Project Title **Code: 2.2**	**Extension of citrus IPM in Vietnam**
Australian Personnel	Professor GAC Beattie, Dr Debbie Rae
Australian Institution	Centre for Horticulture and Plant Sciences, University of Western Sydney
Vietnam Institution	National Institute of Plant Protection Plant Protection Department, MARD
Project Duration	July 2001 to December 2003

Project Description

The aim of the proposed activity is to enhance Viet Nam's capacity for teaching and research and development in the citrus sub-sector of agriculture. This will be achieved by the publication of reference texts and the development of high quality curricula for farmer field schools (FFS) in citrus IPM. The three Vietnamese texts will incorporate the research results of ACIAR project CS2/96/176, current information not easily accessed in Viet Nam and new information collected from throughout Viet Nam as part of the activity. Training activities will include an intensive course for 21 key Vietnamese personnel in Australia, and local workshops for 90 Plant Protection Sub-Department staff and 120 IPM trainers, technical resource people and farmers. FFS curricula will be developed from experiments conducted over two full growing seasons in two key citrus growing locations.

Objectives

(a) Produce a pictorially based booklet in Vietnamese on spray application and use of PSOs, for use by citrus farmers.
(b) Produce a more technical booklet in Vietnamese on spray application and use of PSOs, for use by technicians and scientists
(c) Produce a reference book in Vietnamese on citrus pests and natural enemies in Viet Nam. This would be modelled on "Citrus pests and their natural enemies: Integrated pest management in Australia" although smaller in scope. For each of the major pests there will be a high quality colour photograph, photographs of natural enemies, a map showing distribution and severity of the pest throughout Viet Nam and written information. The text would include a description of the pest, the damage caused, natural enemies and management of the pest. Plant Protection Sub-Department information on citrus pests is currently available province by province from the Community IPM Fruit IPM Baseline Survey database, and would be contributed to this activity proposal. However, natural enemy data is not readily available and would require collection and rearing by PPSD personnel and identification by NIPP.

(d) Train key Vietnamese extension scientists and technicians at UWS in aspects of PSO use in IPM programs relevant to the citrus industry. Key scientists will be chosen from a range of institutions (Appendix 2), taking their level of involvement in the proposed activity (Appendix 3) gender issues and English skills into consideration.
(e) Undertake season long field studies and pilot FFS for two consecutive seasons at two important citrus growing locations in Viet Nam to develop curricula for Training of Trainers (TOT) and FFS. Exact locations would be chosen during the course of the proposed activity, but would be within two of the four top citrus growing provinces of Can Tho, Ha Nam, Son La and Quang Nam.

Outputs and Performance indicators

1. Publication of the booklet on spray application and use of PSOs, for use by citrus farmers.
2. Publication of the technical booklet on spray application and use of PSOs, for use by technicians and scientists
3. Publication of the reference book on citrus pests and natural enemies in Vietnam.
4. Participation of key Vietnamese extension scientists and technicians in intensive training in Australia.
5. Completion of season long field studies and pilot FFS for two consecutive seasons at two important citrus growing locations in Viet Nam and development of curricula for TOT and FFS

COMPLETE REPORT

Executive Summary

Adoption of integrated pest management leads to both economic and environmental benefits. Higher profits can be achieved through reductions in inputs and associated costs and the use of more sustainable farming practices. However, as IPM uses a wide range of different but complimentary methods to reduce pest populations, it requires greater knowledge to implement than pest control based on the use of high inputs of broad-spectrum synthetic agrochemicals. The most successful method of providing this knowledge and implementing IPM in less developed countries has been through the use of Field Farmer Schools (FFSs). FFSs empower farmers to learn and create a better situation for themselves, rather than passively relying on others to make decisions for them. Viet Nam has a well-developed National IPM program and an excellent extension capability based on the FFS model. However, prior to this project Viet Nam lacked resource materials and specific expertise in citrus IPM extension. This project has addressed these deficiencies by developing high quality curricula for FFSs in citrus through field activities conducted over 2 seasons involving 60 citrus growers from 2 villages in Nghe An province and 47 growers from Tien Giang province. The project also produced two reference texts in Vietnamese. A third planned reference was not completed as originally envisioned due to a range of factors, the most critical of which was the declining health of a key Vietnamese scientist from the National Institute for

Plant Protection (NIPP). However, the text of a book has been produced by Plant Protection Department and Can Tho University personnel and is ready for publication. The only requirement to achieve this is approval to use remaining project funds held at NIPP and UWS for publication by the Agricultural Publishing House. In order to fully realise the benefits of this project, it is strongly recommended that further support be provided to allow Training of Trainers (TOT) for about 30 Master Trainers in citrus IPM masters in the near future. Support to allow the adoption of a media approach to motivate farmers to become involved in citrus IPM FFSs using the approach of the recent award winning "Three-Reductions Initiative" in rice would also be highly beneficial.

