BUILDING DISEASE MANAGEMENT CAPACITY IN VIETNAM

4 PROGRESS REPORT

Farmer Participatory Research in High Value Crops

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1 Summary

This report summarizes the activities and discussions held with all the partners of the ACIAR-funded project 'Developing Disease Management Capacity in Vietnam'. After identifying the major gaps in terms of diagnostics and management of major diseases, Farmer Participatory Research approaches (often known in Vietnam as Participatory Action Research (PAR), or 'Making Farmers Researchers' when translated back literally from Vietnamese) were introduced by Dr. Paul Van Mele from CABI *Bioscience* during two 2-day workshops between June 9th and June 24th, 2003.

Pathogen identification issues were discussed during the workshop and each group leader has the responsibility to seriously look into the suggestions made by Dr. Eric Boa in his summary report on the surveys. Dr. Paul Ferrar from ACIAR has fully acknowledged the importance of this report for directing future actions in this and other projects. Each group leader will meet with their partner institutes to finalise the list of symptoms for which more sample collection and identification is required. This list will be send to Drs. Eric Boa (CABI) and Roger Shivas (QD PI) for their comments before the end of June, 2003. Drs. Roger Shivas and Tony Cooke will visit Vietnam from July 27 to August 9 to assist in identifying these undiagnosed symptoms.

Partner institutions re-emphasized that more support is needed for training master trainers in field diagnosis. This will be dealt with in September by Drs. Eric Boa and Paul Van Mele. At the same time, the development of an ExcellDatabase of high quality digital photographs of symptoms available at each institute should receive high priority. Group leaders to coordinate this activity and present list by the end of July, 2003 to project leader. This will assist us in making the Field Diagnosis training manual fully adjusted to examples based on the Vietnamese context and hence easier to apply when training PPSD and farmers during our next training on Field Diagnosis from September 15 to October 5th. During the first week, we will focus on finalizing 'the manual.

Farmer Participatory Research methods were introduced and activities planned on major fungal, bacterial and viral diseases. An overview of planned FPR activities in collaboration with provincial PPSDs is given in the next table. In the South, FPR activities on mango are being linked to a farmer cooperative, recently established by the AusAid CARD project 'Improving the performance of the fruit industry in Tien Giang and Tra Vinh provinces', and the Song Hau state farm at Can Tho, uniting more than 1000 farmers growing 150,000 mango trees.

This CARD project has brought farmers for the first time in Vietnamese history in direct contact with retailers to develop a quality grading system. Linking this project to our ACIAR project was perceived as a unique opportunity to have cooperative farmers work with scientists and PPSD towards achieving improved quality standards and explore the potential for creating innovative financing mechanisms for service provision. Extra income through improved fruit quality and stronger negotiation power could be reinvested in farmer training in one way or the other, and hence create an example of how financial sustainability of farmer training, a global problem, could be addressed. Farmers at the Song

Hau state farm have already verbally mentioned willingness to pay for services which help them to tackle serious problems.

Overview of planned FPR activities in collaboration with provincial PPSDs.

INSTITUTE	CROP	DISEASE	PROVINCE	COMMENTS
NIPP	Longan	Flower rot, anthracnose (fungus)	Hung Yen	Both *Anthracnose* and *Peronophythora* occur on flowers. Are these symptoms distinct?
	Orange	Greening (bacterium)	Ha Tay	
TNU	Longan	Anthracnose (fungus)	Thai Nguyen	Group learning will be compared between NIPP, TNU and HAU. Different treatments and approaches may be used depending on local preferences.
HAU	Litchi	Anthracnose	Hai Duong	
PPD-PQ	Pineapple	*Phytophthora* heart rot (fungus) Pineapple wilt (virus)	Bac Giang	Red wilt or red blight may be caused by stress, mealybugs or *Phytophthora*, so it is too early to conduct FPR on this problem. After the workshop we conducted a field sampling trip and confirmed the wilt-associated virus transmitted by mealybugs. If possible also this disease will be covered in FPR
SOFRI	Pineapple	*Phytophthora* heart rot (fungus)	Can Tho Dong Nai Tien Giang	Cantho Extension Centre SEFRC-SOFRI in SE Vietnam SOFRI
	Mango	Anthracnose (fungal)	Can Tho Tien Giang	All mango FPR experiments in Can Tho will be a collaborative effort of SOFRI and CTU Mango FPR activities in Tien Giang will link to on-going CARD project and include PHTI
	Mango	Black spot (bacterial)	Can Tho Tien Giang	
	Tomato	Bacterial wilt (*Ralstonia solanacearum*)	Tien Giang	
CTU	Mango	Anthracnose	Can Tho Dong Thap	
	Mango	Black spot (bacterial)	Can Tho Dong Thap	Song Hau state farm, samples to be collected asap for proper diagnosis
PHTI	Mango	Anthracnose	Tien Giang	
IAS	Chili	Anthracnose	Lam Dong and Ho Chi Minh City	

2 Abbreviations

ACIAR	Australian Centre for International Agricultural Research
CABI	CAB International
CARD	Capacity-building for Agricultural Research and Development (AusAid)
CPC	Crop Protection Compendium
CTU	Can tho University
FFS	Farmer Field Schools
FPR	Farmer Participatory Research
HAU	Hanoi Agricultural University
IAS	Institute of Agricultural Sciences
NIPP	National Institute of Plant Protection
PAR	Participatory Action Research
PHTI	Post Harvest Technology Institute [HCMC]
PPD	Plant Protection Department
PPSD	Plant Protection Sub-Departments
PQ-North	Plant Quarantine [Hanoi]
PQ-South	Plant Quarantine [HCMC]
QDPI	Queensland Department of Primary Industries
SEFRC	South East Fruit Research Centre, linked to SOFRI
SOFRI	Southern Fruit Research Institute
TNU	Thai Nguyen University

3 Workshop Output

3.1 Pathogen Identification

Several capacity building training courses were conducted over the past two years to improve the diagnostic and identification skills of mainly young scientists. Towards the end of the second year of our project, I am very pleased to let you know that Ms. Barbara Ritchie has made a tremendous effort in collating all the training materials from the past laboratory diagnostic and post-harvest training courses undertaken within our project. Both the resulting manual '**Laboratory Techniques for Plant Health Diagnostics**' and all Power Point Presentations from these courses were distributed to the partner institutes as an electronic copy, which was very well received by all. This will enable project partners to use these materials to train others, hence increasing project impact.

