sheep.

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The widespread use of the medicine has led to fewer sick animals, higher milk yields and diversification into a range of milk products including yoghurt and cheese. The natural medicine is also cheaper than conventional medicines. The cost of treating a sick animal with conventional medicine is approximately US$ 2.5 per animal. In the case of the natural medicine, it is US$ 0.60 per animal. We estimate that over 3000 families now use the natural medicine for controlling F. hepatica in the highland provinces near to Sicuani, and that villagers have treated approximately 30 000 cattle and 7000 sheep.
The Kamayoq are involved in many activities. Here, they are providing advice on honey production.

agro-industry and marketing was added as a sixth technical speciality area after 2000. This new area included subjects such as the elaboration of business plans for small agricultural businesses as well as agrarian law. In all, the six technical themes currently cover topics ranging from soil fertility to greenhouse vegetable production and cheese-making.

Language was an issue that was often mentioned in the earlier evaluations. The Kamayoq suggested that more Quechua and less Spanish be used in the trainings. There was also a request that the trainers used simpler words. The use of an alienating language. Spanish, is a particular issue for women. Hence, since the 1999-2000 course, the school also provides courses in the grammar and writing of Quechua.

The key to the success of the Kamayoq model is that farmers highly value the assistance provided by their fellow Kamayoq and are willing and able to pay for this assistance. Farmers pay the Kamayoq for their services in cash, in kind or in the promise of future help through an indigenous system known as “ayni”. It is farmers’ willingness to pay that makes the Kamayoq model so interesting. It is largely an unsubsidised farmer-to-farmer extension service with external financial resources only being needed to cover the cost of the training provided at the Kamayoq school.

Combining participatory research and development and farmer-to-farmer extension

Local farmers and Kamayoq work together to resolve priority agricultural problems. To date, examples of successful participatory research and development initiatives have included the treatment of a maize fungus disease; the control of mildew on onions; and treatment of animal diseases. The most sought-after service is the last of these, i.e. the diagnosis and treatment of various animal diseases. In each of the communities where Kamayoq live and work, mortality rates among sheep and cattle have fallen dramatically. One of the most interesting results of farmer innovation and experimentation has been the development of a natural medicine to control the “sheep liver fluke” (see Box p. 23).

Impact and scaling-up

The Kamayoq school is not expensive to run, and in some cases the Kamayoq are able to pay for part of their training. Still, it is unrealistic to expect them to cover more than a small percentage, so the continued success of this development initiative requires external funding. Another difficulty has been trying to get the support of the local government, or linking this experience with the existing technical schools found in the region. Many of these have discontinued their agricultural courses due to less demand, while the national government has still not defined a clear strategy towards extension or agricultural development.

However, the impacts of the Kamayoq are overwhelmingly positive. While farmers in this region used to produce only subsistence crops, they now, particularly the women, produce both subsistence crops and also onion and carrots, which they sell in the market. A very positive result is that most families have tended to use the increased income from market sales to pay for the education of their children.

At the same time, farmers are better able to detect animal diseases and take evasive action. In the past, they would often wait until the animals were sick and then seek a technician who tended to over-charge them, or just let the animals die. As mentioned, in the farming communities where the Kamayoq have been active, mortality rates among cattle have fallen dramatically. There is also evidence that the improvement in food security (brought about by improved agricultural and animal production) has led to the more sustainable use of natural resources.

More importantly, there has been an increase in self-confidence among the Kamayoq and the farmers who have been attended by the Kamayoq. Most seem willing to take part in local trials and experiments, something that has led, for example, to them growing other crops. In 1998, a group of trained Kamayoq established the legally-recognised “Asociación Kamayoq Toribio Quispe”, as an organisation which could represent them. The Kamayoq are increasingly being contracted by public and private organisations to extend the farmer-to-farmer training well beyond the communities and region where the Kamayoq have operated to date. In these cases, the Kamayoq are paid to act as technical instructors and the Kamayoq association facilitates this process.

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An earlier version of this article was published in "Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook” (see Sources section).
A promising groundnut variety for low rainfall areas

Abdul Kareem

Majority of the farmers in Anantapur district of Andhra Pradesh are resource poor, mostly dependant on dryland agriculture. The rainfall in this region is erratic and prolonged drought conditions are quite normal.

Groundnut is the major cash crop grown since 25 – 30 years. In the past, farmers were growing local spreading varieties. As the number of rainy days decreased over a period of time, farmers gradually switched over to bunch varieties, the most popular being TMV-2, released during 1960s. Though many bunch varieties like K-134, JL 24, Tirupathi varieties and Kadiri varieties were released by the Agricultural University and Department of Agriculture (DoA), TMV-2 prevailed for a long period, as seeds were readily available.

Over a period of time, the yields of TMV-2 have been gradually decreasing owing to various reasons - non-availability of pure seed; loss of genetic vigour in the available seed; small size of pods and kernels and increased susceptibility to pests and diseases owing to continuous cultivation.

The programme

Understanding the need for an improved groundnut variety suitable to Anantapur conditions, a programme “Farmer participatory development of grain legumes in Rainfed Asia” was launched during 2002. The programme was supported by IFAD. It was implemented by RDT/Accion Fraterna, an NGO, in collaboration with ICRISAT in Danduvanipalli and Rekulakunta villages. RDT/Accion Fraterna has been working in parts of Anantapur district for improving livelihoods through bringing about changes in agriculture, animal husbandry and promoting home-based activities, particularly for women.

The process

To start with, an awareness meeting was held with the farmers, Farmers identified constraints in groundnut production and also ways to mitigate them. Some of the solutions were also suggested by the Scientists. Based on the problems and possible solutions, it was decided to conduct “Participatory Varietal Selection” (PVS) trials to identify a suitable variety through Participatory Technology Development (PTD). The Socio-technical Organiser stationed in the village, ensured participation of farmers in every stage of PTD.

During Kharif 2002, a set of 8 groundnut varieties from ICRISAT and K-134 (Kadiri Research Station) and local variety (TMV2) were provided to 10 farmers in Danduvanipalli and Rekulakunta villages. Out of 8 varieties, 6 varieties from ICRISAT had crop duration of 120 – 125 days which are not ideal for Anantapur district. The other medium duration varieties were not suitable as the rainy period is short in the district. ICGV 91114 and ICGV 89104 were provided to around 50 farmers. Each of these varieties are early maturing varieties.

