Recovering biodiversity knowledge

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Generating financial returns is an important function of farming systems but not the only one. Other functions, such as providing food for the farm household, sustaining (agro)biodiversity, and maintaining ecosystem health also contribute to the economic value of a farm.

Agro-biodiversity is extremely important to individual farmers and farming communities, but also to scientists and (plant) breeding institutions. It enables farmers to grow crops under varying environments, allows breeders and farmers to select for better crops and varieties, and makes it possible for households and consumers in different cultural settings to access commodities that satisfy their specific needs. Achieving a continuous and improved supply of food, medicines, fibres and other products depends on the presence of a robust agro-biodiversity.

Destruction

Since 1975 Cambodia has experienced two far-reaching political revolutions and the country and its people have suffered from more than two decades of destructive civil war. These years of violence have had far-reaching consequences for the country's agro-biodiversity and on farmers' traditional knowledge of how to preserve the rich variety of species nurtured, cultivated and handed down by their ancestors. Farmers who had previously managed and conserved different species of a range of agricultural crops, were forced to abandon them and much was lost as seed stocks were left behind or eaten. Traditional cultivars were mixed and known cultivars with specific traits disappeared. At the same time knowledge stored in universities, research stations and in researcher's minds also fell victim to the violence of war and political repression. The result has been a dramatic narrowing of genetic diversity.

The work of the *International Rice Research Institute* (IRRI) in the early 1970s had ensured that some 500 different traditional Cambodian rice cultivars were preserved. This seed has now been returned to Cambodia and, together with the results of more recent in-country collection efforts, has been used to breed many recently released varieties. However, because no inventorization or conservation efforts were made with other crops, it is difficult to calculate how much genetic diversity has been lost.

Cambodia's current commitment to a market-orientated and open economy has added urgency to the need to rebuild genetic resource knowledge and inventorize its agro-biodiversity. A market-led economy poses its own threats to agro-biodiversity. Local varieties are now being threatened by improved, exotic varieties and species and when farmers introduce these varieties into their fields, old varieties disappear or fall victim to new pests and pathogens.

Photo: G. Meijerink

Vegetable trading is often done by women.

Reconstruction

The main concern of the project PEDIGREA, *Participatory Enhancement of Diversity of Genetic Resources in Southeast Asia*, is the status of on-farm agro-biodiversity conservation in countries like Cambodia. Several pilot projects to link the preservation of genetic diversity to markets have been launched in the region. In Cambodia the PEDIGREA project is focusing on vegetable diversity.

Crop cultivation in Cambodia depends largely on the few traditional cultivars, old varieties and land races that remain. Almost 80 percent of the area is cultivated with local unimproved varieties of rice, maize, sesame, vegetables and potatoes. Efforts to conserve what remains of Cambodia's agro-biodiversity include taking stock of the landraces currently used by farmers. However, limited funds and a serious shortage of trained experts make inventarization difficult. Cambodia does not have proper *ex-situ* conservation facilities. There are no national genebanks for the long-term conservation of germplasm and existing germplasm collections are maintained under uncertain field conditions.

In-situ conservation

In Cambodia, the project works with two villages in Kandal Province and Kampong Speu. Both represent typical rice-based farming systems with vegetables. Using a Farmer Field School (FFS) approach that includes participatory plant breeding, the project is stimulating agro-biodiversity conservation in farmers' fields. Farmers are encouraged to select varieties, improve them through crossbreeding and store their seed. Locally-adapted technologies are being developed for crop improvement and results of experiments are shared with local farming communities. Strategies to improve farmers' marketing opportunities are also being developed and the project is supporting efforts made by local agencies to generate genetic resources and empower farmers.

The villagers of Kandal and Kampong Speu had already been through a Farmer Field School on Integrated Pest Management and were keen to participate in the PEDIGREA initiative. The majority of farmers had had little schooling and saw the initiative as an opportunity to learn. The project started in 2002

with a base-line survey that included marketing aspects. In 2003, the plant breeding training was launched and in 2004 marketing training was started.

