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Participatory On-Farm Research and Use of Indigenous Knowledge in the Plain of Reeds, Mekong Delta, Viet Nam

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Abstract

The ISA/FOS project conducts applied research with farmers to improve land reclamation techniques on highly acid sulfate soils in the Plain of Reeds, a dynamic pioneer zone in the Mekong delta in Viet Nam. Research topics and program were openly discussed and trials were implemented jointly. A team of young motivated researchers lived with the farmers and thus gained their trust and benefited from their experience. The results of this cooperation greatly encouraged both farmers and researchers. They will serve to initiate rapid and harmonious development in the Plain of Reeds.

Key words

Farming systems research, on-farm experiments, Plain of Reeds, Mekong Delta, Viet Nam, rice, sowing in water.

Résumé

Recherche participative en milieu paysan et utilisation des savoirs paysans dans la plaine de Reeds, delta du Mékong, Vietnam

Le projet ISA/FOS mène avec les paysans une recherche appliquée sur les techniques de mise en valeur des sols fortement sulfatés acides dans la plaine des Joncs, un très dynamique front pionnier dans le delta du Mékong, au Vietnam. Les sujets et le programme de recherche ont été discutés ouvertement et la réalisation des essais s'est faite en commun. Partageant la vie des paysans, une équipe de jeunes chercheurs motivés a su gagner leur confiance et bénéficier de leur expérience. Les résultats de cette coopération sont d'un grand encouragement pour les paysans et les chercheurs. Ils œuvreront sans doute pour un développement rapide et harmonieux de la plaine des Joncs.

Introduction

The Plain of Reeds Farming Systems and Extension Project, which was initiated in 1992, is a cooperative project between the Institute for Agricultural Sciences of South Vietnam (ISA), Viet Nam, and Funds for Development Cooperation (FOS), a Belgian nongovernmental organization. The project is compose of:

– a scientific component for applied research, training, and extension; its objective is to develop a range of sustainable cropping systems that are integrated into the socioeconomic environment;
– a rural economy component for assessment of economic returns of test cropping systems; it involves economic surveys and diagnosis, and trials of experimental rural credit systems.

All operations are conducted in the Plain of Reeds (Dong Thap Muoi), in southern Viet Nam.

The Plain of Reeds

Difficult Biophysical Conditions

The Plain of Reeds is a large depression located in the northern part of the Mekong delta (Figure 1). Climatic conditions are characterized by high temperatures throughout the year and a 6- month rainy season. Agriculture is limited by two main factors:

– Floods in the Mekong river. Every year, the plain is covered during 3—6 months with 30 cm to more than 1 m of water, depending on the local topography. Flood amplitude varies greatly, between 2.6 m asl (in Moc Hoa, 1976) and 4.5 m asl (in 1978) (pers. comm. meteorology office, Long An Province, 1992). This makes cultivation of, for example, traditional floating rice crops unreliable.
– Soil problems. Acid sulfate soils (363 000 ha) cover most of the plain (Nhan 1991). In these soils, crops are affected by ferrous iron and, sometimes, H_2S toxicity in reduced conditions. In dry conditions, oxidation of pyretic material leads to production of H+ ions and aluminum toxicity linked with low pH. These extreme conditions explain why in 1993 more than 100 000 ha

(highly acid sulfate soils) are still unexploited (pers. comm. Nhan NV, Mekong Delta Master Plan, 1993).

A Dynamic Pioneer Zone

Reclamation of the acid sulfate lands is of great interest to Viet Namese farmers and authorities. Migration to this region can reduce overpopulation problems not only in other provinces of the delta, but also in central and northern Viet Nam. It would increase agricultural production and encourage settlement of Viet Namese people near the border in an area that is still claimed by Cambodia.

The development of a large-scale irrigation and drainage system in the 1980s made rice cultivation possible, and with this development started migration and land reclamation. Initially, capital availability was an important parameter. Unlike other pioneer zones with high soil fertility, acid sulfate soils develop fertility over time. These soils improve and produce higher yields as toxic elements gradually leach out. Farmers are ready to support high risks to seize the opportunity of obtaining 2—3 ha of land. Success is variable and this has already caused social differentiation. Farmers who fail are forced into a downward spiral of credit, with high interest rates (10%/month for private loans). Success in the first 3—5 years secures the future of the family. The project's main thrust is therefore reclamation of acid sulfate soils.