Farmers evaluated the varieties, considering the different traits like plant stand, resistance to drought, rejuvenation of crop after receipt of rains and with parameters of yield of pods and haulms. Short duration varieties, ICGV 89104 and K-134 also did not differ much compared to the local variety. Farmers observed that ICGV 91114 variety performed well and was therefore the preferred variety.

Replicating the trials

Continuing the trial, during kharif 2003 the PVS was taken up in Rekulakunta village again and a new village, West Narasapuram, with two short duration varieties ICGV 91114 and ICGV 89104. But as the rains were below normal during the year, with a total rainfall of 256.2 mm in 23 rainy days against the normal of 634.2 mm in 36 rainy days. Hence, sowings got delayed and the crop received only 227.1 mm rainfall during the crop period.

50 farmers each in West Narsapuram and Rekulakunta village assessed the varietal performance. Here too, ICGV 91114 variety performed well in all aspects with respect to pod yield, haulm yield, pods per plant and shelling percentage. In West Narasapuram village, farmers retained the seed and some quantity was shared with their near and dear.

ICGV 91114, the preferred variety

Continuing the trial, during kharif 2004, ICGV 91114 variety, which performed well in the earlier two trials, was introduced in Sivapuram village involving 50 farmers. ICGV 91114

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Village</th>
<th>Year / season</th>
<th>Yield of ICGV 91114 Pod (kg/ha)</th>
<th>Haulms</th>
<th>Yield of TMV-2 Pod (kg/ha)</th>
<th>Haulms</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>West Narasapuram</td>
<td>2003 Kharif</td>
<td>640</td>
<td>720</td>
<td>558</td>
<td>701</td>
<td>Drought period</td>
</tr>
<tr>
<td>2.</td>
<td>West Narasapuram</td>
<td>2004 Kharif</td>
<td>787</td>
<td>622</td>
<td>577</td>
<td>549</td>
<td>Receipt of rain better than 2003</td>
</tr>
<tr>
<td>3.</td>
<td>Sivapuram</td>
<td>2005 Kharif</td>
<td>1001</td>
<td>1024</td>
<td>874</td>
<td>951</td>
<td>Rains received are sufficient for crop.</td>
</tr>
</tbody>
</table>
Participatory Varietal Selection

K. Venkataranga Naika and C.V Prakashan

The goal of PVS is to efficiently transfer improved varieties to farmers field by understanding farmers preferences for varietal traits for conducting breeding and selection, determining the varieties that farmers want to grow; minimising the time required to move varieties on to farmers’ fields and to understand gender differences in varietal selection criteria.

Phases of PVS

A successful PVS has four phases:

1. Identification of farmers’ requirements
Farmers’ requirements are identified using several methods like participatory rural appraisal (PRA), examination of farmers’ crops around harvest time and the pre-selection by farmers, of varieties from trials of many entries, grown either on a research station or on a farm. In areas where there is a diversity of landraces in farmers’ fields, and where resources allow, the local germplasm can be collected and grown in a trial, on station or on farm, with recommended cultivars as a control. This process is carried out to identify the best performing landraces; to compare the performance of recommended cultivars with the local germplasm; to evaluate the extent of diversity in the trial; and to determine the degree of agreement between the names given to landraces by farmers and their phenotypes.

2. Search for suitable material and advanced lines
A search is made for cultivars that most closely meet the important identified characteristics particularly those relating to maturity, plant height, agro ecological niche and grain quality.

3. Experimentation on farmers’ fields
Trials are conducted on selected farmers fields. Various testing and evaluation systems can be employed and they vary greatly in the extent of farmer participation.

4. Wider dissemination of farmer-preferred cultivars
PVS is usually conducted with farmers situated in a small geographical area. Nonetheless, the cultivars that are selected will have a recommendation domain larger than the area of research i.e. a larger agro-ecological zone. The larger recommendation domain allows the economies of scale of the more formal seed sector to be exploited, and permits the dissemination to extend beyond farmer-to-farmer spread or community based seed production.

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Scaling up

For promoting a better variety across the region, Accion Fraterna took interest in spreading this variety along with ICRISAT / crop live stock projects. Following were some of the efforts made to spread the variety:

- Identification of farmers interested in new varieties.
- Selection of varietal plots on the road side to get publicity
- Providing breeders seed at nominal rate of Rs.10/- kg.
- Procuring the seed from farmers and distributing to other farmers.
- Giving wide publicity through newsletters and media.

By Kharif 2005, the variety has spread to 41 villages, extending over an area of 704 acres. The variety also spread to two villages of the neighbouring district of Karnataka.

It is fascinating to note the sustainable performance of ICGV 91114 groundnut variety, even in adverse conditions and the increasing demand for the seed. Sri Y.V. Malla Reddy, Director Ecology & HRD of Accion Fraterna has aptly named the variety as “Anantha Jyothi”, the light of Anantapur.
Participatory technology and development

The research in agriculture has been confined to laboratories of the Research Institutes and Universities. The scientists most of the times, are not exposed to the ground problems faced by the cultivators. However, farmers did use the transferred technologies very efficiently. But, if the scientists can join the farmers in any new research or while introducing a new practice it can help the farmer more effectively. Also, the scientist can get new ideas in identifying and solving the problems.

During 1976 – 77 monsoon, the extension officer of the Agriculture University, introduced a new technology of cultivating soyabean as an intercrop with rainfed maize crop. It was advised to prepare 2’ x 2’ ridge and furrow and to dibble the maize with a spacing of 1 foot within a row and 2 feet from one row to another. Soyabean had to be dibbled at a distance of 4 inches between the maize rows. This is a very good practice as we can get 3 to 4 quintals of soyabean additionally, spending only on soyabean seeds. Further the soyabean plants provide a live mulch, suppressing weed growth, and supplementing nitrogen for maize crop.

Accordingly we prepared 2’ x 2’ ridges and furrows uniformly. Just before dibbling maize seeds, I thought about earthing up of the maize (supporting maize plants with mud to discourage lodging when the maize crops grow big and heavy). This needs minimum 1.5 feet vacant place between 2 rows of crops. If we had planted maize at 2 feet from row to row and planted soyabean in the center we would have had only 1 foot distance between every maize and soyabean row.

