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MANAGING AGROBIODIVERSITY UNDER CHANGING MARKET AND AGRICULTURAL PRODUCTION SYSTEMS OF VIETNAM: The Use of Farmers Fields Schools Approach[1]

The Biodiversity Use and Conservation in Asia Program (BUCAP) is implemented in Bhutan, Lao PDR and Vietnam which were selected to represent countries in Asia at different stages of global market integration and production system. BUCAP aims to: a) increase agrobiodiversity in different market and production systems, b) strengthen farmers' management of agrobiodiversity and c) build local capacities of local institutions to support farmers' management and control over their agrobiodiversity. To accomplish these objectives, BUCAP adapted the Farmer Field School (FFS) approach of the Integrated Pest Management Program both as a research and extension methodology. This paper focuses the experience of Vietnam in using FFS approach for rice plant genetic resources conservation, development and use under Vietnam's highly market integrated rice production system. Adaptive mechanisms for marketing developed by farmers after FFS are discussed. The challenges faced in designing and implementing FFS for research and development (rice improvement and conservation plus increasing diversity) while at the same time serving as a training and extension methodology for farmers and other stakeholders to build and strengthen capacities to manage local agrobiodiversity are likewise presented.

I. Changing Market and Rice Production System of Vietnam

Vietnam is one of the three countries involved in the regional program on agricultural biodiversity conservation, development and use called BUCAP (Biodiversity Use and Conservation in Asia Programme). Vietnam was selected because it exemplifies a country whose agriculture (particularly rice) is generally integrated to the local and global market. Primary products, which include rice, coffee and sea products rank second (next to crude oil) among the commodity group exported by the country, accounting for 42% of the total exports in 1996 and 30% in 2000 (Fjorde, 2002).

Vietnam is one of a few countries which maintain a strong state presence in running national and even village level economies while finding ways for political and economic decentralisation. The state needs to propel national economies and are therefore pushing for integration to the global market, but at the same time the state recognises the need to protect the diverse resource base to sustain economic growth. In the case of Vietnam's rice genetic diversity, generally, it is narrow. Primarily because of the changing market demand i.e., rice for export has to be of uniform quality forcing farmers to use and trade particular varieties with defined qualities. In the Mekong Delta for example, farmers are planting Thai jasmine rice for export. The biological challenge

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(looking at conservation of traditional Vietnamese varieties and security against pests and diseases) therefore is to increase the diversity of rice under prime irrigated, market integrated system.

At the same time, the state is also concerned in ensuring that the human resource base – especially small-scale farmers' and farming communities, who have been managing what is left of agricultural biodiversity - will not be left vulnerable with market integration. Women farmers are especially vulnerable as the market becomes more the domain of male farmers. More than ever, there is a strong need to strengthen the capacities and roles of both male and female farmers' to manage (conserve, develop and use) their agricultural biodiversity and to become profitable in the changing market systems. The challenge therefore is to develop programs and policies that strengthen farmers' resource management system while balancing agricultural biodiversity conservation with market integration to ensure long-term food and economic security of small scale farming communities. This complicated task requires innovative approaches, methodologies and the involvement of different stakeholders.

This paper looks at the use of Farmers Fields Schools (FFS) as an approach to strengthen the capacity of small farmers to manage their resources in the face of global market integration. What are the successes and lessons in using the FFS approach in an on-farm plant genetic resources conservation, development and use project aimed to address issues on agricultural biodiversity, capacity building, policy changes and marketing?

II. FFS and On-farm Plant Genetic Resources Conservation, Development and Use (PGR CDU)

BUCAP-Vietnam Country Project was initiated in Vietnam in 2000 through the National Integrated Pest Management (IPM) Programme, Plant Protection Department, Ministry of Agricultural and Rural Development with the administering assistance by Oxfam Solidarity Belgium in Hanoi. Main objectives of the project are providing farmers with knowledge and methodology to conserve and diversify plant genetic resources at community level through FFS and field studies (FS).

The FFS approach, as an educational process was adapted for on-farm PGR CDU. Like IPM FFS, community based study groups are formed composed of 20-30 farmers while extension agents or trainers facilitate the process and provide technical inputs. A group field is also set-up as a common learning area from which hands-on exercises on PGR CDU are studied. Special topics supplement the field experience.