Integration of Farmers' Knowledge in the Research Program

Project Approach

On-farm, farmer-managed trials were implemented after a technicoeconomic diagnosis, followed by the identification of recommendation domains according to a typology of farmers (Anh, Vandome 1992; Cauchois 1993), and

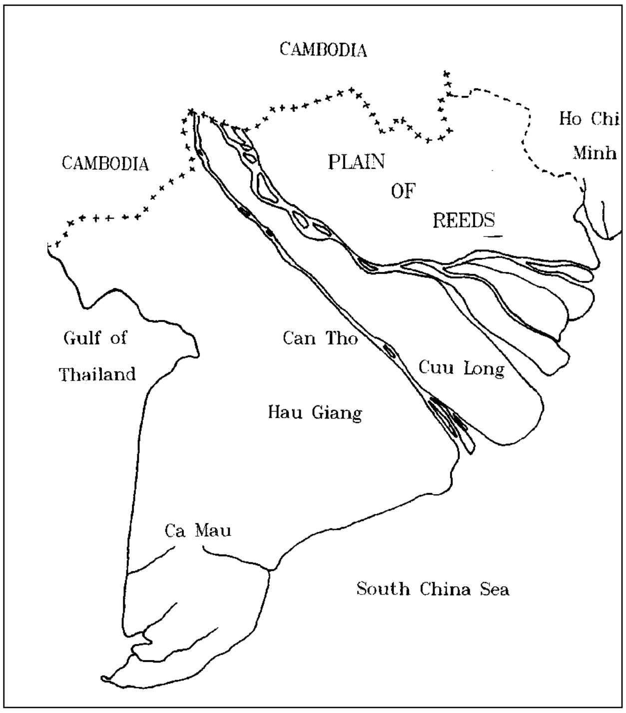

Figure 1. *The Plain of Reeds in the Mekong delta, Viet Nam.*

establishment of priorities (Husson et al 1993b). The approach was based on the concept of *création-diffusion* of cropping systems, developed by CIRAD-CA (Séguy, Bouzinac 1988). Large-scale experiments, in which technical itineraries were assessed for their technical and economic efficiency, were combined with small-scale, thematic superimposed trials. Farmer participation was central to these actions. All trials were implemented and financed by farmers; the project covers only losses, in case of failure. Farmers set up the trials in their own fields, according to a program devised with researchers.

Elaboration of Research Program in Tan Lap Village

Farmer practices were identified by researchers during the diagnostic phase. Tan Lap village, in Tan Thanh district, was selected as it is representative of the biophysical conditions in the Plain of Reeds. The choice was also determined by the keen interest of farmers in land reclamation, and their technical level.

Before the flood, a meeting was organized in the village with those farmers willing to reclaim land. Projects goals and work principles were presented. In a second meeting, volunteers discussed their plans, problems, and interest in research topics. Fields were then mapped by the project team to identify heterogeneity. A draft program was prepared based on the map; it integrated on-station research results, and farmers' practices and interests. The detailed program was proposed to farmers for discussion in a third meeting. Some topics proposed by researchers had to be abandoned. Water management practices, for instance, were not realistic at a large scale because of high soil permeability. Fertilizer rates were also discussed and modified, and use of Viet Namese-made thermophosphate fertilizer proposed by researchers was welcomed by farmers.

A commonly grown rice variety proposed by farmers was selected. Topics for thematic trials were easily adopted by farmers as they could choose the trials they were interested in.

The research program was progressively refined by specifying the technical itineraries for each plot, based on the map drawn by researchers, farmers' projects and resources, and research requirements.

Organizing Diversity

The focus of the research program was to organize diversity. A wide range of technical itineraries, involving different fertilizer rates, and methods of land preparation and water management, were tested in different physical situations. The itineraries were based mainly on farmers' best practices, technical and economic efficiency, and relevant on-station research results. At one experimental site, farmers and researchers developed a wide range of technical solutions. The program enabled scientific comparison of the itineraries and identification of those best suited to each recommendation domain.

Establishment, Adjustment, and Follow-Up of Experiments

The research team set up quarters in a hut built in the experimental fields. They could thus interact daily with the farmers to solve unpredictable problems rapidly and adjust the program accordingly. Sowing dates, for example, were decided jointly only a few days in advance, according to flood recession speed and field topography.

Crop protection measures were taken by farmers, according to advice from researchers. Before harvest, plots of 1 m^2 were sampled to measure yields components. The output from each treatment was harvested and weighed jointly by farmers and researchers, in a real spirit of cooperation.