1.0 Project Description

1.1 Background and preparation

The stated aim of the project was to enhance Viet Nam's capacity for teaching and research and development in the citrus sub-sector of agriculture. This was to be achieved through publication of reference texts and the development of high quality curricula for farmer field schools (FFS) in citrus IPM. The three Vietnamese texts were to incorporate the research results of Australian Centre for International Agricultural Research (ACIAR) project CS2/96/176, current information not easily accessed in Viet Nam and new information collected from throughout Viet Nam as part of the activity. Training activities were to include an intensive course for key Vietnamese personnel in Australia, and local workshops for Plant Protection Sub-Department staff and integrated pest management (IPM) trainers, technical resource people and farmers. FFS curricula were to be developed from experiments conducted over two full growing seasons in two key citrus growing locations.

1.2 Context and rationale

The project stemmed from two ACIAR projects 'Integrated Control of Citrus Pests in China' (ACIAR CS2 1993 005; 1993-1997) and 'Integrated Control of Citrus Pests in China and Southeast Asia' (ACIAR CS2 1996 176; 1997-2000). It was undertaken in collaboration with personnel from the lead partner institutions in Viet Nam, the National Institution for Plant Protection (Ministry of Agriculture & Rural Development: MARD) and the Plant Protection Department (MARD). A collaborative research relationship was established with the National Institution for Plant Protection in 1997 as part of ACIAR project CS2 1996 176. During that ACIAR project Centre for Horticulture and Plant Sciences (CHAPS) personnel made contact with Plant Protection Department staff, through FAO personnel and the Viet Nam National IPM Programme. The current project marked the commencement of a collaborative working relationship between CHAPS and the Plant Protection Department.

Other institutions involved in the current project included:

Southern Fruit Research Institute (MARD),
Research Institute of Fruits and Vegetables (MARD),
Agricultural Extension Department (MARD), and
Can Tho University,

Farmers were identified as the key beneficiaries of the project.

The project was developed and conducted on the premise that adoption of IPM-based technology previously developed in Southeast Asia would lead to significant reductions in the use of broad-spectrum synthetic pesticides in Vietnamese citriculture, and that such reductions in pesticide use would result in benefits to the environment, the health of farm workers who apply agricultural chemicals, and the health of consumers who eat citrus fruit.

During ACIAR CS2 1996 176 links were established between CHAPS personnel and the FAO Programme for Community IPM in Asia. The then Vietnam Country Programme Officer, Dr Patricia Matteson was very interested in the results of the project. Copies of all ACIAR research reports were sent to the FAO Programme for Community IPM office in Hanoi, and Dr Matteson was invited to two project workshops in Hanoi. The reviewers of the project made two recommendations in relation to Viet Nam, the most important of which stated 'ACIAR should discuss extension prospects within Viet Nam with the PPD, AusAID, FAO and other relevant agencies mentioned in this report. The aim should be to establish a system of Training of Trainers and Farmer Field Schools as widely as possible through citrus growing areas of Viet Nam'. This recommendation was based on the then current lack of:

- Vietnamese texts on citrus pests, natural enemies, spray application and technical aspects of spray oils, and
- FFS curricula and training in citrus IPM required to commence the process of dissemination of results to the end users, the citrus farmers.

Viet Nam has demonstrated an excellent extension capability based on the FFS model, which has been managed by the National IPM program. FFSs have trained more than 500,000 farmers to make better decisions about growing healthy crops in ways that are both sustainable and profitable. Special emphasis is given to providing the farmers with alternative tools for pest control to allow their dependence on chemical pesticides to be reduced. Most FFS have been on rice, but curricula have also been developed, and FFS facilitated for, vegetables, tea, cotton, soybeans, and peanuts. However, until recently production of citrus has been assigned a much lower priority than that of rice and other staple crops. Consequently, development of a FSS program for citrus in Viet Nam lacked resource materials and specific expertise in citrus IPM extension. The objectives of this AusAID CARD project 'Extension of Citrus IPM in Viet Nam' addresses these needs.

The project was undertaken concurrently with preparation for, and the first year of, ACIAR CS2 2000 043 'Huanglongbing management for Indonesia, Vietnam and Australia', a Horticulture Australia Limited project 'Incursion management for huanglongbing (citrus greening) and its vector (Asiatic citrus psyllid)' (HAL CT 2002 005), and support for extension activities linked to the marketing of horticultural and agricultural mineral oils in Asia.