Ideas were drawn on a sheet using different spacings. Based on that I decided to prepare ridges and furrows again at 2 ½’ x 2 ½’ and 1 ½’ x 1 ½’ rows simultaneously. This way it was possible to dibble 2 rows of soyabean between 2 ½’ x 2 ½’ rows and keep the simultaneous 1 ½’ x 1 ½’ rows vacant for using it for digging mud at the center for earthing up the maize plants.

I ploughed back the whole area and prepared the land accordingly. This little change in designing the rows also had the same population of maize and soyabean, still making available space for earthing up. The scientists who visited the land several times, appreciated the modification in the preparation of land for sowing.

Most of the literature available or taught for preparing neem solution for pesticide use says that to prepare 15 litres of pesticide, one needs to pound 1 kg of well dried neem (free from fungal attack), tie it in a cloth and soak in water. This way, for preparing 225 litres solution for 1 acre, we need 15 kgs of pounded neem seeds tied up in cloth bundles. It is better not to tie in the cloth, instead soak directly in water and mix it thoroughly, and strain the mixture in a cloth. The product will be much better, as it gets mixed easily than being tied in a big cloth bundle.

As a pest management measure, the extension officers mostly recommend to hold a long string by 2 or more people, above 8 inches from the paddy fields and move it fast. This will make the insects on the crop, fall off into water mixed with kerosene and get killed. This is a difficult job for the men moving the string, demanding bending their bodies all the time. But, farmers have found that only one person can do this job shaking the paddy plants with 6’ to 8’ long bamboo branch, just by walking. It would be better if the scientists could appreciate such innovative practices adopted by farmers and popularize them through their extension workers.

Some farmers have reduced the cost of drip irrigation system by installing lateral pipes at 4 feet distance instead of 2 feet, to grow vegetables by shifting the laterals at necessary intervals of time. They laid one drip line at a distance of 10 feet between rows and planted banana on both sides in a zig zag way, so that they were 2 feet away from the drip line. This not only saved a lot of money but also water consumption, accommodating more sun light. It is also more spacious for growing vegetables and inter cultivation among banana after vegetable harvesting.

If the research scientists and the innovative farmers get together in research and development of agricultural technologies, they could be more efficient and useful for the welfare of the country and farming communities.

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Farmer Functionary Research – an innovative methodology for transfer of technology

Nisha Aravind, Vinod Mathew, D. Rakhesh, Swapna T.R and Jinesh J. George

In Kerala, factors like narrow land-man ratio, depleted forests and farm environment due to the combined effect of environmental degeneration, over reliance on fertilizers and poor farm management practices have led to declining farm yields. The outlook of the farm population is also changing owing to increasing exposure to urban life and mass media. Many of the farmers now think that farm life is dull with drudgery, and not a paying occupation. Added to this, are the factors like lack of technology and research support. It is necessary that appropriate, location specific, ecologically sustainable and economically viable technologies that are suitable for the resource poor farmers are developed and disseminated. This is best achieved when innovative technologies are tried and validated on farmers’ fields than relying on demonstrations in research stations.

The FFR approach
The Farmer Functionary Research (FFR) approach is a participatory approach to build capacities of farmer groups in managing crop ecosystems and making them better decision makers in promoting sustainable use of resources at the cropping, farming and watershed system levels. Besides, the approach aims at identifying and training master farmers who would help in further scaling up. In FFR approach, need based season-long training is organised to farmers emphasizing discovery learning. Training is provided on the farmers field itself enabling better understanding of the field problems, their management and control.

The learning process
KVK in collaboration with Department of Agriculture under NWDPRA adopted Farmer Functionary Research Approach (FFRA) with Participatory Technology Development (PTD) as an entry point activity.

FFR was started mainly to train farmers in a specific technology with the objective of developing them as master farmers. Based on learning and experiences, the process was built progressively to address complex needs at the cropping and farming system levels. With issues emerging along the process, strategies and approaches were refined. Gradually, experimentation and technology development was also included into FFR through PTD for exploring various technological options (both indigenous and external) on issues identified in crop management.

PTD process was chosen as an entry point programme. In dialogue with farmers and institutions like the Department of Agriculture and Regional Research Stations, the immediate problems were identified. Farmers drew the decision matrix for different technologies. This decision matrix clearly reflected that farmers were aware of the positive aspects of improved technologies but were somehow not practicing them.

Based on the above decision matrices, four technologies - Vanilla, Mushroom, Tissue culture Banana, Vermicomposting, were identified to be carried out as trials on selected farmers fields. Accordingly, 138 farmers from seven watersheds did comparative analysis on the growth, yield and bunch emergence parameters of tissue culture and sucker banana; 33 farmers from nine watersheds did on-farm testing of different species of earthworms on vermicomposting; 41 farmers from five watersheds were experimenting with Vanilla vines and rooted cuttings; 12 farmers from three watersheds compared the efficacy of two species of Oyster mushroom.

Selected farmers were organized into groups to create mechanism for joint learning. Farmers practicing same technology were organized into one group. As a group, farmers learned faster and the group served as a source of inspiration and encouragement.

Trials were carried out in the farmers fields. All the inputs for carrying out the trials were provided by KVK. The parameters to be observed in different technologies were identified and farmers recorded the growth parameters of each technology on a weekly basis. Monthly meetings were organized in the farmers plot. Farmers, experts, Dept. Officials and KVK staff were involved in discussions and identifying solutions.

The members in these groups worked in small groups to conduct experiments, collect data from the field, generate analysis through discussion, present results and make group decisions for field management. Farmers held weekly group meetings in the field of each group member. During the meeting they shared their experiences. Details discussed in the meeting were noted in a register which was maintained by the secretary of the respective groups. Major focus was given to the constraints encountered by the farmers. Some of the constraints were solved during interaction of these farmer members. For problems which could not be solved within the group, experts advice was sought.

Field data was collected by individual farmers based on the given parameters. Data were recorded in a Diary provided by KVK and a separate notebook was maintained for recording informal observations. Coding of field data was done by Convener and Secretary along with farmers in a evaluation workshop. KVK carried out statistical analysis in collaboration with University staff. Results were discussed in monthly meetings.