After each partner institute presented their achievements of the past 6 months, the **need to better integrate available information sources nationally and internationally** was emphasized. A clear example arose when participants in the north presented their results from recent surveys. Results from the Central Plant Quarantine office for instance reported that in Ha Tay province one of the major pineapple diseases was heart rot. Most pineapples grown in Ha Tay belong to the Victoria variety. In the laboratory two causal agents were found, namely *Phytophthora* sp. and *Erwinia* sp. This resulted in a group discussion to why it proved difficult to identify whether the major cause was fungal or bacterial.

During this discussion I browsed the CABI Crop Protection Compendium (CPC) for pineapple heart rot and it reported that the pineapple Queen variety is resistant to *Erwinia* (see textbox). We stressed the importance to use this important resource before embarking on surveys and sample collection. **Copies of the CABI Crop Protection Compendium 2nd edition were handed out** to each of the institutes and were used during group work for the remainder of the workshop as resource material.

> Excerpt from the CABI Crop Protection Compendium:
>
> "The causal bacterium, *Erwinia chrysanthemi*, attacks the [pineapple] fruit a few weeks before maturity when it suddenly exudes copious fluid and bubbles of gas. There is no effective direct control, but spraying heptachlor on the ground at the time of flowering and 2 weeks later controls the ants which spread the bacteria. Diseased fruits need to be removed and destroyed elsewhere to reduce the population of the bacteria in the field. The pathogen also causes bacterial heart rot when it infects the tender bases of young leaves of 3-6-month-old plants. The rot can cause serious losses and is characterized by its putrefying odour. The Cayenne and Queen pineapple appear to be resistant to this bacterium. In the Philippines and Thailand, heart rot is caused by the fungi *Phytophthora cinnamomi* and *Phytophthora parasitica*, respectively."

The occurrence of *Erwinia* sp. on Queen pineapple requires further investigation to see whether typical bacterial rot symptoms develop in the field or not. Either resistance has broken down, or *Erwinia* was present, but did not cause the symptoms. Further field studies should be conducted in the location where this sample was collected, namely at the Suoi Hai state farm, Ba Vi district, Ha Tay province. Equally important is to upgrade information on disease status of different varieties within international Databases, such as the CABI Crop Protection Compendium, as this is an important decision-support tool for policy makers and land-use planners.

A new pineapple processing plant has been established in Bac Giang province, yet a lot of the pineapple provided by the farmers was rejected because of poor processing quality. Most pineapple grown in the North is of the relatively low yielding Queen variety. Cayenne is better for processing and if government pushes for a dramatic shift of varieties, new diseases are likely to be encountered. Updating electronic databases like the CPC are also of utmost importance for screening pest and disease status when introducing new varieties. During this visit, in both the north and south samples were collected of pineapple wilt for identification at CABI. Highly likely it is a mealybug transmitted virus.

The following overview of field samples taken nation-wide during the surveys within the project shows that 1 out of 3 of the samples have not been completely identified and 1 in 6 could not be identified. As this refers to samples collected before actual laboratory training courses were given during the project, it is anticipated that this situation has improved.

TABLE 1. Status of field samples taken during project field surveys.

	TOTAL FIELD SAMPLES TAKEN	NOT COMPLETELY IDENTIFIED	NOT YET IDENTIFIED
Fruit	66	21	10
Vegetables	65	23	9

Combined with the latest report from Dr. Eric Boa it seems that, apart from pineapple, litchi and longan in the North also needs further attention in terms of identification of exact causes. I have matched these results with the crop phenology information available on each of these crops (see first report by Drs. Eric Boa and Paul Van Mele), and with the availability of our Australian colleagues. Drs. Roger Shivas and Tony Cooke from QDPI have planned their next visit to Vietnam from July 27 to August 4 and 9, respectively. Both will start working in the North (27 July – 1 August, 2003); the second week (4 - 9 August) Tony will be working in the South. Litchi is currently being harvested, which brings us to the following crops to focus the next disease sampling on: for the North: longan and pineapple, and for the South: pineapple, dragon fruit and some vegetables.

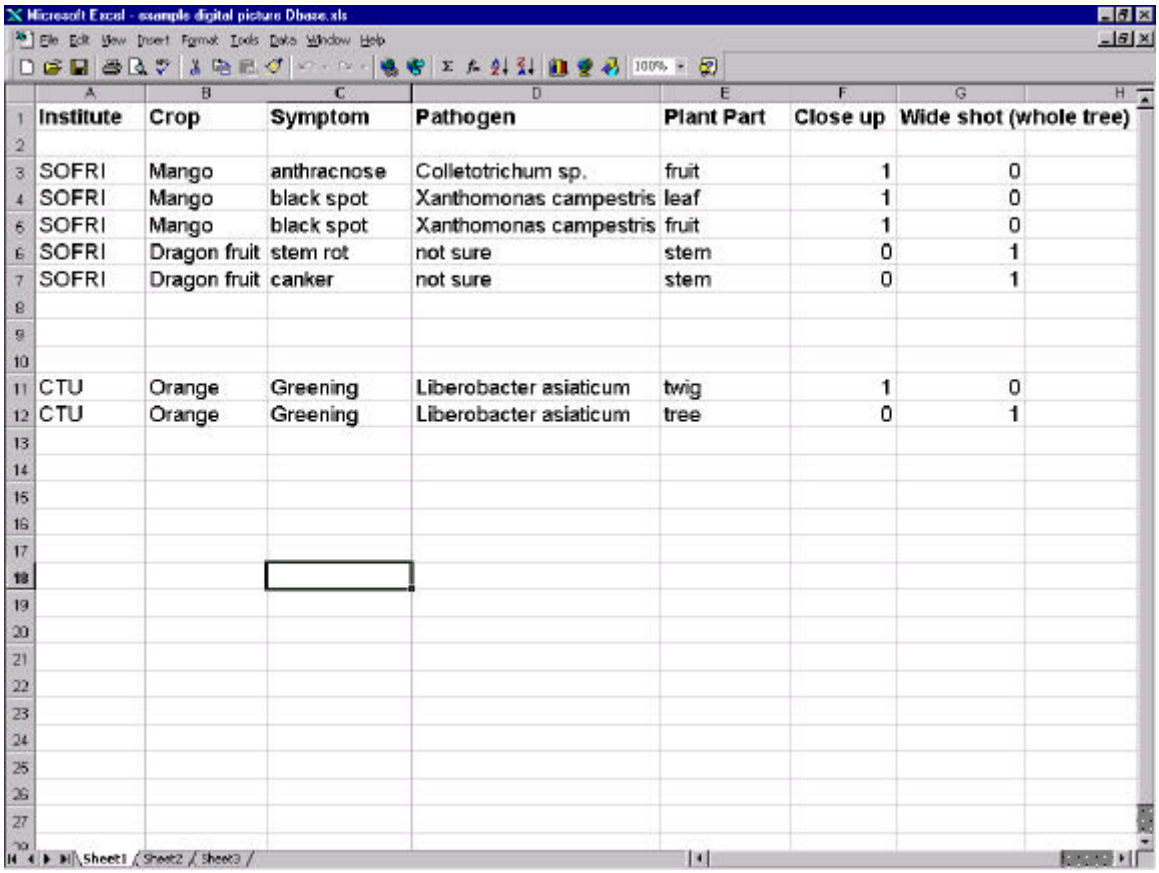
ACTION: **Lists of samples which will be collected for further identification need to be finalized by the end of June, 2003 and send to Drs. Eric Boa and Roger Shivas for their comments.**