1.3 Project objectives and scope at design

The aim of the project was to enhance Viet Nam's capacity for teaching and research and development in the citrus sub-sector of agriculture. The project design was relevant to both the AusAID country strategy and the Vietnamese government program, as sound education and information about technical subjects always promote progress.

The proposed activities were designed to achieve capacity enhancement through:

- the provision of essential resource material and training of key Vietnamese personnel in Australia, and
- the development of curricula for TOT and FFS, which were not available in Viet Nam at the inception of the project.

The major development objectives were:

I. Produce a pictorially based booklet in Vietnamese on spray application and use of PSOs, for use by citrus farmers.

II. Produce a more technical booklet in Vietnamese on spray application and use of PSOs, for use by technicians and scientists

III. Produce a reference book in Vietnamese on citrus pests and natural enemies in Viet Nam modelled on 'Citrus pests and their natural enemies: Integrated pest management in Australia' but smaller in scope. The book was to include high quality colour photographs of pests and natural enemies, a map showing distribution and severity of the pest throughout Viet Nam, and written information describing the pest, the damage caused, and its natural enemies and management. Existing provincial Plant Protection Sub-Department information on citrus pests from Community IPM Fruit IPM Baseline Survey database was to be used for the book but collection of natural enemy data, which was not readily available before the project, was to be collected by PPSD and NIPP personnel.

IV. Train key Vietnamese extension scientists and technicians at UWS in aspects of PSO use in IPM programs relevant to the citrus industry. Key scientists were to be chosen from a range of institutions based on their level of involvement in the proposed activities, gender issues and English skills.

V. Undertake season long field studies and pilot FFS for two consecutive seasons at two important citrus growing locations in Viet Nam to develop curricula for Training of Trainers (TOT) and FFS.

1.4 Implementation arrangements

Institutional arrangements outlined in the project document were that CHAPS personnel would assist with the preparation of material to be included in the proposed publications, oversee the publication process and arrange for training of key Vietnamese scientists in aspects of IPM relevant to citrus in Australia. NIPP were to oversee the adaptation of material to be included in the publications, for the local situation. They were also to oversee the collection of specimens (for photographs) and information about citrus pests and natural enemies from throughout Viet Nam, and be responsible for all translations. PPSD personnel were to collect natural enemies and relevant information from

throughout Viet Nam and provide these specimens and information to NIPP. The PPD National IPM programme were to oversee the season long field studies, pilot FFSs and development of curricula. NIPP and PPD were to jointly organise the workshops. All implementation arrangements were carried out as outlined in the project document.

2.0 Appropriateness of Project Design and Objectives

2.1 Appropriateness of Objectives

Objective No.	Objective Description	Appropriateness rating
I	Produce a pictorially based booklet in Vietnamese on spray application and use of PSOs, for use by citrus farmers	5
II	Produce a more technical booklet in Vietnamese on spray application and use of PSOs, for use by technicians and scientists	5
III	Produce a reference book in Vietnamese on citrus pests and natural enemies in Viet Nam containing high quality colour photograph of each pest, photographs of natural enemies, a map showing distribution and severity of the pest throughout Viet Nam. Text was to include a description of each pest, the damage caused, and its natural enemies and management.	5
IV	Train key Vietnamese extension scientists and technicians at UWS in aspects of PSO use in IPM programs relevant to the citrus industry.	5
V	Undertake season long field studies and pilot FFS for two consecutive seasons at two important citrus growing locations in Viet Nam to develop curricula for Training of Trainers (TOT) and FFS.	5

Rating. 5: Best practice; 4: Fully Satisfactory; 3: Satisfactory Overall; 2: Marginally Satisfactory; 1: Weak

2.2 Appropriateness of Design

Within the 5 objectives there were 2 key project design features. These were the production of reference texts and development of high quality curricula for farmer field schools (FFS) in citrus IPM through training and experience gained in both Australia and Viet Nam. The production of reference texts to provide information on biological control, integrated pest management and other alternative methods of pest control was deemed as a highly appropriate approach to address the problem of pesticide overuse in citriculture in Viet Nam. Previous experience with the FFS model in Viet Nam had demonstrated that the model is a highly effective and appropriate method of empowering farmers with the

tools to make informed decisions about how to grow their crops and manage pests and diseases in a sustainable way. Rapid advances achieved in sustainable rice farming over the past decade allowed Viet Nam to transform from a rice importer to the world's third largest rice exporter. Similar achievements can be expected in fruit crops including citrus in the future, if effective extension of information to farmers is accomplished.