In general, FFS is more of an education tool than a high level research and in most IPM-FFS studies (e.g. defoliation studies) the outcome is known to the trainers. The important aspect is the process of learning, where farmers discover on their own, through a simple field experiment, the results (discovery based learning). In BUCAP, the concept was further extended by engaging farmers in research whose outcome is not pre-determined. In the process, generating new information which are not known by facilitators, research institutions and farmers at the same time, developing the capacity of farmers to conduct crop improvement researches for improved production and market potential.

For BUCAP-Vietnam project, farmers diversify and develop varieties that are resistant to pests, diseases and harsh conditions, with high yield potential in order to develop a sustainable agricultural ecology and improve productivity. The project also focuses on improving capability of women farmers to participate in community plant genetic resources conservation and development activities.

Project activities have been implemented in five rice growing provinces in the North and Central Vietnam namely Hoa Binh, Ha Noi, Hue, Bac Kan and Quang Nam. Main activities by farmers participating in the project are:

- attending Farmer Field Schools (FFS) on community plant genetic resources conservation, development and use to obtain basic knowledge on rice plant genetic resources conservation and development; to fully understand crop improvement, variety rehabilitation, segregating line selection and rice variety evaluation techniques,
- developing and improving rice PGR materials through:
    - Selection from segregating lines
    - Crossing of selected parentals
- rehabilitating traditional varieties, and farmers' favourite varieties that deteriorated over time,
- comparing and evaluating the adaptability of varieties under local conditions,
- exchanging and supplying varieties in the community.

- Steps in FFS for PGR CDU -

The steps in FFS for PGR CDU are similar to the usual FFS. The field set-up and the special topics are the main differences. Below are the usual steps undertaken for BUCAP FFS.

Step 1. Starting Activities

- **Community protocols and courtesy calls**
  -trainers to give courtesy calls to officials to explain about FFS PGR CDU and broader program or project objectives
  - to identify village for implementation
- **Selection of farmer participants**
  -establish the selection criteria at the onset
  - select farmers who are interested and committed
  - ensure a balance of male and female participants
- **Site selection for field trial**
  - with the farmer participants, select the common learning area where the field studies will be set-up for one season
  - set the criteria for site selection with farmers

Step 2. Baseline Establishment

- **Objectives**
  a) establish the situation of plant genetic resources according to farmer perception
  b) establish the situation of farmers' skills and knowledge in plant genetic resources management and breeding according to their perception
  c) enable the trainer/researcher to understand the situation and farmers perception and begin to share his knowledge and facilitate farmers data gathering and analysis
  d) motivate farmers to look into their plant genetic resources situation and act

- **Baseline Exercises**

- **Map of (rice) plant genetic resources in the village**
- **Matrix of rice varieties and their characteristics (strengths and weaknesses)**
- **Sources of rice plant genetic resources**
- **Assessing farmers' skills**
- **Setting the breeding objectives**

Step 3. The Planning Meeting

- **Validation of the biodiversity situation in the locality**
- **Validation of characteristics of local varieties**
- **Identifying desired varietal characteristics**
- **Plant breeding systems**
- **Developing workplans for the first season**

Step 4. Field Studies

The field studies can be likened to the experimental plots. For BUCAP, the Field Studies although they can be undertaken independently are linked into one process.

- **Varietal Evaluation Study**
  - farmers identify their preferred varieties which they will then multiply, distribute and plant in their fields

- **Seed Rehabilitation Study**
  - if the preferred variety from the Varietal Evaluation Study has deteriorated (with mixtures and impurities), farmers may opt to rehabilitate them before using them as parent materials
  - some farmers rehabilitate the seeds of traditional rice varieties as a form of conservation and improvement
  - seed rehabilitation studies sometimes result to development of purelines and later distinct variants of the variety being rehabilitated

- **Plant Breeding Study**
  - farmers use their preferred varieties from the Varietal Evaluation Study as parent materials for crosses
  - farmers synchronise the flowering dates of preferred parents.

- **Selection Study**
  - after planting F1 seeds from the Plant Breeding Study for one season, the F2 seeds are evaluated and prefered plants or lines are selected until a stable material (around F7 or F8) is developed
  - segregating populations or lines of different generations (F2, F4 and F6 preferably) are evaluated and farmers select the best plant or bulk the population until it stabilises
  - the use of different generations in the study will allow farmers to experience handling the different generations; they will have a good picture of the selection process from segregating population
  - different crosses are recommended for diversity, preferably obtain segregating materials from crosses between traditional varieties or traditional varieties by improved varieties

It is not necessary to do all the field studies in one season. The decision on the number and kind of field studies to implement will depend on their interest and initial assessment of the capability of the farmers' groups to manage the activities.