3.2 Field Diagnostics

As commonly reported in world literature, farmers often confuse disease symptoms with insect pest damage. Hanoi Agricultural University presented a clear case whereby farmers confuse litchi leaf vein borer damage with a foliar disease and use fungicides to control it. Hence the need for further developing the Field Diagnostics course/manual as initiated in February 2003 by Dr. Eric Boa with Ms. Barbara Ritchie. Course material consisting of photos and power point presentations were provided to the different partner institutions at the time of the course. Upon request EB prepared some back-up guidelines to enable the partners to make better use of these training materials.

A monitoring and evaluation mission has been planned from September 15 to October 5, 2003. During this time also Hue will be visited to train staff from Hue AFU and PPSD.

ACTION: **Group leaders need to coordinate the development of an Excell Database of high quality digital photographs of symptoms that are already available at each institute, and present list to Drs. Paul Van Mele and Eric Boa by the end of July, 2003**. This will assist us in fully adjusting the Field Diagnosis training manual to the Vietnamese context and hence make it easier to use when training PPSD and farmers. An example of the format to be used is given below.



	Institute	Crop	Symptom	Pathogen	Plant Part	Close up	Wide shot (whole tree)
3	SOFRI	Mango	anthracnose	Colletotrichum sp.	fruit	1	0
4	SOFRI	Mango	black spot	Xanthomonas campestris	leaf	1	0
5	SOFRI	Mango	black spot	Xanthomonas campestris	fruit	1	0
6	SOFRI	Dragon fruit	stem rot	not sure	stem	0	1
7	SOFRI	Dragon fruit	canker	not sure	stem	0	1
11	CTU	Orange	Greening	Liberobacter asiaticum	twig	1	0
12	CTU	Orange	Greening	Liberobacter asiaticum	tree	0	1

The importance of field diagnosis is not just limited to rather unknown or uncommon diseases. Even the diagnosis of the well-studied greening or huanglongbin disease is prone to confusion. This is shown by the multitude of possible causes resulting in similar symptoms (see textbox CPC).

> Excerpt from the CABI Crop Protection Compendium:
>
> "The first symptom of huanglongbing is usually the appearance of a yellow shoot on a tree, hence the name huanglongbing which literally means yellow dragon disease. Progressive yellowing of the entire canopy follows: leaves turn pale-yellow, show symptoms of zinc or manganese deficiency, or display blotchy mottling, and are reduced in size. Blotchy mottle is the most characteristic symptom, but is not specific to huanglongbing. Stubborn disease [Spiroplasma citri], severe forms of citrus tristeza closterovirus (CTV), species of Phytophthora, waterlogging and the use of marcots can produce similar blotchy mottle patterns. Symptoms of zinc deficiency are also associated with the early stages of citrus blight (a disease of unconfirmed aetiology). Huanglongbing bacteria, however, do not induce the xylem dysfunction and wilting observed in blighted trees.
>
> Chronically infected trees are sparsely foliated and show extensive twig dieback. The fruits are often small, lopsided and poorly coloured (hence the origin of the name greening). They often contain aborted seeds. Similar fruit symptoms are also observed with CTV infection."

As training people in field diagnosis requires thorough preparation, planning and practice, we look forward to your experiences and suggestions that may arise when you are conduction your own Field Diagnostics courses with PPSD staff in the provinces.

Dr. Eric Boa and myself will be monitoring these activities over the coming months, as indicated in the project activities schedule given in Chapter 4, and do an evaluation in September. The first week we will look at adjusting the manual to the Vietnamese conditions, incorporating local examples and photos.