Description of design features	Appropriateness rating
Production of 3 reference texts	5
Development of high quality curricula for farmer field schools (FFS) in citrus IPM	5

Rating. 5: Best practice; 4: Fully Satisfactory; 3: Satisfactory Overall; 2: Marginally Satisfactory; 1: Weak

3.0 Implementation Performance

3.1 Project Components and Outputs

Objectives I, II, IV and V were all successfully completed within the approved extension of the project. Objective III was not completed but actions required to complete this objective using residual funds is outlined below.

Component No.	Component Description	Outputs	Performanc e Indicators	Performance Rating
I	Produce a pictorially based booklet in Vietnamese on spray application and use of PSOs, for use by citrus farmers	2,000 copies of book printed and distributed	Publication of book completed	3 (completed)
II	Produce a more technical booklet in Vietnamese on spray application and use of PSOs, for use by technicians and scientists	1,000 copies of book printed and distributed	Publication of book completed	3 (completed)
III	Produce a reference book in Vietnamese on citrus pests and natural enemies in Viet Nam containing high quality colour photograph of each pest, photographs of natural enemies, a map showing distribution and severity of the pest throughout Viet Nam. Text was to include a description of each pest, the damage caused, and its natural enemies and management.	Originally envisaged book not completed but an alternative book containing 3 major sections on: cultural techniques; pests and diseases of citrus; and plant protection has been written and is ready for publication.	Publication of book possible depending on approval to use remaining funds from UWS and NIPP.	2 (pending)
IV	Train key Vietnamese extension scientists and technicians at UWS in aspects of PSO use in IPM programs relevant to the citrus industry.	Intensive training of 21 key Vietnamese personnel in Australia	Attendance at lectures and field visits and participation in practical sessions.	4 (completed)
V	Undertake season long field studies and pilot FFS for two consecutive seasons in Nghe An and Tien Giang provinces to develop	> 130 farmers and > 16 trainers participated in FFS activities	Production of farmer training guides and technical information	4 (completed)

5: Exceeding time and quality targets, 4: Achieving time and quality targets and on budget; 3: Moderate progress towards targets, some issues about quality, budgets or costs but these are being adequately addressed; 2: Some progress towards targets, but slippage

in schedule and cost overruns; & 1: Significant problems in achieving targets, quality outputs unlikely to be achieved and substantial cost increases affecting overall budget.

Objectives I, II, IV and V were all successfully completed within the approved extension of the project. Objectives IV and V were achieved on time and within budget. Training was a very important component of the project, and in addition Objective IV allowed the establishment of an excellent rapport between key Vietnamese scientists and Australian project personnel. Season long field studies conducted under Objective V resulted in the production of farmer training guides and technical information for trainers in each of the participating provinces (Annexes 1-5).
Objectives I and II were achieved with some slippage in relation to the original schedule and slight overruns in the budget. However, there was considerable expansion in the scope of the 2 books published in relation to that originally envisaged in the project document. Book 1 was planned to be a 30 page black and white booklet, but was published as a 62-page booklet on high quality paper including 18 pages with colour plates (Annex 6). The increases in cost were partially compensated for by decreasing the print run from 5,000 to 2,000 but the overall cost was still higher than provided for in the budget. The second book was planned to be a 50 page black and white booklet but the published book has 136 pages (Annex 7). The print run was not reduced from the originally planned 1,000 copies. Distribution of the first book was previously reported (Annex 8) and distribution of the second book used the same distribution list with numbers halved to each institution.

Objective III was not fully completed due to a range of factors, the most critical of which was the ill health of Prof Nguyen Van Cam. According to the project document, 7 Vietnamese personnel were scheduled to be involved in the production of Book 3, with Dr Pham Van Lam and Prof. Nguyen Van Cam from NIPP being most involved. Over the course of the project Dr Pham Van Lam became more involved in political activities and was required to attend an extensive course to this regard. Prof. Nguyen Van Cam was the driving force in relation to the first 2 publications, but declining health during this time resulted in slippage in the schedule. In January 2004 Prof. Nguyen Van Cam contacted Prof. Andrew Beattie to formally acknowledge his inability to be involved in cooperative research projects (Annex 9). Both the activity director from the Plant Protection Department, Mr Nguyen Huu Huan and Mr Huynh Tri Duc completely fulfilled their commitment to Objective III by each writing a book chapter. In addition 2 researchers from Can Tho University have contributed chapters to the book, as well as Mr Ho Van Chien, Director of the Southern Regional Plant Protection Centre and one of the participants in Objective IV. This book entitled “QUAN LY SINH THAI VUON CAY CO MUI” (Ecological management of citrus) is now ready for publication and a mock copy is provided in Annex 10. NIPP only have 45,000,000 VND (~$A 3,700) remaining in their budget, which is not sufficient to produce this publication ($A9,580 was originally budgeted in the project document to produce 1,000 copies). However, UWS have $20,581 residual funds as a result of savings made on airfares and other travel costs associated with 21 Vietnamese personnel visiting Australia for intensive training in the first year of the project. It is therefore proposed that AusAID give approval for these residual funds to be used for publication. Current estimates of publication costs for a

range of publication runs are provided in the table below. Funds could be allocated in a number of ways depending on the advice of AusAID, however, our suggested option would be 6,000 copies of book 3, 3,000 additional copies of book 1 and 2,000 additional copies of book 2. The cost of this would be around $23,430 for publishing plus some minor costs for final technical editing.