Farmers compared actual experimental results with practices that were used before. This also included the “Stop and Go” method, where any particular treatment were stopped and re-introduced several times to show its effect. Results were quantitative as well as qualitative.

Evaluation workshop
After completing the experiments, the group consisting of master farmers as well as other experimenters came together for an evaluation workshop. The participants discussed the results and factors that influenced them. Results of the experiments were reviewed, looking into each of the criteria defined by farmers and KVK staff during the design stage, as
difficulties, making crop management decisions based on the watersheds. Selected master farmers, took up the responsibility of training in different watersheds in each technology. These outstanding farmers from FFR were grouped and retrained as farmer trainers. Two weeks of training of trainers (TOT) was imparted to these farmers by the department. After the TOT, in few initial trainings, each group was tied up with KVK trainers to further sharpen their training skills. Once fully trained, they were approved as master trainers in the department, for imparting training in a specific technology, in the watersheds.

**Conclusion**
The FFR approach enabled farmers to become informed decision-makers, making crop management decisions based on learnings on their own fields along with training received. As a result, farmers moved away from excessive use of agro-chemicals towards more environment friendly and sustainable crop management practices. By this, they also experienced reduction of input costs while maintaining or even improving crop production.

Farmers were involved in all stages of the process from setting the research agenda and the experimental treatments, conducting observations and discussing and interpreting results. With renewed confidence, farmers had become useful research partners with research institutes and extension staff, in field-based research.

**Farmer’s diary**

**Vertical agriculture**

**Chalasani Dutt**

In India, farmers born after 1950 will be puzzled if they are told that crops can be raised without the use of manmade chemical fertilizers and pesticides. But that is what have precisely been doing since 1995 in our family-owned Prakash Bio-Organic Farm. We have not innovated anything. We are only adopting what farmers have been following for thousands of years before the advent of chemical fertilizers and pesticides. We follow the time-tested, traditional techniques and adopt the best and the latest organic practices.

Azolla, introduced on the farm, serves as a feed for livestock and an organic supplement for plants. Chemical manures and pesticides are not at all used on the farm. Vermiculture, composting, pancha gavya, amrith jalam, bio-dynamics, effective microorganism, amino acid (fish), sub soil rain water harvesting and apiculture are some of practices followed on the farm to promote crop yields. Every day, we perform ‘homam’ and play music as both of them contribute to better growth of plants.

We follow a lot of eco-friendly practices. We use neem, garlic, marigold, tulasi, basil and aswagandha grown on the farm to help control nematodes and prevent pest infestation. Twenty types of herbal leaves available from the farm are fermented with cow urine and E.M. Solution and mixed with vermiwash to serve as a foliar spray. All the bio integrated farm components are being effectively harnessed to attain sustainability on the farm. On-farm organic wastes like weeds, coconut leaves, coconut husk and outer shells, and trimmings of cocoa, gliricidia, jatropha, drumstick, henna and custard apple are recycled into compost to provide excellent nutrients to the crops. We observed that, the incidence of ‘mite’ can be arrested when two pure copper rods of 6mm x 250 mm are perpendicularly inserted in the trunk of the coconut tree enabling the sap to get converted into copper oxi chloride on a continuous basis.

Vertical agriculture is another innovation developed for producing about 10 types of vegetables in limited space available on the roof tops in urban areas. The method is described below:

Take a drum with a capacity of 200 lts. Remove the top and the bottom portion. Make 6 holes each at two variable heights – one level at the bottom portion and another a little below the top portion. Each hole of the diameter 8-10 cm. for the air to flow freely. Fill the drum with straw, crop wastes, dried leaves and sprinkle water. In a few days, these materials decompose and it comes close to the holes made at the bottom portion. Plant the saplings through these holes. As the plants establish and grow, see that it comes out of the hole having its base within the drum. Again fill the drum with the wastes as done before. When the decomposed material fills to the next level of holes made, again plant saplings so that they grow out of the holes. By this method more than 10 varieties of plants can be grown from one single drum.

Prakash Bio-Organic Farm, the first in Andhra Pradesh has been certified organic by Skal International. It has supplied Totapuri Mangoes to ITC Limited. ITC produced pulp out of the mangoes and exported it to the U.K. “The quality of the farm produce is superb”, commends ITC. The produce tastes great and its preserving quality, incredible.

**Chalasani Dutt,**

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The three volumes which constitute this sourcebook aim to inspire and guide aspiring and new practitioners of Participatory Research and Development (PR&D) to learn, reflect and constantly refine the way they work. The target users are field-based researchers in developing countries involved in natural resource management, agriculture and rural livelihoods activities. The book is intended to enhance access to information on field-tested PR&D concepts and practices among field practitioners and their organisations. It is envisioned as a general reference and comprehensive overview, showcasing the rich diversity of perspectives on PR&D. The printed version of the book consists of three volumes in a box, and is accompanied by a CD ROM which provides all the papers in digital form (pdf files). The three volumes are available at http://www.cip-upward.org and http://www.idrc.ca sites. A Spanish edition of the sourcebook will be available from September 2006. For inquiries, contact CIP-UPWARD as above.

Agroecological innovations: increasing food production with participatory development by Norman Uphoff (ed.), 2002. 306 p. ISBN 1 85383 857 8. Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk ; http://www.earthscan.co.uk

This book presents a collection of innovative, successful and diverse approaches to agricultural development. Documented in 12 case studies from Africa, Asia and Latin America, these approaches draw upon greater knowledge, skills and labour input, rather than on larger, unsustainable capital expenditure, and are shown to increase yields substantially, sometimes doubling or tripling output. This volume presents both key concepts and operational means for reorienting agricultural efforts towards more environmentally friendly and socially desirable approaches to the pressing problem of food security in the developed as well as the developing world.

Beyond participatory tools: field guide by Tafadzwa Marange, Mutizwa Mukute and John Woodend (eds.), 2006. 66 p. ISBN 0797431195. DFID Crop Post-Harvest Programme Southern Africa, P.O. Box CY 2855, Causeway, Harare, Zimbabwe. E-mail: tafadzwa@ecoweb.org.zw

Primarily intended for development facilitators who work directly with communities, this field guide was written because of the growing evidence that many people who use participatory tools need more understanding of why they are using them, not just how. It provides a good understanding of what lies behind the tools, which should allow us to question them, adapt them and develop them further. The manual is experience-based and draws on the various experiences of three organisations (PELUM, the DFID Crop Post Harvest Programme, and VECO Zimbabwe) and the partners they have worked with in eastern and southern Africa where the social, ecological and political conditions are similar.

