Farmer-based research for sustainable rice farming

Small farmers are recognising that the "miracle" rice of the Green Revolution is not bringing them profit. Angelina Briones and her colleagues of the UPLB describe how rice farmers, NGOs and scientists are working together in a new form of research to satisfy the farmers' desire for productive and sustainable agriculture.

Angela Briones and her colleagues

The term sustainable agriculture recalls the farming practices of Filipinos in the past. Farming was an inherited art moulded through time by the collective culture and experiences of farmers in a given sociocultural setting. Rice is the people's staple food. The unschooled farmer learned to be self-sufficient in this crop, having direct control over production inputs, particularly seed, to plant in the next season. Thousands of rice varieties used to be grown countrywide. Rice fields abounded with additional food such as fish, frogs, snails and crabs. Various other field crops were grown after rice, particularly around the farmhouse. The carabao produced fresh milk for the children; backyard livestock and poultry served as "live savings" for household necessities. Animal manure, crop residues and legumes enriched the soil. The Filipino farmer had a sustainable system of food production. However, poverty, deprivation from social services and subjection to political manipulation was also a part of rural life. The government had to import supplementary rice whenever there was wide-scale crop destruction by typhoons. Made available to farmers. HYV production became widespread in areas where irrigation infrastructure assured two rice crops per year. Average rice yield per cropping season increased from 1.7 (before HYVs) to 2.5 tons/ha.

Top-down policy

In the 1960s the Green Revolution set foot in the Philippines through the establishment of the International Rice Research Institute (IRRI). The government cut off support for local rice research and depended on IRRI for technologies. Meanwhile, rice imports had to be increased for the rapidly expanding urban centres. Upon the release of IRRI's high yielding varieties (HYVs), the government became a foremost advocate of the Green Revolution. HYVs and associated production technologies were demonstrated country-wide. Bank loans for inputs were made available to farmers. HYV production became widespread in areas where irrigation infrastructure assured two rice crops per year. Average rice yield per cropping season increased from 1.7 (before HYVs) to 2.5 tons/ha.

What happened to the farmers?

For several years, the farmer fully embraced the government programme. HYVs were thought to be a deliverance from poverty. But then he realised that a big harvest also meant a big expense. Production costs (seed, fertiliser, pesticide, labour, machine rental, irrigation fees) and land amortisation or rental fee took a large chunk of the harvest. "Take-home" grain was not enough for the family until the next harvest. Rice had to be bought from the market. Meanwhile, population increased. Rural poverty accelerated migration to the cities. But unemployment soon took its toll. Widespread urban poverty became a devilish twin of rural poverty. As Meadows et al. (1974) observed, where economic inequality already exists, the Green Revolution tends to cause widening inequality.

Ecological aspects
There are now only 4-5 HYVs widely planted in the country. The farmer has to buy certified seeds from seed producers. Loss of indigenous seed means erosion of genes that have been adapted to local environments for centuries. Farmers’ seeds constitute a natural seed bank for breeding and crop improvement - a patrimony that a people should protect. Breeding strategies for semi-dwarf rice have been known to result in the narrowing of genetic base (Richharia, 1988). Some HYVs already in wide-scale production in the Philippines have succumbed to tungro virus and other pests. Extensive use of pesticides caused disappearance of beneficial insects, while certain pests become resistant to commonly used pesticides. Farmers also noticed the disappearance of fishes, frogs and snails.