3.3 Farmer Participatory Research on Disease Management

3.3.1 Creating the FPR framework

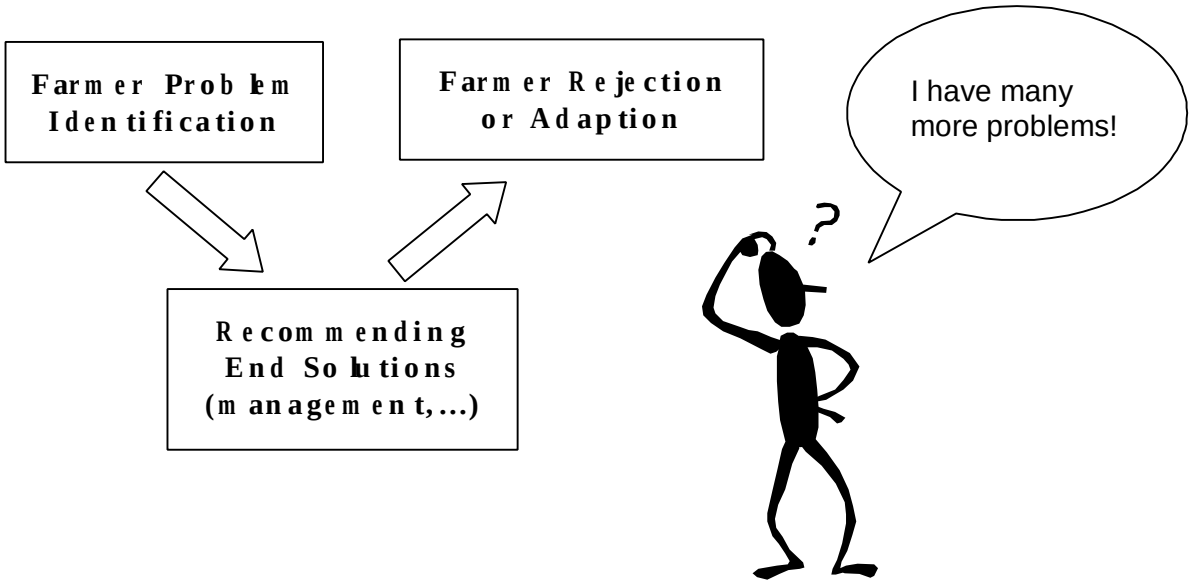
A good example to illustrate farmer empowerment was given by Prof Ha Minh Trung. He described how in a previous ACIAR project a lack of scientific knowledge about the cause of litchi sudden death lead to an approach of properly diagnosing the underlying causes by a team of national and Australian experts, followed by farmer training on the principles of disease development. This resulted in farmers experimenting by themselves and innovating to solve their own problems (see text box).

The case study provides us with an excellent example to illustrate one of the basic principles of empowering farmers through proper diagnosis and stimulating farmer experimentation by injecting new information on disease development and spread. As we will see later on this is not quite the same as farmer participatory research, although both approaches can lead to farmer empowerment. Often participatory training through the use of adult learning principles will trigger farmers to explore new management options.

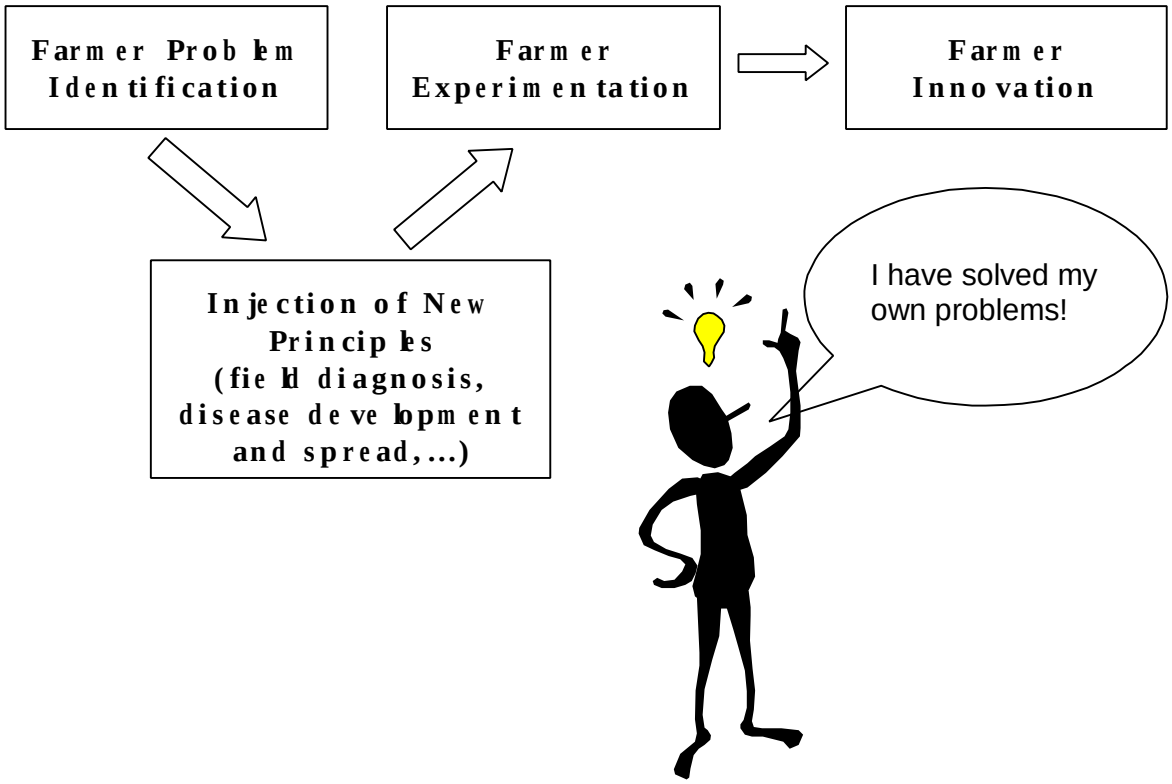
A case study by Prof Ha Minh Trung:

Litchi sudden death typically occurs after harvest when the tree is exhausted (July-August) and when rains are most heavy (up to 100 mm per day). This case provides a clear example of soil-borne pathogens for which a range of pathogens and nematodes have been found. From another ACIAR project on soil-borne diseases with Dr. Lester Burgess, *Phytophthora* specialists were invited as NIPP collaborators suspected *Phytophthora* to be the main cause. Farmers were informed how *Fusarium* mainly developed at the tree collar and in cases where trees are planted to deep in the soil. They were also informed about *Phytophthora* affecting mainly the deeper hair roots at the water table level, because of poor drainage. After understanding the principles of disease development farmers came up with their own solutions by digging up the soil from around the tree base to allow air to reach the tree collar. In case *Fusarium* was spotted they treated the trunk with fungicides (Aliette). They also made extra drainage canals in their field to reduce *Phytophthora* damage and as they realised the roots were sick, they experimented with different levels of pruning branches to give the tree a rest. Most trees recovered.

SCENARIO 1: FARMER IS PASSIVE RECIPIENT



SCENARIO 2: FARMER IS EMPOWERED



Presenting this type of information to farmers typically lies at the origin of participatory training or extension activities, especially if combined with adult learning principles. Another way to empower farmers is to fully involve them in participatory research activities. This is particularly fruitful in the case when both scientists and farmers are unclear about how exactly to tackle the problem in the field, yet the problem should have been diagnosed to a certain extent (otherwise we risk loosing too much of the farmers' time in case we fail to explore the right type of management practice).