Publication	No. copies	Cost ($AUD)
Book 3	2,000	6,227
	5,000	12,140
	10,000	21,555
Book 1	2,000	4,129
	3,000	6,194
Book 2	1,000	991
	2,000	1,982

The only approved change to the project was a 6 month extension without any additional funds, to allow field experiments to be conducted over 2 complete citrus growing seasons. This change was critical to the success of the project and highlights the importance of considering agricultural and environmental time frames when designing capacity enhancement projects for rural development.

A major factor that influenced the project in both positive and negative ways was that the project was driven from within Viet Nam by individuals who had a good raporte with Australian project personnel and also shared a similar scientific paradime, rather than through the institutions that we dealt with. This was very positive in terms of the excellent working relationship that was developed with a range of Vietnamese personnnel, particularly PPD staff and Can Tho University personnel that were not known to the Australian project personnel prior to the commencement of this project. In relation to PPD personnel, the excellent relationship that was developed between the Vietnamese Activity Director Mr Nguyen Huu Huan, and one of his senior staff, the Director of the Southern Regional Plant Protection Centre, Mr Ho Van Chien and their direct involvement in the activities of the project spilled over to many other PPD staff. However, in relation to NIPP the excellent working relationship that we had with Professor Nguyen Van Cam, which had developed in a previous ACIAR project, had a negative influence on the project in the particular circumstances encountered. Although the nominated Activity Director for NIPP was Dr Nguyen Van Tuat, he was very heavily committed in other activities and was not directly involved in the project. Professor Nguyen Van Cam was the driving force in relation to the project within NIPP, but unfortunately his health began to deteriorate not long after the commencement of the project. Initially it resulted in minor slippage in the project, but this began to increase over time. Because of our great respect for Professor Nguyen Van Cam we did not feel it appropriate for us to comment directly to him in relation to his illness, and unfortunately it appears that he was not given support from within his Institute to assist with the project activities by allocating other staff to assist him. Professor Nguyen Van Cam did directly inform Professor Andrew Beattie of his failing health, but this was not until after the completion of the current project. So in this case the project being driven by an individual

rather than the collaborating institution resulted in some negative effects through lack of general support from the institution.

3.2 Project Outcomes

There were 4 key outcomes

- publication of two books in Vietnamese
- training of farmer field school trainers, and
- inagural farmer field schools for citrus farmers.

The first book, 'A Guide for Using Mineral Oils in Vietnamese Citrus IPDM' was the first book of this type to be published in Viet Nam and there is interest in having the original English text translated and modified to account for the regional incidence and importance of pests in China, Thailand and Malaysia. Although 2000 copies of this book were distributed in Viet Nam, it appears that awareness of the book remains low, and a number of project personnel from Tien Giang Province had not seen the book even though it was sent to the directors or heads of their work units. Clearly more copies of the text are needed and efforts made to distribute the books more directly to both extension workers and farmers. This could possibly be achieved by working together with oil distributors to provide the books to extension workers recommending use of oil and farmers that purchase spray oil. Appraisal of the book by Vietnamese farmers and farmer field trainers was not within the scope of the present project, but this would be a valuable exercise that would provide very useful information. After such appraisal it is highly recommended that necessary minor changes be made to the text and a second edition of the book be published in larger numbers.

The second book 'Use of Horticultural and Agricultural Mineral Oils in Citrus IPDM' is also the first such publication in Vietnamese and is novel in that it is the first text to comprehensively deal with the use of mineral oils to control phytophagous pests of citrus in Asia. The targeted audience of this more technical publication is extension workers, IPM trainers and scientists. Like with the first book it would also be a very valuable exercise to seek appraisal of the text by the targeted audience, and to assess whether sufficient copies have been published.

Season long field studies and pilot FFSs were very effectively conducted at 2 locations in Viet Nam. In Nghe An province a total of 6 FFSs involving 180 farmers were conducted and 8 technicians developed their skills to a level where they can hold "Training of Trainers" schools (TOT). In Tien Giang province a total of 53 farmers from 3 village groups received awards for participation in the program. At this site there were also 6 FFSs involving 8 trainers. FFSs and training activities resulted in the development of farmer training manuals and technical reports on studies conducted in both Nghe An and Tien Giang province sites (Annexes 1-5). Differences between locations were actively discussed at the final workshop held from 16-17th December 2003.