Participatory Technology Development (PTD): linking indigenous knowledge and biodiversity for sustainable livelihoods by Maruja Salas, Xu Jianchu and Timmi Tillmann, 2003. 176 p. ISBN 7541618713. Yunnan Science and Technology Press, Press Building, Huanchengxilu No. 609, Kunming, Yunnan 6500034, China. E-mail: contactus@cbik.ac.cn; http://www.cbik.ac.cn

Participatory Technology Development (PTD) aims to strategically enhance indigenous knowledge as a means of generating indigenous innovations and to support indigenous innovators in their socio-cultural and biophysical contexts. Providing training material for capacity building of community facilitators, researchers and technicians, this field manual aims to aid field practitioners working with ethnic communities in Southeast Asia and Southwest China. It is based on an adaptation of the PTD approach to a learning process undertaken in eight villages in Xishuangbanna, a tropical rain forest area of Yunnan populated by several ethnic minorities whose livelihoods are undergoing externally driven changes.


The second number of FARM-Africa’s “Project Experience Series”, this document reports the key experiences and lessons learned during the implementation of a project on Farmer Participatory Research (FPR) in Ethiopia. Carried out by FARM-Africa and various partner organisations concerned with agricultural research, development and education, this project focused on establishing a wide base of knowledge and skills in FPR and creating an enabling environment for applying the approach. A large number of government staff were trained in FPR, and many farmer led participatory on-farm trials were supported. The four years of the project were an intensive learning process for all partners involved. The key elements that supported the institutionalisation process were identified and valuable lessons were generated from the gained experiences.

Investing in farmers as researchers: experiences with local agricultural research committees in Latin America by Jacqueline Ashby, et al., 2000. 199 p. ISBN 9586940306. CIAT, Publications Distribution Office, Apartado Aéreo 6713, Cali, Colombia. E-mail: ciat@cgiar.org; http://www.ciat.cgiar.org

A Local Agricultural Research Committee, or CIAL is a farmer-run research service that is answerable to the local community. The community elects a committee of farmers, the CIAL, which conducts research on priority topics and reports its results back to the community. Both the CIAL members and the community benefit from this approach. This report describes the history and results of a number of CIALs in Ecuador and Colombia. It is an impressive example of how poor farmers can help themselves and their community to increase food security. The report ends with a long list of research topics investigated by CIALs all over Latin America, including the development of local crop varieties, resistance to pests or adaptation to local soil conditions and evaluation of livestock diets. There is also a bibliography with training materials and manuals.
E-mail: earthinfo@earthscan.co.uk; http://www.earthscan.co.uk
As mentioned, “one of Africa’s major untapped resources is the creativity of its farmers”. Based on fieldwork on a wide variety of farming systems throughout Africa, this book demonstrates how small-scale farmers, both men and women, experiment and innovate in order to improve their livelihoods. The examples show that innovation takes place despite the adverse conditions and lack of appropriate external support. The studies have been written primarily by African researchers and extension specialists, covering countries as diverse as Tunisia and Cameroon, Ethiopia and Zimbabwe.

This manual describes a new R&D method designed to stimulate innovation along market chains by enhancing stakeholder collaboration and trust. This method grew out of a joint effort made by different R&D organisations and projects, with the aim of finding new ways of intervening in market chains and improving poor farmers’ livelihoods. It provides useful tips for applying the concepts it presents, together with examples of how the approach has been used in the Andes of South America.

With more than 30 contributions, this book brings together the reflections of a diversity of development professionals from different generations and arenas of development work, cultural and political contexts and professional backgrounds. All have engaged with Participatory Rural Appraisal (PRA), in one way or another, whether as practitioners, trainers, donors, academics or activists. Embracing a range of entry points and experiences, their stories speak of moments of frustration and revelation, of dilemmas and discoveries. Their pathways to participation have shaped their perspectives on PRA, as well as vice versa. Together their accounts provide the variety of practices that have come to be called PRA.

Enabling innovation: a practical guide to understanding and fostering technological change by Boru Douthwaite, 2002. 256 p. ISBN 1856499723. Zed Books, 7 Cynthia Street, London N1 9JF, U.K. E-mail: enquiries@zedbooks.demon.co.uk; http://www.zedbooks.co.uk
This book is an account of some of the disaster, and success, stories around technological development and diffusion from both industrial and developing countries. It tells the story of very different technologies including agricultural appliances, wind turbines and Green Revolution high yielding seeds. Little is known about the social and human processes - if those who will use the innovation are involved in technological adaptation and adoption, will the result be both better technologies and their more rapid adoption? The author has constructed a “how to do it” guide to innovation management that tries to counter many of the top-down development assumptions of today.

Science, agriculture and research: a compromised participation? by William Buhler, Stephen Morse, Eddie Arthur, Susannah Bolton and Judy Mann, 2002. 163 p. ISBN 1853836915. Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk; http://www.earthscan.co.uk
Agricultural research is a wide subject area therefore the approach the authors have taken is illustrative and general rather than fully comprehensive. The aim is to inform and broaden debate surrounding agricultural research and what drives it. In this book agricultural researchers explain what is involved: why they do what they do, what drives the research methods and agenda, who funds it and how the system functions. Using a historical analysis based on two main case studies (the U.K. and Nigeria) an interesting comparison of the evolution of agricultural research in the developed and developing world is made. The authors use this to explore some of the many complexities and trade-offs in the field of agricultural scientific work.

The “Development of an improved method for soil and water conservation planning at catchment scale in East African highlands” project developed two new tools which can be employed within the daily context of the extension services in Kenya and Tanzania. The methods were developed together with the farmers and representatives of the extension services. This report describes the developed tools and their potential use within the current extension approaches for natural resource management in Kenya and Tanzania.