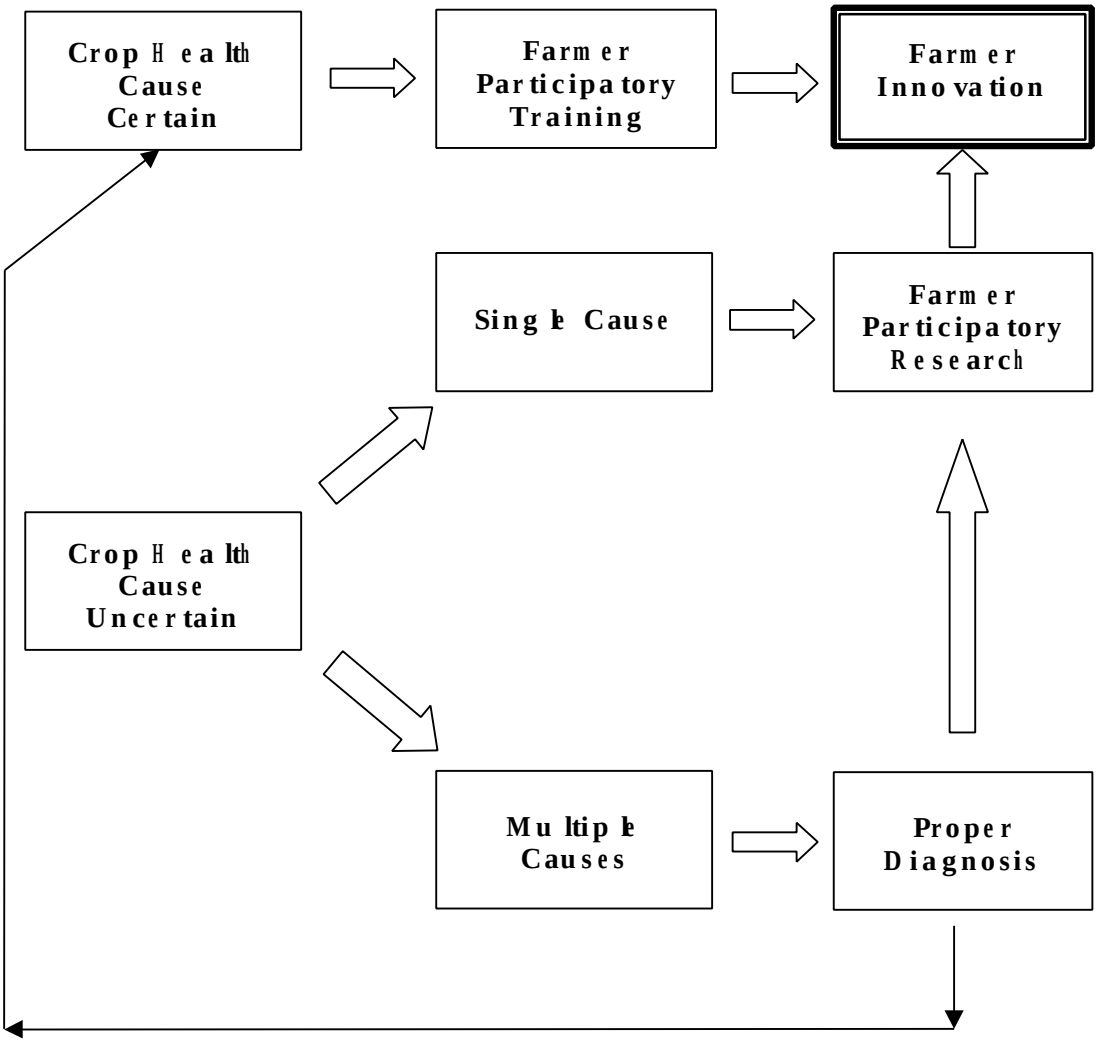
A major difference from the traditional approach of working with farmers is that farmers learn to solve their own problems, rather than being told what they should do. As each of us will learn these participatory approaches ourselves by doing, you will realize over time that facilitation skills become equally important as technical skills. Hence also the logical step of approaching farmers simultaneously as a team of scientists and extension staff/ PPSD, rather than approaching them in the traditional sequential way.

In those cases where Vietnamese research institutions have experience in regularly working with farmers in the field (either for conducting farmer interviews or on-farm research), there has hardly ever been a joint and systematic effort to involve extension or PPSD. On the other hand, tremendous achievements have been made over the past decade in Vietnam through national and international programs and projects regarding human capacity building in using participatory approaches (Integrated Pest Management, Natural Resource Management, Community Forestry, …).

One of the aims of our ACIAR project is to integrate skills across projects and programs. PPSD has been involved (and still is) in the training on Field Diagnostics, initiated by the project in February 2003. During this workshop we have invited two PPSD staff members who are experienced in conducting participatory research within Farmer Field Schools on rice or vegetables as resource people. It was heart warming to see their enthusiasm and eagerness to collaborate with the project, even if they hadn't worked on fruit crops before.

For instance one of the resource people in the North was Mr. Pham Dinh Tho from PPSD, Hai Phong. He has been working in the National IPM Program on rice since 1994 and has been involved in a number of Participatory Action Research (PAR) activities within the FAO regional IPM on Vegetables Program. Mr. Hong from PPSD, Ha Tay, joined us as second resource person, while in the South Mr. Le Minh Dung from PPSD, HCM City contributed with a strong presentation and supporting group discussions. Often scientists are called in as resource person during Farmer Field Schools to convey technical information, this time people from PPSD acted as a resource person to convey methodological backstopping to scientists.

The following diagram shows the conceptual framework for integrating diagnostic and participatory research approaches. It has been used as the basis on which diseases were selected as topics for FPR, evidently in combination with the perceived importance of the disease. A similar systematic approach has been used in the survey summary report by Dr. Eric Boa, an important guiding tool during the workshop (Thanks for this great effort, Eric).