A small group of farmers will be assigned to take care and monitor the field studies for the entire season. This will lead to the development of a core group of farmers with specialised skills on each of the topics. It will be the responsibility of the core groups to help other farmers gain the different skills.

During the season, it is important for each small group in the FFS to share their experiences and understand how their studies are all linked together. For this reason, it is suggested that the studies all be set up in one field to facilitate observations and collective learning.

Step 5. Special Topics and Field Exercises

The group of farmers meet weekly to observe the field studies for 14-20 weeks. To facilitate learning, special topics (for conceptual understanding) and field exercises (for hands-on experiences on topics) were developed. The timing of the field exercises depend on the growth stage of the plant. For example, field exercise on selection should be done before actual selection (near harvest time). The usual special topics and field exercises for the season are:

- **What is biodiversity and plant genetic resources?**
- **Understanding loss of biodiversity**
- **Review of agroecosystems analysis**
- **Conservation of plant genetic resources**
- **The plant breeding cycle**
- **Two systems of plant breeding**
- **The rice plant: overview of the agronomy, morphology and growth stages**
- **Reproductive characteristics of rice**
- **Genes, genetic and phenotypic segregation**
- **Selecting a mate: setting the criteria for parentals**
- **Techniques in rice breeding**
- **Criteria for selection of varieties**
- **Selection techniques for segregating materials**

Team building exercises like 'Group contract', 'Experiencing change', 'The box' and 'Paper bag' are facilitated by trainers to enhance the learning process.

Step 6. End of the season activities

Near the end of the season, a Farmers' Field Day (FFD) is organised by the group of farmers attending the FFS. In the FFD, other stakeholders – farmers from the same village or neighbouring village, village officials, policy makers, researchers, development workers and others – are invited for a reporting of the results of the field studies. Farmers also take the opportunity to lobby local officials to support their activities and share the results and process to other interested farmers.

Sometimes, farmers also organise the eating quality evaluation in time for the FFD to involve other stakeholders in the assessment of the varieties/lines they are experimenting on.

III. Promising Results

The winter-spring season of 2001 - 2002 is the third season of BUCAP in Hoa Binh, Ha Noi, Hue and Bac Kan, and is the fourth season in Quang Nam. In winter-spring season 2001 - 2002, farmers led the activities in the provinces, especially in Hoa Binh and Quang Nam. This clearly showed the clear direction of the program. Farmers' field studies have initially produced adaptable varieties that are acceptable in the locality. A variety/seed exchange system has also been established between farmers participating in the studies and other farmers.

In winter-spring season 2001-2002, BUCAP activities were conducted in **21 villages in 5 provinces** comprising of 13 old villages, where farmers implemented program activities

for two to four seasons, and 8 new villages, where project activities were conducted for the first time. Farmer groups in these 21 villages carried out **77 field studies** (on variety comparison, seed rehabilitation, segregating line selection, rice breeding along with other studies such as pant density), **9 FFS on PGR** organised **24 farmers' field days**.

Of the 100 varieties which were compared, farmers in 5 provinces selected **49 varieties** which will be multiplied and further evaluated in the next season. Positive results were also gained from segregating line selection and seed rehabilitation studies. Varieties were rehabilitated after being deteriorated over many seasons. The high purity of the newly produced varieties was highly appreciated by other farmers. In segregating line selection studies, farmers in Quang Nam and Hoa Binh provinces have stabilised and selected **92 lines**, which will be evaluated as farmer varieties in the next season.

Seed-multiplication activities were conducted in all 5 provinces and a seed supply and exchange system between BUCAP farmers and other farmers was established and operated quite effectively. Rice varieties, after being multiplied, were supplied and exchanged with other farmers in the village and with other villages in the district (in Hoa Binh, Ha Noi, Hue, Bac Kan, Quang Nam provinces) and were also supplied to other districts in the province (Hoa Binh province). Seed production, supply and exchange activities were mainly carried out by farmer themselves or with the participation of Cooperative authorities. In Hoa Binh province, in particular, seeds have been exchanged in larger area and in bigger volume since the provincial authorities supported the variety exchange activities by farmers. They estimated that seeds from BUCAP field studies will be used in 2% of the total rice area in their province by next season. It is estimated that a total of **175.5 tons** of seeds were multiplied and exchanged within the five provinces from BUCAP FFS and Field Studies.