Farmer centered innovation development: experiences and challenges from South Asia by Annette Kolff, Laurens van Veldhuizen and Chesha Wettasinha (eds.), 2005. 155 p. ISBN 9843226747. SDC and Intercooperation, P.O. Box 6724, CH-3001 Berne, Switzerland. E-mail: info@intercooperation.ch; http://www.intercooperation.ch
The regional workshop on farmer-centred introduction of innovations, held in Bogra, Bangladesh in 2004, involved participants from Bangladesh, India, Pakistan and Nepal. This document contains the proceedings and papers presented. It aims at sharing insights of the process prior to and during the workshop and analyses concepts and working principles of participatory methods. The discussions and papers presented provide experiences with spreading and scaling up, the role of community based organisations, and institutionalisation of participatory innovation development.
Open Knowledge Network  
http://www.openknowledge.net/  

OneWorld UK, 2nd Floor, River House, 143-145 Farringdon Road, London EC1R 3AB, U.K.

The Open Knowledge Network is an initiative to support the creation and exchange of local content in local languages across the South, supported by a range of information and communication technologies (ICTs). It is a network which collects, shares and disseminates local knowledge, considering that local content development is closely tied to human development. Its work focuses on various countries of east, west and southern Africa, India and also in Latin America. All information on their site is in English, French, Portuguese and Spanish.

FAO’s Participation Website  
http://www.fao.org/participation/  

E-mail: IWG-PA-Webbox@fao.org

The Participation Website was established in 1999 by the Informal Working Group on Participatory Approaches and Methods to Support Sustainable Livelihoods and Food Security (IWG-PA). One of the key objectives of the working group is to capitalise on FAO’s most successful normative and field experiences with participatory approaches and methods through their adaptation, replication and dissemination, in order to enhance FAO’s field programme. The site, with links, news and broad information, is also in French and in Spanish.

PROLINNOVA  
http://www.prolinnova.net/  

P.O. Box 64, 3830 AB Leusden, The Netherlands  
E-mail: prolinnova@etcnl.nl

PROLINNOVA (PRomoting Local INNOVAtion) is an NGO-led initiative to build a global learning network on promoting local innovation in ecologically oriented agriculture and natural resource management. Its focus is on learning from and encouraging field activities that strengthen the capacities of smallholders, livestock-keepers and fisher-folk to adapt to changing conditions; to continue to develop and adapt their own site-appropriate systems and institutions of resource management. Its website includes information on each of the country programmes, news and events, links to other websites and to publications, and even a picture gallery. Visitors are welcome to join their E-mail mailing list.

Seed Initiative  
http://www.seedinit.org/  

Seed Initiative, c/o IUCN, rue Mauverney 28,  
CH - 1196 Gland, Switzerland. E-mail: info@seedinit.org

The Seed Initiative (“Supporting Entrepreneurs in Environment and Development”) aims to inspire, support and build the capacity of locally-driven entrepreneurial partnerships to contribute to the delivery of the Millennium Development Goals. The initiative focuses on delivering real solutions through project cooperation among all the different actors working in the field of sustainable development. Through an international award scheme, intensive capacity-building activities and a research programme, the Seed Initiative aims to stimulate and build the capacity of entrepreneurial, nascent partnerships; disseminate good practice and lessons-learned; and generate evidence-based research to assist policy makers. Readers with innovative ideas for a partnership project that may contribute to sustainable development are encouraged to apply for the “Seed Awards”.

Creating and Exchange of Local Agriculture Content,  
CELAC  
http://www.celac.or.ug/  

P.O.Box 26970, Kampala, Uganda.  
E-mail: brosd@infocom.co.ug

CELAC is a project of the Busoga Rural Open Source and Development Initiative, aiming at the use of ICT methods and knowledge sharing to enhance poverty reduction and food security. CELAC operates in all the four regions in Uganda, collecting and exchanging local agricultural content that works from the farmers. Their website includes general information, a set of guidelines, specific farmers’ advice, and access to their newsletter.

Resources Centres for Participatory Learning and Action,  
RCPLA Network  
http://www.rcpla.org  

E-mail: pisaak@neareast.org

The RCPLA network is an alliance of seventeen different organisations from around the world, that strive to promote the empowerment of the disadvantaged through participation in their own development. The Network helps researchers and practitioners share information and experience about Participatory Learning and Action (PLA) approaches, and encourages the improved implementation of these approaches globally. Since its creation, the RCPLA has helped to facilitate the development of PLA ideas. Through the Network, partners have also influenced the development and application of participatory methodologies on local, national, and international levels.

The LearningForSustainability website  
http://learningforsustainability.net/  

LearningForSustainability is a new resource for NGOs and other community groups working to support multi-stakeholder learning processes. This guide to on-line resources highlights a number of activity areas that are prerequisites for social learning. These include topics such as networking, dialogue, adaptive management, knowledge management and evaluation. The growing role of the Internet is treated as a separate section. A short introduction to each section outlines the nature of the resource links provided, and provides pointers to other topic areas which are closely related in use. A separate section links to key manuals and guides on the Internet for facilitating participation and engagement. Feed back on the Learning For Sustainability site is welcomed. If you have particular guides on the Internet that you find useful in practice please suggest them as a future resource to add and share with others.
Communities, Livelihoods and Natural Resources

This book synthesizes results from a 7-year program of applied research on community-based approaches to natural resource management in Asia. The 11 case studies featured illustrate how local innovations in participatory natural resource management can strengthen livelihoods, build capacity for local governance, and spark policy change. The lessons are derived from the application of a participatory action research framework that engaged resource users, local governments, and researchers in collaborative learning. They illustrate practical innovations to strengthen livelihoods through improved collective resource management practices and broader technology choices.

The book provides practitioners with models of “good practice” in participatory, community-based resource management and demonstrates how site-based research contributes to broader learning in the field of natural resource management and policy. In addition to its uses for practitioners, this book will also be a valuable resource for graduate students in development studies and for applied researchers in government or private research organizations interested in development programs and policy analysis.


The book deals with participatory issues in three major natural resource development programmes of government of India namely: Irrigation Management Transfer (IMT), Joint Forest Management (JFM), and Integrated Watershed Development (IWD). It makes an attempt to raise issues on the urgent need for genuine participation of people and the stakeholders for sustainable natural resource management system. It tries to highlight the facts that how participatory policies are relevant to India’s overall development strategy of reducing poverty, protecting the environment, developing human resources, and fostering farm sector growth. The book tries to analyze, how practice and experience of participatory approach varies from the theory. The book is based on actual field experience and has adopted a multidisciplinary approach to cater needs of planners, implementing agencies (Gos, NGOs, and funding agencies), agriculture and rural development professionals.