As was outlined in the project document, full utilisation of the citrus IPM curriculum developed as part of this project will require further support from donor agencies in the

initial period until local funding can be attracted. Ideally an initial TOT for about 30 Master Trainers in citrus IPM should be conducted in the near future. These master trainers would then facilitate FFS in high priority provinces. In other crops local funding for FFS often comes from combined sources including local government, Women's Union, Farmer Union, NGOs, other donor-funded projects, cooperatives and the fruit farmers themselves. Long-term sustainability comes from local demand plus willingness to provide financial support in order to meet local agricultural development needs. Farmers involved in this project to date have shown very high levels of interest, which would increase the likelihood of long-term sustainability.

An additional unscheduled activity conducted by Southern Regional Plant Protection Centre personnel, particularly Mr Ho Van Chien and Can Tho University personnel, particularly Dr Tran Van Hai was the production of interactive CDs containing a range of information and pictures relating to the ecological management of citrus. Additional training in the professional production of interactive CDs would be extremely beneficial for the involved personnel and the provincial trainers who are the major target audience for these CDs.

The PPD Activity Director, Mr Nguyen Huu Huan was recently involved in a “Three-Reductions Initiative” that won the MARD 2003 Golden Rice Award, for best agricultural innovation (Annex 11). The initiative used radio and TV broadcasts, supplemented by farmer interviews and game shows to reach 90% of targeted farmers with information that motivated them to experiment with reducing seed rates, fertilizer and pesticides. Many farmers discovered they could greatly reduce input costs and government agencies and funding organisations were motivated to allocate additional resources to extend the three-reductions practices. The adoption of such an initiative in relation to citrus IPM would greatly improve future performance of the FFSs developed for citrus in this project.

3.3 Sectoral Impact

This project has led to the development of the tools required to allow citrus farming communities and women within those communities be empowered to learn about different citriculture and plant protection methods and make informed decisions about methods that suit them best, rather than passively relying on others to make decisions for them. More than 130 farmers were involved in the pilot FFSs with more than 50% of those farmers in Nghe An province being women. In addition 3 of the 8 trainers involved in the project in Nghe An province were women. In Tien Giang province the level of participation of women was very low with only one woman farmer and no women trainers. This issue was raised with project personnel. The National director of the IPM program, Mr Ngo Tien Dung informed us that gender studies conducted by FAO in other crops have shown that the participation rates of women in IPM is higher in northern regions of Viet Nam at 40 to 70% compared to 10 to 30% in southern regions. Despite this lower level of participation as a result of cultural differences in southern Vietnam, Mr Ngo Tien Dung believes that women still want to learn. Although a range of factors are involved in determining the level of participation of women in FFS activities, one of the most important is the process of selection of participants. In future activities it has

been suggested that a closer association be developed with the local Women's Association and training activities be organised with them. The facilitation skills of trainers also need to be strengthened and gender exercises introduced to the training program in regions where the level of participation of women is lower.

3.4 Costs and Financing

Cost estimates made during the design of the project were reasonably accurate in relation to actual costs incurred (Appendix A1.0). Althought there was some variation in line items of the budget, partly being due to different categories being used by the funding agency and the accounting system of the lead Australian institution, the overall budgeting was excellent. In the first tranche, a large part of the budget was allocated for international travel when 21 Vietnamese scientists attended intensive training in Australia. Savings were made in relation to this travel, mainly through an 18% lower cost in airfares and lower insurance costs than budgeted. These savings were carried over to the second tranche, but were not spent. In the second tranche 100% of funds were accquitted. Some savings were made in relation to travel as economy air fares were budgeted, but special fares were purchased, and these compensated for increases in all salary costs due to University salary increases

3.5 Monitoring of project

Monitoring arrangements outlined in the project document were:

i. Publications: NIPP and CHAPS personnel would jointly report progress in six-monthly reports, which would be compiled by CHAPS.
ii. Workshops in Vietnam: Key Vietnamese personnel would monitor the effectiveness of workshops by asking a sample of participants a series of set questions and recording the answers.
iii. Training in Australia: The level of understanding and appropriateness of material would be monitored throughout the intensive training course using a series of informal quizzes. At the end of the training, participants would be asked to complete an anonymous questionnaire and findings reported in the first six-monthly report.
iv. Development of FFS curricula: PPD personnel would report progress every three months and CHAPS personnel would visit study sites every six months. Findings would be incorporated into six-monthly reports.
v. Acquittal of AusAID funding and tracking of institutional contributions: The Research Office of UWS would manage all activity funds and arrange a written agreement with all recipient parties to specify accounting/ acquittal procedures. CHAPS, NIPP and PPD will each be individually responsible for providing six-monthly acquittals to the Research Office to incorporate into the annual financial reports.