Support from local government units

These results helped local authorities to have a better understanding and assessment of farmers' activities. In almost all of the five provinces, cooperatives participating in the project provided farmers with access to meeting rooms and other materials for the studies; provided financial support for farmer meetings; reduced and freed farmers from tax and fee imposed on using the fields for studies; and even insured productivity for fields used.

In Hoa Binh province, provincial authorities even used part of the provincial IPM budget to expand BUCAP activities. The authorities also guaranteed seed supply and exchange activities for farmers. Mass media at the province and district level likewise participated in BUCAP activities by disseminating information about the activities of the farmer groups in Quang Nam, Ha Noi and Hoa Binh. To a certain degree, provincial policies are being amended to support farmers' efforts.

Marketing schemes after FFS

In Vietnam, farmers have developed their own mechanisms and marketing schemes aimed to sustain their group activities and increase household income at the same time introduce diversity into the current system.

- ***Through the Farmers Field Days*** – Farmers involved in the FFS and subsequent field studies (in the succeeding seasons) usually conduct a Farmers Field Day (FFD) near harvest to share to other farmers and government authorities the results of their studies. Aside from advocacy functions, FFD are also used by farmers as an opportune time to 'market' their product either through the normal non-monetary seed exchanges or through small scale buying and selling of seeds. If there are sufficient seeds, then the exchanges occur at harvest time, if not, then the order is placed for the next season. The farmers then estimate how much and which materials they will multiply for next season to sell or exchange. The buyers can be farmers, extension agents from other villages and other officials who think that the material has a good potential and should be distributed to other farmers through the government extension program.
- ***FFS participants' fields as 'show rooms' –*** Members of the study groups are 'assigned' to grow selected varieties in their own fields as a 'show room' of their product so that neighbours can inspect, buy or exchange seeds.
- ***Village heads as marketing arm*** – From the field studies/ field experiments, which are part of the FFS, farmers selected varieties (usually coming from research stations or traditional varieties from other farmers) he or she likes, and planted the varieties in their own farms for multiplication. Farmers practise seed rehabilitation or seed selection techniques which they learned from FFS in their own farms. The seeds (s)he harvest from the selected varieties are brought to the village leader for him to sell to other farmers in the village. The village leader acts as the marketing arm of the group of farmers who finished FFS.

  Farmers in Vietnam have limited landholding and there are limited seeds that come from the field studies. At the same time, they themselves are testing the adaptation of the selected varieties in their own fields so they cannot risk planting their entire field to the selected variety to multiply and sell as seeds. This is one form of risk aversion and risk distribution among the members of the group. Come harvest, they pool the seeds of the same variety (they keep track of who planted what variety and monitor among themselves the maintenance of seed quality) which the village head temporarily keeps in his house until sold.

  They opted to have the village head as marketer because of his network and credibility in the village. His status as a village head symbolically guarantees the quality and performance of the seeds. At the same time, by involving him in the activity, the farmers are able to draw political and social support to their group activity which later can be translated into more concrete policy actions and support for agricultural biodiversity conservation and development.

  The whole scheme has the potential to increase the diversity in farmers' fields especially if the farmers have come to an understanding of the need to maintain diversity. On one end, the scheme has the potential to reduce diversity especially if farmers opted to multiply and use only one variety.

- ***Co-operatives as production and marketing channel*** – Farmer co-operatives are still present in some villages in the North of Vietnam. Most farmers are members of co-operatives. What the farmers involved in BUCAP did, was to

explore the potential of co-operatives in linking their research to the local markets.

One scheme developed by farmers is to use the co-operative's land for seed multiplication of the selected variety from the field trials. The group of farmers maintain the field and come harvest time, the seeds are marketed through the network of the co-operative. Part of the proceeds goes to the co-operative as general fund (usually used to support FFS activities in the community), a part goes to the field maintainers and farmers/co-operative members who were involved.

Another scheme is to ask a farmer to multiply the seeds for the co-operative and come harvest, the proceeds will be divided between the maintainer and the co-operative. The profit from the sale will become part of the general fund of the co-operative which the members will use to finance some of its community activities.

Collective risk sharing was done through the co-operatives. Farmers reasoned that the small amount that they will get from selling the seeds will go to the co-operative funds which in turn will benefit all the members (through improved services etc) anyway. In a way, the work with the co-operative can address the concern of distribution of benefits for all.