Sowing Autonomy: gender and seed politics in semi-arid India by Carine Pionetti, 2005. 240 p. ISBN 1843695626. IIED, Reclaiming diversity and citizenship series, IIED, 3 Endsleigh Street, London WC1H 0DD, U.K. E-mail: info@iied.org; http://www.iied.org

Through their multiple roles as farmers, livestock herders, cooks, gardeners, keepers of culinary traditions, seed custodians and healers, women play a major role in shaping biodiversity for food and agriculture. Carine Pionetti looks in particular at women’s roles in agriculture, more precisely in saving and reproducing seeds in the drylands of the Deccan Plateau, in South India. Detailed farmers’ accounts of why seed-saving is essential emphasise the interconnectedness between self-reliance in seed, crop diversity and nutrition. These three areas are largely under the control of women. However, the processes of industrialisation and institutionalisation in the seed sector are undermining independent seed production, and, as such, the position of women. The author argues that a radical reorientation in public policies is needed to support autonomous seed production in the drylands of South India. Poverty alleviation and biodiversity conservation both directly depend on this.


The main aim of this book is to provide an overview of the potential role of organic agriculture in a global perspective. It provides in-depth discussions on political ecology, ecological justice, ecological economics and free trade, with new insights on the challenges for organic agriculture. These are followed by coverage of the potential role of organic agriculture in improving soil fertility, nutrient cycling and food security and reducing the use of veterinary medicines, together with discussions of research needs and the importance of non-certified organic agriculture. This book will be of interest to researchers in organic agriculture, agricultural economics and rural development as well as NGO workers and policy makers.


This film is about Vandana Shiva, Indian environmental activist and nuclear physicist, who was awarded the Right Livelihood Award in 1993. It’s a film about globalisation and patenting, genetic engineering, bio-piracy, and indigenous knowledge. In this documentary, the filmmakers follow Vandana Shiva over a two-year period, from her organic farm at the foot of the Himalayas to institutions of power all over the world. Here Vandana Shiva does battle with one of her toughest opponents, Monsanto, a huge American biotech company, when they try to patent an ancient Indian strain of wheat. In this film Vandana Shiva does battle with one of her toughest opponents, Monsanto, a huge American biotech company, when they try to patent an ancient Indian strain of wheat. In this film Vandana Shiva also tackles the question of farmers’ suicide, a backlash of the globalisation. Her opponents gave her “The Bullshit Award” for sustaining poverty, yet for many she is a hero of our times, an icon for youngsters all over the world.
Disseminating traditional seed storage practices through people’s participation

G. Krishna Prasad and Vanaja Ramprasad

Seed is the bedrock of a sustainable farming system backed up by the richness of soil and water. The secret of a successful harvest lies in the synergy created by the interaction of soil, water and seed. Farmer’s knowledge in selecting, cultivating and storing has played an important role for generations. With the advent of new seeds and changing cultivation practices, the diversity and indigenous knowledge associated with it, have been lost. If agriculture has to be sustained, it is imperative to revive the diversity and the knowledge associated with it. Green Foundation’s major goal has been to address this need among the small and marginal farmers in the dry land regions of Karnataka.

Effective seed management practices in storage plays an important role in ensuring availability of quality seeds for small and marginal farming communities. Inadequate storage facilities is one of the major problems faced by the farmers.

Traditional storage practices
In the multi cropping system adopted in the dry land regions, pulses are intercropped to provide the required nutrition for the resource poor farmers. Unfortunately, pulses attract pests vigorously during storage as compared to other field crops. This is because the protein content is high, which promotes the multiplication of the storage pests. For instance, pulse beetle (Callosobruchus chinesis) which is reddish in colour, feeds on pulses such as cowpea, gram and field bean, both in the field as well as in the storage.

As part of the ongoing efforts to revive the indigenous knowledge, Green Foundation had standardized and replicated popular storage methods across Karnataka. Results have shown that traditional seed storage practices are eco-friendly, cost-effective and provide room for farmer innovations. The findings of the traditional seed storage experimentation show that farmer’s practices are more effective and economical. Hence, Participatory seed storage research, by involving women farmers, was adopted as a strategy to revive the indigenous storage methods.

The best traditional practices serve as a knowledge pool for the small and marginal farmers to store seeds without high risk. However, the lacunae is lack of effective communication means to disseminate this knowledge to the resource poor farmers. To address this concern, a Participatory Research and Development (PR&D) project was conducted to develop a communication framework for effective dissemination of the

Box 1: Elements of Participatory Research and Development
The GF research project showed and used the following PR&D elements of:

1. **User sensitivity**: Farmers, as the main users of the technology are involved in decision making. Moreover, the research emphasized on gender sensitivity.

2. **Institutional partnerships**: Consultation with the various stakeholders like NGO’s, government officials and other researchers is important in any community based and participatory endeavor.

3. **Field-based action**: The role of local people is well emphasized through the validation of local knowledge by the farmers that enable them to enhance their knowledge and improve innovations.

4. **Impact-driven agenda**: PR&D has proven instrumental in reviving oral traditions that are slowly dying.
appropriate seed storage practices among the resource-poor farmers (see Box 1).

Documentation of traditional seed storage practices
Seventeen knowledgeable farmers were identified to form an advisory group, also called as “barefoot scientists”. The group included individuals and members of the community seed banks. The members selected were experienced farmers who had in-depth knowledge about farming practices and indigenous seed storage practices. The group spearheaded the designing of methodologies for the participatory seed storage experimentation. The advisory group met once a month to monitor the research progress.

As a first step, the advisory group documented the various seed storage practices of the farming communities. Using the information, the group short listed five most appropriate traditional seed storage practices for conducting trials. The selected practices were (i) mixing with sand, (ii) smearing with red soil, (iii) mixing with castor seed powder (iv) mixing with Gonde soppu (Sphaeranthus indicus) and chilly and (v) mixing with gonde soppu, neem leaves and salt.

After selecting the five storage practices, these were tried to test their effectiveness among resource-poor farmers. To identify the resource poor farmers, a wealth ranking exercise was conducted in the villages of Bettahalli, Dinnur and Veerayyanadoddi. The exercise revealed that 75% of the farmers belonged to small, marginal and landless.