3.3.2 Learn to report, report to learn

It is my experience that reporting on FPR activities is often neglected, which leads to missed learning opportunities. It is by documenting and reflecting on activities that you will learn most. In the workshops we agreed on a fairly simple format for reporting. Each team will keep records of their field activities and summarize this under six sections/questions. Remember that in each of these steps the farmer should play a central role and that more emphasis should be given to the process than to numerical data gathering:

1. How have problems been identified?
2. How have groups been formed?
3. How have treatments been selected?
4. How have data been collected?
5. How have data been analyzed?
6. How have analyzed results been presented to wider farming community?

Farmer Participatory Research approaches were introduced and activities planned on major fungal, bacterial and viral diseases. Each group prepared their action plan of FPR activities to be implemented over the coming year on topics agreed upon by the whole group (Table 2). The structure for preparing the action plan was similar to this for the report to be produced on these activities.

TABLE 2. Overview of planned FPR activities in collaboration with provincial PPSDs.

INSTITUTE	CROP	DISEASE	PROVINCE	COMMENTS
NIPP	Longan	Flower rot, anthracnose (fungus)	Hung Yen	Both *Anthracnose* and *Peronophythora* occur on flowers. Are these symptoms distinct?
	Orange	Greening (bacterium)	Ha Tay	
TNU	Longan	Anthracnose (fungus)	Thai Nguyen	Group learning will be compared between NIPP, TNU and HAU. Different treatments and approaches may be used depending on local preferences.
HAU	Litchi	Anthracnose	Hai Duong	
PPD-PQ	Pineapple	*Phytophthora* heart rot (fungus) Pineapple wilt (virus)	Bac Giang	After the workshop we conducted a field sampling trip and confirmed the wilt-associated virus transmitted by mealybugs. If possible also this disease will be covered in FPR
SOFRI	Pineapple	*Phytophthora* heart rot (fungus)	Can Tho Dong Nai Tien Giang	Cantho Extension Centre SEFRC-SOFRI in SE Vietnam SOFRI
	Mango	Anthracnose (fungal)	Can Tho Tien Giang	All mango FPR experiments in Can Tho will be a collaborative effort of SOFRI and CTU Mango FPR activities in Tien Giang will link to on-going CARD project and include PHTI
	Mango	Black spot (bacterial)	Can Tho Tien Giang	
	Tomato	Bacterial wilt (*Ralstonia solanacearum*)	Tien Giang	
CTU	Mango	Anthracnose	Can Tho Dong Thap	
	Mango	Black spot (bacterial)	Can Tho Dong Thap	Song Hau state farm, samples to be collected asap for proper diagnosis
PHTI	Mango	Anthracnose	Tien Giang	
IAS	Chili	Anthracnose	Lam Dong and HCM City	

In the following sections some key reminders and examples are presented on each of these six points. Hands-on information of how to initiate and conduct Farmer Participatory

Research (FPR) activities was presented by PPSD specialists who had been involved in Farmer Field Schools on rice and vegetables for many years. They had been asked to prepare and present their experiences using the same structured outline. Discussions were then held on how to adapt approaches for tree crops.

3.3.3 Problem identification

One of the prerequisites for farmers to participate is of course that the activity must focus on a locally perceived problem. Although the specific problem to work on actually has to be decided upon through group consensus in the community through a ranking or voting mechanism, we already narrowed down the topics, being at the start of the third year of the project. Those topics chosen for participatory research reflected the significance of the disease in the region and the level of confidence about correct diagnosis, based on the gained insights from the project.

To illustrate the importance of proper diagnosis, PPD-PQ for instance wished to work on pineapple 'red wilt'. However, as the causal agent was far from known I convinced them not to embark on it. When 2 days after the workshop we went on a field trip to Bac Giang together with Dr. Tu from PPD-PQ and Ms. Ly from NIPP,. the wilt was diagnosed to be caused by a virus transmitted by mealybugs. Knowing this, management strategies could be explored and the road to FPR was opened. If we had not properly diagnosed this symptom, management strategies for *Phytophthora* might have been explored at no use.

In the South people decided to work in teams consisting of people from different institutes, especially for FPR work on very serious diseases like mango black spot and mango anthracnose.

At the Song Hau state farm at Can Tho, mango black spot incidence increased in six months time from 3% damage (early harvested fruit) to 65% damage (fruit harvested at normal time). Here 1000 farmers grow more than 150,000 mango trees and if noting is done about it, the next year will be disastrous. The bacterial disease was quickly refered to as *Xanthomonas campestris*, but later on I found out that samples had previously been send to CIRAD, Réunion, and that no *Xanthomonas* was found. Samples should be collected and identified as quickly as possible. Anyway, knowing it is caused by a bacterium will allow us to explore certain management interventions.

Mango anthracnose, on the other hand, is an important disease where farmers need both pre- and post-harvest support on tackling this disease. Farmer cooperatives established within the CARD project 'Improving the fruit industry in Tien Giang and Tra Vinh provinces' recognised this as an important constraint which makes selling to large traders impossible. Our FPR work on mango anthracnose will work with farmers from these cooperatives.

3.3.4 Group formation

I would recommend farmer research groups to have between 4 and 10 members. The larger the group the more difficult to get them all together during data collection and other

activities. With smaller groups we risk to increase the human error of estimating values for the different parameters. No matter what size the group will be, at this stage actual experiments should only be set up in 1 or 2 orchards. Other group members join in during each activity.

The type of farmers to be selected was raised and some guiding criteria are:

- Education level
- Respected in the community
- Enthusiasm to participate
- Have sufficient time
- Preferably previous experience in FFS

Village leader could be consulted to assist in the selection. As the latter criteria might be difficult to achieve because there exist no FFS for fruit crops, it may be important to sit together with PPSD staff who will be involved in the FPR experiment and discuss the disease you want to work on. With the vast experience of PPSD in developing and/or using discovery learning exercises, they may quickly come up with some general exercises that can be used to give participating farmers a quick introduction on the development and spread of the disease in a way that is understandable to the farmers.

Another factor to consider is how the formation of the group links to other existing institutions in the farming community. In the South, for instance, we decided to link FPR activities on mango to a farmer cooperative, recently established by the AusAid CARD project 'Improving the performance of the fruit industry in Tien Giang and Tra Vinh provinces'.