Mutual Respect, Trust, and Confidence

For more than 5 months, researchers shared the farmers' life. The hut where they lived served as a perfect place for informal talks during meals, working sessions, and evenings with farmers. Trust and respect gradually increased as an atmosphere of friendship set in.

Researchers quickly understood how much they could learn from the farmers. In the beginning, farmers wondered how researchers "from the city" would endure rural living conditions, but they soon appreciated their presence and often came by themselves to ask for advice when they faced problems. Thanks to their technical knowledge, the researchers were able to answer their questions.

From the beginning, thermophosphate proved to be highly efficient. Researchers' knowledge and advice on pest control were of great interest to farmers and they were very important in gaining farmers' trust. This climate of trust is essential for any farmer participatory research. It can be built only if researchers are able to provide technical answers to farmers' problems. No "specialists" can work efficiently with farmers if they do not have strong general knowledge about crop and livestock production.

In addition to organized visits, more than 600 farmers spontaneously visited the experimental area. All the 17 farmers who worked for the project in 1992/93 also participated in the 1993/94 trials, which covered about 18 ha and involved 29 farmers. Although no contracts had been signed, there were no problems during talks after harvest. Compensation for poor harvests was given only in case of financial losses due to poor results of tested treatments.

Technical Results Achieved with Farmers' Knowledge

Significant technical progress was made from the first year. It is explained in detail in the annual reports (Husson et al 1993a, 1993b).This paper only focuses on technical improvements inspired by farmers.

Varieties

The variety selected by farmers for the trials was the best from 18 varieties tested in the first year of experimentation. It was used again as the control variety in the second year.

Land Preparation

Farmers' practices were used for land preparation, with some variations to assess the importance of each step. Farmers in Tan Lap village were aware of the importance of burning and removing organic matter before and after the flood. They also paid great attention to leveling, another major factor. Land preparation treatments varied, depending on farmers' resources. Those having the means could devote more time and money to land preparation, while others had to cope with inadequate leveling and higher organic matter residue.

Experiments showed that poor land preparation reduced yields, despite high fertilizer levels; it is a key issue, together with water management, in land reclamation.

Sowing in Water and Water Management

On-station experiments clearly showed the importance of water management on acid sulfate soils. Continuous reduction leads to ferrous iron and H_2S toxicity. Acidity occurs when fields are left to dry, and this leads to aluminum toxicity. However, water control is difficult in farmers' fields due to high permeability of these soils, which have never been cultivated. Water pumped to a depth of 20 cm will disappear in 24—48 h. Adequate water management is difficult to achieve.

Farmers have overcome this problem by deepwater sowing. This technique was discovered by chance by a farmer who pumped water out of his field to plant early and avoid pests. He pregerminated the seed, as is commonly done in the area, but heavy rains flooded the field again. The farmer decided to broadcast the seed in the water because he had no time to pump the water out again. This farmer obtained better results than others (pers. comm., priest Huong, Tan Lap, 1992).

On the acid soils in the Plain of Reeds, water is usually also acidic (pH 3—3.3 in experimental fields at sowing in 1992/93) and clear. To get clear water, farmers apply 20—30 kg/ha of urea after sowing. NH_4+ ions probably cause flocculation of particles in water. Clear water allows sunlight to reach submerged rice leaves. Water depth at sowing is very important and a wrong calculation of flood water recession can lead to high losses. Rice leaves must reach the water surface within 2—3 weeks, otherwise poor tillering and plant development can cause high mortality.

Sowing in deep water is the only solution for adequate water management on these permeable soils (Figure 2). Sowing dates and water levels at sowing have to be calculated according to the average field topography and flood recession speed. This technique also reduces pumping and weed control costs; moreover, as it allows early sowing, pest incidence is also reduced.

Tidal irrigation is used wherever possible. The purpose of water management is to prevent acid layers of the soil from drying out, without keeping water permanently in the field. As the practice yields good results in difficult local conditions, it has been widely adopted. Adequate land preparation, fertilization, and water management ensured yields of 3—4 t/ha in large fields from the first year, compared with 1.5—2.5 t/ha usually obtained in farmers' fields.