- ***Production and marketing with state companies*** – This case is particular in Hue province. The provincial authorities mandated the Agricultural Material Supply Company, a state company in-charge of providing agricultural materials, to also produce and distribute seeds now to address the failure of the state seed company in providing cheap but good quality and quantity seeds. The province hopes to provide 50-60% good quality seeds this year, possibly in preparation for the reduction in state support in the coming years as part of trade liberalisation scheme.

  Since the local governments (District Agriculture Rural Development) know about the farmer activities in BUCAP and about the Agricultural Material Supply Company, a deal was struck. Farmers advised the Agricultural Material Supply Company to produce the varieties they have selected from the field trials. The Agricultural Material Supply Company contracted the local co-operative to multiply the seeds (the state company requires that seedlings should be distributed and not seeds) and distribute the seedlings to the farmers to transplant. The district office provided financial support for every 500 sq m planted by the co-operative. The Material Supply Company, in turn provided technical and materials support. Selection techniques (seed rehabilitation) were provided by the facilitators of BUCAP. It was agreed by the farmer group that for every one kilogram of seedling distributed the farmer has to return 1.3 kilogram of paddy to the co-operative. The proceeds from the sale of the grain/seeds become part of the general fund of the co-operative which is used to improve services.

The different schemes were ways of farmers to finance some of their field activities/ field studies and at the same time increase their income by selling seeds instead of grains. These schemes are some of the adaptive mechanisms developed by farmers from the

positive results of their FFS to better position themselves in the changing production and market system of the country. Before, the sale of 'good quality' seeds in Vietnam is dominated by the State Seed Company, now, farmer groups are trying to 'compete' with the seed company in securing the seed supply in their communities with the aim of diversifying their income sources and livelihood options. These they do on top of the traditional form of seed exchanges.

V. Issues and challenges

The results from the Vietnam experiences of using FFS as an educational and research process to strengthen farmers' management of their PGR system looks promising. FFS as an approach was able to address biological concerns of working towards increasing diversity of PGR in the community, develop the capacity of farmers to manage, control and produce good quality seeds. Farmers Fields Days were opportunities for farmers to present before government officials and policy makers the results of their work and lobby these people to support their efforts at the same time market their seeds. Another expression of gained confidence by farmers from the FFS is the attempt of farmers to revitalise or form community groups to address marketing concerns in the context of an evolving global market system.

BUCAP implementation, combining research and extension functions through FFS while addressing biological, social, economic and political objectives, was not that easy at the start. Some challenges faced and are being faced:

- Usually it takes time to develop a pool of trainers with excellent skills and knowledge about the technical aspect of the work and the process. For Vietnam, there is already a pool of good trainers with good skills on the process. It was a matter of fine tuning the technical part of work as it links to the process.
- Initially, trainers had difficulty in fusing IPM with PGR but after one season of field experience and refresher trainings and a defined curriculum, the difficulty was lessen if not totally absent.
- To catch the season, some of the initial materials released were not according to farmers' preferences and were not that diverse. The project went after the educational process than biological objectives.
- Difficulty in obtaining crosses (for line selection studies) according to ecosystem and farmers preferences and objective of increasing diversity while increasing production. Some research institutions were reluctant to get involved (because of property rights issues) while most do not have the needed materials. This is an indication that some research institutions may not be breeding in accordance to farmers' preferences. The farmers' preferences therefore became a research topic for collaborating institutions.
- Quality vs. Quantity of implementation - it is easy to expand operations with FFS but quality of implementation may be at stake.
- Question on sustainability of farmers efforts - to sustain current efforts there is a need to get the support of local government units and other stakeholders.
- Policy issues – how will the current efforts of farmers (resulting from FFS in PGR CDU) be 'protected' within the current policy environment favouring plant variety protection, promotion of hybrid rice and genetically modified organisms.

- Alliance building – BUCAP is not the only effort of its kind in Vietnam, there is also the CBDC program in the South of the country, the challenge is in bringing the two programs to harness their strengths to address technical and political issues.

In general, the difficulty was in balancing technical/scientific soundness with educational process. And most of the questions raised from BUCAP field experiences relate to the scientific quality of research or the quality of science in implementation viz. the participatory and educational process. At a more political level, one of the challenges is in raising the policy related questions from field implementation to enable a more conducive and supportive policy environment supportive of farmers' efforts. Methodologically, the challenge will be in using FFS as platforms for policy changes.

VI. Literature Cited

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