This CARD project has brought farmers in direct contact with retailers to develop a quality grading system. Linking this project to ours was perceived as a unique chance to have cooperative farmers work with scientists and PPSD towards achieving improved marketing standards, while at the same time exploring the potential for creating innovative financing mechanisms for service provision. Extra income through improved quality could be reinvested in farmer training in one way or the other, and hence create an example of how financial sustainability of farmer training, a global problem, could be addressed. One of the perceived benefits of working together as a cooperative was the increased access to technical training. It will be worth exploring to what extent farmers want to invest financially in building their own capacity as a group.

3.3.5 Deciding on the treatment

First of all local ideas should be collected, ideally after having conducted a basic discovery learning training course on the development and spread of the disease. The 'injection' of new principles might trigger new ideas for the management of the disease, which were not considered at first (see also previously presented diagram SCENARIO 2: Farmer is empowered). On a flip chart you list all the ideas, followed by the origin or source of the

idea (for instance extension staff, farmers Kim and Lam, scientist Hong) and in a third column how achievable this idea is.

Try to tackle one problem at a time and do not attempt to select two treatments and a control when working with fruit trees. In that case you will better conduct each single treatment (and control) in a separate orchard altogether.

3.3.6 The nitty-gritty of designing FPR experiments

This step also requires great communication skills and experience in FPR / PAR as we need to explain farmers the need of the developing a certain procedure. One extra reason to work with PPSD. Some of the partners have already initiated 'participatory research' activities without involving PPSD. In Vietnam, scientists often embark on doing experiments directly with farmers, yet the objectives are mainly to develop results and recommendations, rather than focusing on the learning aspects of the whole process. Later, we will try to evaluate the differences, as this will yield some interesting lessons.

TABLE 3. Main differences of FPR in annual and perennial cropping systems.

	ANNUAL & VEGETATIVELY PROPAGATED CROPS	PERENNIAL TREE CROPS	COMMENTS
Examples	Rice, vegetables, pineapple, dragon fruit	Longan, litchi, mango, citrus	
Variability between individual plants	low	higher	Hybrids, varieties or vegetatively propagated plants show less variation in performance due to their higher genetic uniformity. Tree crops are often grown on rootstocks increasing the variation.
Selection of experimental plants	At random	A priori selection of plants to reduce initial variability (similar age, performance, disease level,...)	
Experimental design	Blocks	No blocks unless local conditions dictate so	
Size of experimental plot	Rice (30 m^2) Vegetables (15 m^2)	No specific plot is needed as trees are selected throughout orchard	For fruit crops like pineapple this will need to be explored, based on scientific literature
No of treatments	Flexible, but keep it simple	Ideally in 1 orchard only 1 treatment is compared with a control	
No of replicates	Minimum 3 per treatment	No replicates	
No of plants sampled	At least 3 in each replicate, resulting in 9 plants per treatment	At least 10 trees for the treatment and 10 as control trees	
Control	Farmer practice	Farmer practice	
Time of sampling	Weekly or 2-weekly depending on crop/topic/season	Weekly or 2-weekly depending on crop/topic/season	

Hands-on information of how to initiate and conduct Farmer Participatory Research (FPR) activities was presented by PPSD specialists working in Farmer Field Schools on rice and vegetables for many years. Participants enquired whether for fruit crops a similar approach could be followed, mainly in regard to experimental design and sampling. The author of this report then embarked on the underlying principles of sampling methodology according to the type of cropping system. Major differences with rice and vegetable participatory research are given in Table 3.

Although we discussed the sampling procedure for pineapple, as being quite resembling to this in rice cropping systems, the fact that ants are involved in protecting mealybugs which transfer the pineapple wilt virus requires us to use a different approach as the randomised block design. This was further discussed with Dr. Tu from PPD-PQ and illustrates that not only the cropping system, but also the nature of the pest- or disease complex influences the sampling procedure to be followed. The author remains open for any queries that may arise.

3.3.7 Data collection

Most importantly is that we help farmers to understand the purpose of why we should observe this type of data and that we keep it as simple as possible.

Some groups suggested sampling trees in the 4 different wind directions and in three different layers of the tree (top, middle, bottom). It is useful to know the scientific approaches, but it was agreed these issues need to be discussed with the farmers who will volunteer to collaborate in the participatory research experiment. Farmers will finally need to make the decision as to what they think is feasible. This is one of the major differences between on-farm research and participatory research. We need to nurture farmers' motivation and stimulate the learning process. Presenting them a rigid and complex scientific protocol will not be very helpful in this regard. If scientific data need to be collected this should be done separately.

ON-FARM RESEARCH ≠ PARTICIPATORY RESEARCH

It is probably better for scientists who lack experience in participatory research to discuss scientific protocols and most useful parameters to measure for a specific treatment with their PPSD counterpart in the respective provinces, and then let them facilitate the discussion and procedures with the farmers. Being a scientist myself, I know it is very difficult to give these issues out of hand, but once you take up the role of observer, reporter and advisor (in case you are asked to intervene), you will learn many new things from this interaction.

3.3.8 Data analysis

Simplified statistics are used, presenting data in tabular form on sheets and looking at the range of results (minimum-maximum) to compare treatments. If there is no overlap between the minimum of one treatment and the maximum of another, we can be fairly sure there exists a significant difference. In case you use blocks, also check whether difference is not due to variation between blocks (you may have overlooked an important environmental variable).

3.3.9 Evaluating results

At this final session in working with farmers we need to discuss the benefits of the farmer participatory research, what implications both results and procedures will have on the wider community, how the results will be shared with the wider community. For the latter you may think of using Going Public sessions, or any technique to get feedback from the community. Be flexible and creative.

During this session, new topics for participatory research and how activities could be (co-) funded by the farmer community may be explored.

In the following box a selection of lessons learned are presented from participatory research activities undertaken within the Seed Health Improvement Project in Bangladesh. By learning from other projects we may avoid making the same mistakes over and over again.

3.4 Evaluation of FPR workshop

Some key learning points from the workshop as expressed by the workshop participants shows a clear shift in thinking:

1. Farmer first: this reflects the changed position of the farmer in conducting participatory research. Most institutes in Vietnam have experience in conducting on-farm research, whereby the farmer mainly provides inputs in terms of his or her field and labour. Often a general feedback from the farmer is asked for at the end of the experiment. After the workshop scientists understood the need to have farmers involved in everey step of the experiment.
2. Need to involve extension (PPSD): With a strong emphasis on the learning process and methodology of Farmer Participatory Research (FPR / PAR), scientists realsed they could learn a lot by working more closely with PPSD as they have gained a lot of experience in other IPM programs.
3. Need to integrate skills of farmers, scientists and extension: each has specific strengths which through teamwork will yield best results.
4. Farmer becomes empowered: participants realsed that the aim of FPR is not only to develop appropriate disease management interventions, but that the farmers will be able to apply this methodology to address other problems.