Practical Advice and Field Observations

Even expatriate researchers with language problems, will find that they can learn more during an evening of discussions with farmers, than from any series of formal interviews. Although thermophosphate is a powder, application of the fertilizer is not difficult because it can be mixed with the seed or with a little water to form granules. The quantity to be mixed with, for example, 200 kg of seeds can be 400 kg. Once the farmers gain confidence in their interlocutors, they will give the answer during an informal chat over dinner. The answer is that up to 400 kg of fertilizer can theoretically be mixed, but the seeds already become too heavy with 250 kg of fertilizer and are very difficult to broadcast evenly. A walk with a farmer through a varietal trial will reveal the criteria needed to compare varieties. Selection based on resistance to toxicity and pests is not adequate. Tillering, grain quality, and resistance to submersion should also be added.

Farmers can indicate an amazing number of topics for further research. For example: Should weeds be removed by puddling before the flood? Weeds trap pests and removing them would increase pest incidence. Does mixing seeds with thermophosphate reduce losses due to fish, crabs, and birds, as it is commonly believed?

Researchers can design a relevant applied research program by listening attentively to farmers about their real needs. It is the first step toward the development of suitable technical solutions.

Conclusion

It is not easy to gain the trust and confidence of farmers, and it needs time. Living on site is crucial as researchers learn more from informal talks every day than from any formal interview.

In the Plain of Reeds, the team of young, motivated, and open-mindedresearchers endured difficult living conditions to achieve real, mutually beneficial cooperation with interested and motivated farmers and local authorities. Results from this experience are extremely encouraging for rapid development in the Plain of Reeds, which is a dynamic pioneer zone in a fast developing country.

Acknowledgment

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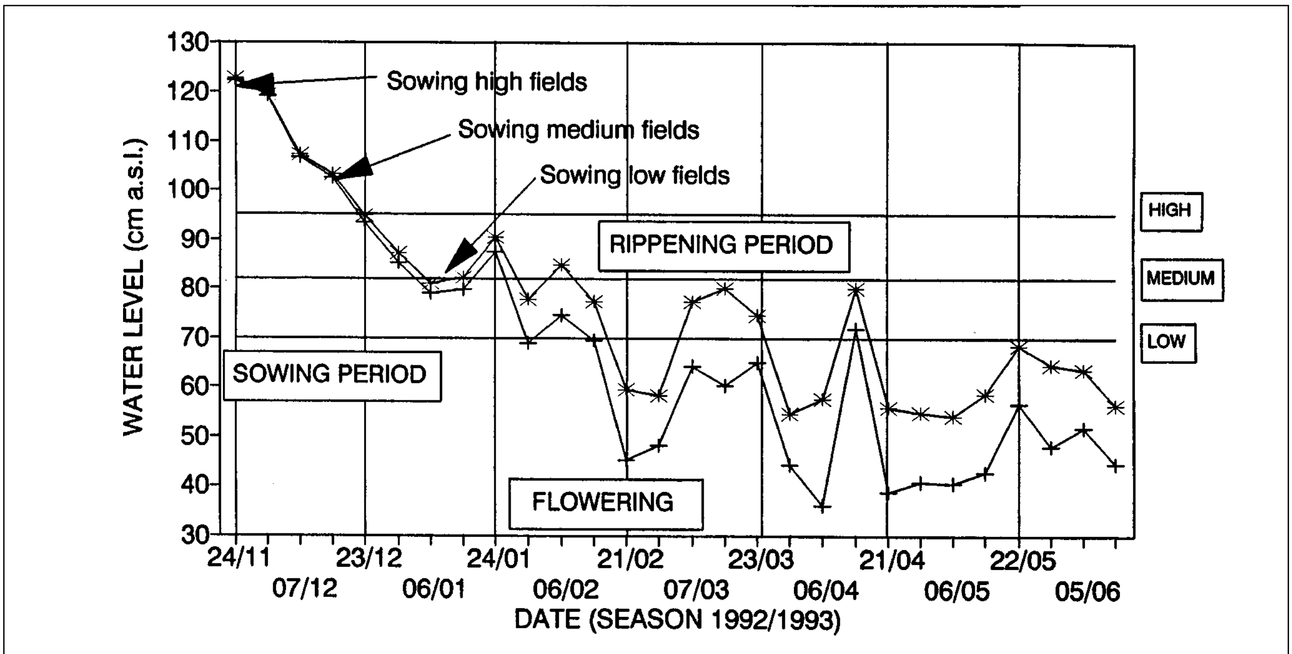

Figure 2. Water level and sowing date in relation to flood recession and field topography; example of water level in canal 2000 N KM 6, November 1992—June 1993.