All of these monitoring arrangements were conducted as envisioned. In relation to (ii), effectiveness of workshops was determined both informally and with written surveys. All information was collected in Vietnamese in relation to this monitoring, and given the

additional time and resources required to translate it to English, this was not requested by the Lead Australian Institution. However, results were discussed between Vietnamese partner institution personnel. Findings were in agreement with the observations of the Lead Australian Institution personnel, that the workshops were highly effective and appropriate.

All monitoring methods were effective, as problems were identified during the course of the project. However, being aware of problems does not necessarily enable those problems to be dealt with, particularly in the case of sensitive issues like ill health.

3.6 Technical Assistance, Training and Capacity Building

The outcomes from this project have enormous potential to assist with capacity building in the citrus sub-sector of agriculture. Citrus is grown throughout Viet Nam and there are more than 340,000 households currently involved in citrus farming. This is expected to increase quickly because of government initiatives to encourage farmers to diversify from rice growing into fruit crops. However, in order to grow citrus in an ecologically sustainable way, farmers need knowledge and experience. The training programs undertaken in this project and the FFS curricular produced, provide the framework through which farmers can gain the required knowledge and experience. However, only the farmers and trainers directly involved with the pilot FFS activities have been able to benefit to date. Other farmers will not be able to benefit until the training program is fully implemented. Full implementation requires an initial TOT for about 30 Master Trainers, who then facilitate FFS in high priority provinces. The TOT for Master Trainers will require support from donor agencies.

3.7 Management of Constraints, Issues, Risks and Change

The major difficulty encountered in this project was slow but progressive slippage in the progress of producing publications. The reasons for this slippage have been discussed at length in section 3.1 of this document. However, the slippage did not impact on the achievement of the publication of two booklets and had little effect on the overall budget. A recommended approach to the management of these difficulties has been presented in section 3.1 (pages 7 and 8).

3.8 Project Management

Ideally the performance of the Lead Institution over the life of the project should be judged by an independent reviewer as occurred in previous ACIAR projects. Personnel from the Lead Australian Institution maintained communication with Vietnamese project personnel throughout the project and they carried out all activities as outlined in the project document. The excellent rapport developed between Australian and Vietnamese personnel over the course of the project and the extremely high level of respect shown by the Vietnamese provides strong evidence that they were happy with the performance of the Lead Australian Institution. A rating of 4 is given for the Lead Institution.

In relation to NIPP there was some slippage in this schedule and, as noted above and in previous reports, this was mainly due to the deteriorating health of one of the key

Vietnamese collaborators, Prof Nguyen Van Cam. There was some slippage in the budget but this was due to an expansion in the scope of Objectives I and II. The additional effort put into these publications is to be highly commended. A rating of 3 is given.

Key PPD staff were very devoted to the cause of educating their trainers and farmers and devoted a considerable amount of time working directly with them. We were very impressed with the PPD training program and the skills they have developed in the course of leading FFSs in rice and other crops. PPD staff also had an excellent working relationship with Can Tho University personnel, who also contributed greatly to the project. At the outset of the project the Lead Australian Institution had no contacts with Can Tho University and did not envision their involvement in the project. However, as a result of this project UWS is working towards signing a memorandum of understanding that would lead to the development of joint postgraduate degrees between UWS and Can Tho University. An overall rating of 5 is given to the PPD.

4.0 Performance and Outcomes

4.1 Assessment of Performance Aganist Objectives and Design

The expected outcomes of the project are outlined in Section 3.1 of this document. Of the five expected outcomes, two books were published (Annexes 6 and 7), intensive training of 21 key Vietnamese scientists was conducted in Australia, and season long field studies and pilot FFSs were conducted at study locations in Nghe An and Tien Giang provinces. The FFSs and experiments led to the development of farmer training manuals and technical information for trainers (Annexes 1-5). The only objective that was not achieved was the publication of the third book, but the book has been prepared to mock up stage for publication (Annex 10) and actions required to complete this objective using residual funds is outlined in section 3.1 of this document. Whether the publication will be completed or not and the timing of completion depends on the decision of the funding organisation to accept the recommended action.