5. Impact on policy: participants felt this was a very useful approach for conducting highly relevant research to solve local problems at and with the farming community and extension, and anticipated this could influence agricultural research policy.
6. Overall knowledge increases: clearly this approach convinced participants that by doing FPR, everybody learns a lot: a win-win situation.

FPR Lessons learned in the Seed Health Improvement Project, Bangladesh

Question-1: How to identify problems?

- Practical experience of the farmers should be given priority
- Try to get to know more about the community
- Use appropriate methods to help all farmers to discuss and give information (group vs individual approaches)
- Dominant participants should be neutralized
- Problems should be prioritized through weight or ranking exercises

Question-2: How to identify and formulate potential solutions?

- Ask probing questions to get to the root of the problem
- Develop platform for discussions among the farmers
- Start with the farmers' knowledge to solve a problem
- Give due importance to all opinions of all the farmers
- Check feasibilty of options

Question-3: How to form groups?

- Willngness of the participants and abilty to join in the group
- Groups should select local facilitator among themselves
- Skill development training should be given to the local facilitator (communication, facilitation and group management)

Question-4: How to collect data?

- Develop monitoring sheet by the farmers
- Brainstorm with farmers to develop monitoring sheet and how to fillit out
- Information in "visual form"
- Farmers should keep monitoring sheet
- Group should decide on data collection procedure
- Both qualtative and quantitative information should be recorded

Question-5: How to analyze the collected data?

- Observe the different treatments and let farmers rank or use weighting
- Use simplfied statistics

Question-6: How to present the analyzed data?

- Present different treatments into one chart
- Convert quantitative analysis into "Visual form of measurement e.g. Bar Chart

4 Project activities schedule for July-December 2003

REGION	DATE	ACTIVITY	CROPS	INTERNATIONAL PARTNERS
North				
	27 Jul - 1 Aug	Targeted Collection and Identification of Samples	1. Pineapple 2. Longan	Drs. Roger Shivas and Tony Cooke (QDPI) to discuss preparations needed with NIPP
	28 Sep – 3 Oct	Field Diagnostic Course	Miscellaneous	Drs. Eric Boa and Paul Van Mele (CABI)
	On-going	Farmer Participatory Research	Management of specific diseases (see Table 3) as decided by community research team	Dr. Paul Van Mele
Central				
	20-27 Sep	Field Diagnostic Course	Miscellaneous	Drs. Eric Boa and Paul Van Mele
	On-going	Farmer Participatory Research	Management of specific diseases (see Table 3) as decided by community research team	Dr. Paul Van Mele
South				
	4-9 Aug	Targeted Collection and Identification of Samples	1. Pineapple 2. Dragon fruit	Dr. Tony Cooke to discuss preparations needed with SOFRI and IAS
	15 – 19 Sep	Finalizing Vietnamese manual and Field Diagnostic Course	Miscellaneous	Drs. Eric Boa and Paul Van Mele
	On-going	Farmer Participatory Research	Management of specific diseases (see table 2) as decided by community research team	Dr. Paul Van Mele

Annex 1. Workshop Agenda

Topic	Activity
1. Welcome participants and introduction	Verbal
2. Overview status project and general project issues	Power Point Presentation (PPT) by project leader, Dr. Paul Van Mele
3. Last years 'achievements partners	Informal or PPT, followed by group discussion
4. Diagnostic and management gaps	Plenary consensus building based on survey findings summarized by Dr. Eric Boa
5. FPR/PAR/PTD concepts	Overheads by project leader and group discussion on sampling techniques
6. FPR/PAR/PTD experiences in Vietnam	Case studies presented by experts from PPSD, followed by group discussion
7. Disease selection for FPR work	Group work followed by plenary consensus building
8. Action plan development	Group work
9. Review action plans	Plenary, each group presents followed by feed-back
10. Evaluation and closing	

Annex 2. Workshop Participants

North		South	
Ngo Bich Hao	HAU	Le Hoang Le Thuy	CTU
Ngo Thi Xuyen	HAU	Tran Thanh Hai	CTU
Nguyen Kim Van	HAU	Phan Van Bang Phi	Ext. Centre (Can Tho)
Bui Van Tuan	NIPP	Hoang Xuan Quang	IAS
Ha Minh Thanh	NIPP	Nguyen Van Kien	IAS
Nguyen Thi Ly	NIPP	Pham Van Bien	IAS
Pham Ngoc Dung	NIPP	Ngo Van Binh	PHTI
Nguyen Van Hoa	NIPP (Biocontrol)	Chung Thi Hong Thoa	SEFRC-SOFRI
Tran Thanh Thap	NIPP (Biocontrol)	Lam Thi My Nuong	SOFRI
Bui Thi Khoi	PPD-PQ	Le Ngoc Binh	SOFRI
Duong Minh Tu	PPD-PQ	Le Thi Thu Hong	SOFRI
Vu Dinh Phuong	PPSD (Bac Giang)	Le Quoc Dien	SOFRI (Ornamental)
Nguyen Thi Hoa	PPSD (Ha Noi)	Nguyen Thi Ngoc Truc	SOFRI (Biotech)
Ms Chung	PPSD (Ha Tay)	Phan Thi Phi	VACVINA (Vinh Long)
Pham Dinh Hoa	PPSD (Hai Duong)	Nguyen Van Ri	VACVINA (Tien Giang)
Le Minh Lam	PPSD (Hung Yen)	Nguyen Van Ky	VINAFRUIT
Luu Quang Tuan	PPSD (Thai Nguyen)	Marlo Renkin	AYAD (Australia)
Bui Lan Anh	TNU		
Nguyen Duc Thanh	TNU	Le Minh Dung*	PPSD (HCM City)
Mr. Hong*	PPSD (Ha Tay)		
Pham Dinh Tho*	PPSD (Hai Phong)		

*Resource persons