Field experimentation
The advisory group drew a detailed action plan and conditions to conduct the experimentation of seed storage practices for field bean, red gram and cowpea. They formulated a set of guidelines to carry out the experiments (see Box 2).

Table 1: Effects of Storage methods on Pest Infestation and Germination percentage

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Observation/Effects</th>
<th>Germination (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixing with sand</td>
<td>- Cool environment disturb the pests - Facilitates free exchange of gases that hinder the pest for feeding activity.</td>
<td>86</td>
</tr>
<tr>
<td>Mixing with Castor oil</td>
<td>- Regulates egg laying and multiplication by pests - Odour of oil acts as repellent - Prevents pests from boring the seeds due to cooling and slippery nature of oil</td>
<td>78</td>
</tr>
<tr>
<td>Smearing with red soil</td>
<td>- Mud layer acts as a physical barrier and also blocks respiration of storage pests.</td>
<td>70</td>
</tr>
</tbody>
</table>

Eight seed bank members and nine individual farmers volunteered to carry out the experiments. Initial germination was recorded and compared with the final germination results. Each method was closely monitored and results were documented.

Of the five practices tried, farmers preferred three practices - Mixing with sand, smearing with red soil and mixing with castor seeds powder. The preference was based on high germination percentage, low level of pest infestation and availability of resources within the community (details in Table 1).

Dissemination
Village meetings with communities were organised at Veerayyanadoddi, Bettahalli and Dinnur villages to choose the best-suited communication mode for disseminating the seed storage methods. Communication modes such as television, radio, drama, street play, lavani (folk songs), Kamsale (folk songs), Sobane hadu (folk song) and print media were listed. Majority of the farmers chose kamsale as the best communication mode for disseminating the seed storage practices.

A communication workshop was organized with farmers, Kamsale artists, seed bank members and other resource persons. The objective of this workshop was to get the inputs from the stakeholders, resource persons and kamsale group to compose songs on seed storage methods for wider dissemination among the village communities. Farmers shared their ideas on composing songs about the seed storage systems. During the deliberations, participants opined that the contents should include both prose and poetry forms, which were closer to the communities. It was recommended that the communication mode need not just be kamsale alone but could be any folk art pertaining to the specific region. At the end of the workshop a song was composed for dissemination.

Box: 2 Guidelines to carry out the experiments
a. The seeds for the trials must be from a single source (farmer).
b. The storage methods documented must be from the local area.
c. Farmers should choose the treatment to be applied.
d. The experiments must be conducted immediately after threshing and tested for its efficacy for a period of 4 months.
e. Initial germination percentage must be obtained in order to make a comparison with final germination.
f. Each group must be allotted with one treatment for experimentation to enhance the participatory learning process.
g. Experimentation results must be monitored by the group members.
h. The pest infestation must be monitored by taking 100 seeds from each treatment and counting done for the number of pest affected seeds.
i. Final germination percentage must be recorded both at farmers level and at research station for comparison.
j. Effective storage treatments must be evaluated with the participation of farmers to be adopted in their homes.

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Reference
How farmers organise themselves to practice LEISA

The development of Low External Input Sustainable Agricultural systems benefit greatly when farmers work together in some way. Farmers organise themselves for various reasons – for instance, accessing and managing scarce resources or inputs like water, seed, biological inputs, credit etc. Also, there are examples of farmers organising themselves for collective action, for eg., marketing of produce, for better bargaining power.

Farmer groups may be formal or informal, be very loose or highly structured. In addition, the local socio-political and cultural environment does influence the successful formation as well as operation of such institutions. Small and local groups might have grown to be part of other regional or national networks. We would like you to share these experiences, the advantages and the constraints in each case. Similarly, there are many examples of farmer organisations successfully working with enabling organisations, such as NGOs, research institutions or advisors and taking an active role in spreading the knowledge on LEISA.

In the forthcoming issue we want to examine some of the reasons and ways in which farmers organise themselves in relation to sustainable agriculture, and how these groups manage themselves effectively. Please send us your experiences relating to the development and the processes involved in establishing such organisational processes.

Deadline for submission of articles: 30 April 2007

Seeds and planting material

All farming depends on a continuous supply of good quality seeds and planting material. Traditionally, farmers have selected the best grains from their harvest and stored them for use during the following cropping season. However, over time, with declining crop yields, owing to factors like small land size, low soil fertility etc., farmers are finding it more difficult to store seeds for the coming season. The only option is to turn to commercially produced seeds which increases the risk for sustainable small scale farming.

But, there are several examples wherein communities have come together to overcome the problem of seed material. For instance, they have their own mechanisms for exchanging seeds locally. In some cases, communities have organised themselves to store seeds in seed banks. This issue of the LEISA Magazine will therefore focus on the availability of seeds and planting material for a low external input and sustainable agriculture. We are interested in experiences showing how farmers select and conserve the species or varieties they are most interested in and how communities organise to meet the need for good planting material.

Deadline for submission of articles: 30 June 2007

Low external input and sustainable agriculture and health

The development of sustainable agricultural systems cannot be separated from the development of the actors involved. In the same way, the health, or viability and robustness of the agricultural system cannot be separated from the health of the farmer and their family and community. In short, healthy soils produce healthy crops which contribute to the health of the consumer. Traditional subsistence agriculture has in most cases provided adequate nutrition for the people depending on it. But, the increasing intensification of agriculture and of the whole food system has meant that the food most of us now eat is primarily produced using chemicals, is often processed, has been stored or treated resulting in food with low nutritional content, making it highly risky for human health.

In recent years there has been a growing interest in the link between food, food production and health and there is now a greater demand for healthy food products, products which are produced in a natural way without chemical inputs. This includes for example organically produced food, which is perceived to be not only better for our health, but also to taste better. This development provides an opportunity for many producers to move towards a more sustainable production system and to improve their own health. In this issue we want to present examples of how the linkages between health issues and agriculture have been addressed, and how low external input and sustainable agriculture can contribute to the alleviation of nutritional problems, disease and health related issues.

Deadline for submission of articles: 30 September 2007

You are invited to contribute to these issues with articles (about 800, 1600 or 2400 words + 2-3 illustrations or photographs), suggest possible authors, and send us information about publications, training courses, meetings and websites.