The full impact of the outcomes from this project will take time to be realised, and will require additional support from donor agencies in order to carry out TOT as discussed in sections 3.2 and 3.6 of this document. The time to reach full implementation of FFS for IPM in citrus will depend on when funds can be obtained to carry out initial TOT for 30 Master Trainers, and how long after the training is completed until FFSs are initiated in high priority provinces.

4.2 Sustainability

This project has a high level of financial sustainability. No further inputs are required for the two published texts until the information becomes out of date. However, it has been identified that a year after publication awareness of the first book remains low indicating the need for additional copies to be printed and more direct distribution methods adopted. However, the cost of producing second editions is much lower than initial costs.

The development of a high quality IPM curriculum for citrus farmers is also highly sustainable. The materials developed are suitable for use in FFSs throughout Vietnam, with only minor regional modifications, and there will also be no recurrent costs to be borne by the PPD National IPM Program. However, in order to expand the training of citrus farmers beyond the scope of this project, financial support will be necessary. This is to Experience from FFSs in other crops has shown that local interest often results in local funding from a range of sources including local government, Women's Union, Farmer Union, NGOs, other donor-funded projects, cooperatives and the fruit farmers themselves. Long-term sustainability comes from local demand plus willingness to provide financial support in order to meet local agricultural development needs.

Control of citrus pests and diseases in Vietnam is currently based almost exclusively on the use of broad-spectrum synthetic pesticides. Farmers often depend heavily on pesticide sales representatives for advice as to what pest or disease problems they have and what to do about them. Simply being able to recognise what pests they have and understanding the seriousness of those pests will allow them to make more informed decisions about pest control. Being able to distinguish a pest from a natural enemy and having some basic understanding of the relationship between pests and natural enemies will help them to understand field ecology better, and allow them to reduce pesticide use. The replacement of broad-spectrum synthetic pesticides with more IPM compatible chemicals such as petroleum derived spray oils will result in benefits to the environment, the health of farm workers who apply agricultural chemicals, and the health of consumers who eat citrus fruit.

An overall rating of 4 is given for the sustainability of this project.

4.3 Development Impact

The potential development impact of this project is large and the Vietnamese perspective has been discussed by Mr Ho Van Chien in his final report for the project (Annex 12). Since the initial implementation of FFSs in Viet Nam more than 500,000 farmers have been trained to make better decisions about growing healthy crops both sustainably and profitably. Within the FFS curriculum, special emphasis is given to reducing dependency and usage of chemical pesticides. Most FFS have been on rice, but curricula have also been developed, and FFS facilitated for, vegetables, tea, cotton, soybeans, and peanuts. The development of curricular for IPM in citrus has the potential to reach farmers within the 340,000 households currently involved in citrus farming. This is the first time that a FFS curricular has been developed for a tree crop and it will open the way for future FFSs to be developed in other fruit crops such as mango, litchi and longan.

5.0 Conclusions

5.1 Overall assessment

This project has achieved the publication of ‘A Guide for Using Mineral Oils in Vietnamese Citrus IPDM’ and ‘Use of Horticultural and Agricultural Mineral Oils in

Citrus IPDM'. These two books are the first of their type to be published in Vietnamese thus allowing scientists, trainers, extension workers and farmers access to information previously not available in their own language. A third text "Ecological Management of Citrus" is ready for publication and only requires approval to utilise unspent project funds for this purpose.

Season long field studies and pilot FFSs conducted at 2 locations in Viet Nam have led to the development of the tools required to allow citrus farmers to be empowered to learn about different citriculture and plant protection methods and make informed decisions about methods that suit them best. This has been achieved through FFSs and training activities that resulted in the development of farmer training manuals and technical reports on studies conducted in both Nghe An and Tien Giang province sites. Full utilisation of this citrus IPM curriculum will require further support from donor agencies in the initial period until local funding can be attracted. Ideally an initial training of trainers (TOT) for about 30 Master Trainers in citrus IPM should be conducted in the near future.

Production of reference texts is highly appropriate as technical information always promotes progress. We have found the design of the FFS to be most appropriate and the effectiveness of this approach has been clearly demonstrated in rice and other crops. This training approach will achieve full effectiveness in citrus if funding can be continued to allow TOTs and further attention to gender issues in southern regions of Viet Nam.

5.2 Lessons Learned

The Australian Lead Institution personnel learned a great deal about the depth of knowledge and commitment of PPD personnel, particularly trainers. The structure of the PPD is such that officers at provincial, regional and local levels all have excellent channels of communication with the target end users, the farmers. Unfortunately there are limited links between some Vietnamese research institutions and the PPD, but as part of this project some links were established and others strengthened. Since the PPD and the National IPM program provide a very effective and appropriate channel for information to reach farmers it is recommended that this channel be utilised in any future capacity enhancement initiatives in Viet Nam.