**Listen to the farmer**

The glaring spread of rural poverty prompted some non-governmental organisations (NGOs) to start consultations with small farmers about the impact of HYVs and other concerns in rice farming. Talks were then organised on a regional level (Luzon, Visayas, Mindanao), followed by a national convention in mid-1985. In May 1985 a small multi-disciplinary group of professors and researchers at the University of the Philippines at Los Banos (UPLB) started weekly meetings on issues about HYVs and rice farmers. This group, known as MSF (Multi-Sectoral Forum), joined as observers in the national convention held on the UPLB campus. For three days, farmers discussed their experiences with HYVs and their problems with government policies. It became clear that farmers should have been consulted before embarking on nation-wide HYV production. They should have been listened to when increases in rice yield were not reflected in their real net income. Certainly, farmers wanted higher rice yields but not by accumulating unpaid loans for inputs and poisoning the streams and fields. They wanted a wide choice of rice varieties to plant. They needed low-external-input technologies relevant to local resources. Loans and technical assistance should not have been tied up only with HYVs. This was seen to guarantee profits to foreign-owned corporations at the expense of the farmers. The message was loud and clear. But was it heard? Yes, the NGOs and MSF listened, but the farmer's principal targets were the policy makers to whom their problems were presented in a public forum at the end of the convention.

**Farmer-NGO-researcher partnership**

Within a year after the convention, a farmer-NGO-researcher partnership was formed. A project with the name of MASIPAG was born to initiate farmer-based research and training for sustainable agriculture. This means that field studies of problems identified by farmers are worked out by them together with NGOs and researchers (MSF). Similarly, farmer-based training begins with what farmers want to learn. What they need to learn from the researchers' perspective comes second. The main project components are:

- CIMME (Collection of rice cultivars, Identification, Multiplication, Maintenance and Evaluation);
- Breeding (hybridisation of farmers' selections);
- APM (Alternative Pest Management);
- Biofertiliser usage (crop residues, local organic resources, green manures, microbial inoculants);
- Diversified farming (cropping systems, crop-livestock-poultry systems);
- Training (includes training needs related to the above components, plus other specific problems of farmers);
- PBMES (Project Benefit Monitoring and Evaluation System).
Cropping for components 1, 2 and 3 is being done without chemical fertilisers or pesticides. Rice straw is returned to the fields to decay before the next cropping. Biofertilisers are used for selected rice cultivars and other crops. A 3 ha research station was set up in the province of Nueva Ecija (Central Luzon) in mid-1986. The area is an irrigated lowland on a flat alluvial plain. It has a warm climate with distinct wet and dry seasons (3-4 wet months). After 1987 trial farms were started in the provinces of Quezon, Aurora and Camarines Sur. These are located on irrigated ridges or footslopes of mountains and have a less warm but more humid climate (5-8 wet months) than the central station.

Research highlights

From 1986-1988, 140 rice cultivars were collected from various parts of the country. These are being purified and characterised in field plots. Cultivars evaluated by farmers also included 21 advanced lines from UPLB Department of Agronomy. As of 1988, farmers' top 11 selections in field plots included 4 traditional and 5 improved varieties and 2 advanced lines. At least 10 farmers learned and practised the art of crossbreeding. The parental materials are their own selections for specific characters and not necessarily from the 11 top selections. Selections for F3 and F4 plantings are currently being made. These originally came from 33 singlecrosses. The first step toward low-external input farming is the plough-down of decayed rice straw, with no chemical fertiliser application. In 1988 three traditional varieties yielded about 4.5-6.5 tons/ha and the improved varieties (including IRRI HYVs) yielded 3-5 tons/ha. As biofertiliser, inoculation of the soil with N-fixing actinomycete, Frankia, was introduced. Initial results indicate positive responses, but they appear to vary with the cultivar. Hence, Frankia x cultivar experiments are currently being conducted. This is the first time that Frankia is being studied as biofertiliser. Within this farmer-based research and training project, farmers have developed their own crosses from their own selection of parental materials for the first time in the history of Philippine agriculture. The results of farmer-NGO-researcher co-operation are also leading to good production without fertilisers and pesticides. In 1988 the top traditional rice varieties were already yielding as high as or higher than improved varieties resulting from conventional breeding.

Angelina M. Briones, E.B. Cayaban Jr., P.R. Vicente and R.B. Aspiras

Department of Soil Science

University of the Philippines at Los Banos

Laguna, Philippines