One surprising result from the base-line survey was the amount of vegetables the farmers could specify. In Kandal villagers identified 102 different vegetables and in Kampong Speu 124. Some of these are collected from the wild, others are propagated either by seed or vegetatively, while for some species planting materials are traditionally purchased outside the community (see Table 1).

Table 1. Vegetables known and used by farmers

	Kandal	K. Speu
No. of vegetables identified:	102	124
Collected herbs and weeds	17%	19%
Collected from trees	26%	22%
Vegetatively propagated	19%	25%
Seed propagated	27%	24%
Always purchased	10%	9%

Source: Smolders, 2002

Farmers actively manage between 46 - 49 percent of vegetables through vegetative or seed propagation. It is encouraging to see such diversity still present. However, the surveys say very little about the *genetic* diversity known to farmers or present in the field. Subsequent meetings with farmers showed that they had little knowledge about the wider genetic diversity within vegetable species. They know and plant one or two varieties per vegetable species, an indication of low diversity levels.

Germplasm for plant breeding was obtained from *The World Vegetable Center* (AVRDC) in Taiwan, as Cambodia has no collections itself. During the base-line survey farmers used agronomic, economic and marketing criteria to select the vegetables they wanted to work with. The FFS began with a season-long training during which farmers learned about plant growth, breeding techniques and how to compare varieties, for example. During the second year, after the hybridized seed had been harvested, farmers continued the selection process based on locally preferred traits.

In 2004, marketing training was started amongst farmers in Chress Village, Takeo Province. During the FFS, a marketing analysis not only revealed the marketing problems farmers faced but production and genetic resource constraints as well. Farmers realized they lacked information on market prices and this made it difficult for them to calculate the profitability of vegetable and rice production. Usually they sold their vegetables to the village collectors at harvest time. Not knowing current prices, they could not decide to sell to the village collector when prices were high. They also realized that the village collectors would prefer to buy in larger quantities whereas farmers were used to selling their produce in small amounts. With these insights in mind, the FFS members decided to keep records of prices – which can fluctuate substantially in a short period of time – and keep each other informed. They also started coordinating their vegetables sales, so larger amounts were available for sale to the village collector who, it was recognized, had a great deal of marketing knowledge and contacts. The need to build up trust and work together was mentioned several times. This may be an issue particularly relevant to Cambodia, with its history of repression and betrayal – even within families – during the civil war.

Farmers discussed the need for good seed. Generally they used their own stock of vegetable seeds but gave little consideration to quality, management or storage. As a result of the knowledge gained during the participatory plant breeding training they are now managing their seeds and selecting and conserving good varieties and selections. It was even suggested that the village could be transformed into a regional pumpkin and wax gourd seed production and marketing centre and plans were made to organize a seed fair to exchange and compare different seed varieties within the region. A major outcome of the Chress Village FFS was the establishment of a farmer research group to produce and manage seed resources and diversity as well as a marketing group to coordinate the pooling of vegetable production area and information.

Conclusions

It is too early to say what wider impacts the project will have on the communities involved or genetic diversity in general. But the results show that the FFS approaches are working well. Working with farmers and with researchers at national level, as research capacity is gradually being re-established, the project is helping to reconstruct the knowledge so essential for maintaining genetic diversity in the field.

A crucial element in PEDIGREA's Cambodian experience has been the link established between genetic resources conservation and marketing. In selecting seeds, the farmers have been encouraged to think not only of production potential – high yield – but also of marketing potential: traits that sell well. In addition they have gained a better understanding of markets and marketing strategies. These new insights have resulted in farmers agreeing to work and plan together in new ways.

Marketing in an open economy with vegetable imports from neighbouring countries such as Thailand and Vietnam pose new challenges to the marketing strategies of farmers. In this time of rapid change, it is even more essential that farmers can rely on their own knowledge, make use of their genetic resources and have the information they need to meet challenges, make decisions and seize opportunities.

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More information on: http://www.pedigrea.org

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