Australian Government
AusAID

Ministry of Agriculture and Rural Development

Collaboration for Agriculture and Rural Development (CARD) Program

Project Completion Evaluation Report

052/04VIE

Management of *Phytophthora* diseases in Vietnam horticulture

Hanoi, March 2007

PROJECT DATA

1. **Project Title**: (052/04VIE) Management of *Phytophthora* diseases in Vietnam horticulture
2. **Implementation Institutions**
   - *Lead Vietnamese Institution*: National Institute of Plant Protection, Hanoi, Vietnam
   - *Australian Partner Institution*: Faculty of Agriculture, Food and Natural Resources, The University of Sydney, NSW-Australia
   - *Collaborating organizations*: Southern Fruit Research Institute; Fruit Trees Research and Development center of Thua Thien Hue; CRC Tropical Plant Protection Qld, Australia.

3. Project Duration: 2 years

- Proposed start date:	January 2005;	- Date commenced:	April 2005
- Proposed finish date:	December 2006	- Revised completion date:	April 2007

4. Project budget (A$): Total: 395,224. From

AusAID:	235,820
Australian Institution:	100,084
Vietnamese Institution:	59,320

5. Project Background:

- Vietnam is a country with subtropical region in the North and tropical region in the South. The various regions provide an ideal climate for *Phytophthora spp* to flourish and the genus *Phytophthora* is responsible for extensive economic damage in a wide range of different crops throughout the country. *Phytophthora* pathogen has been reported to cause Leaf blight, stem canker, heart rot, fruit rot and root rot of fruit, vegetable, timber and other agricultural crops resulting in deduction in yield and significant economic losses, For example: as 30-70% yield loss to tomato, 60% to Pineapple, 20-30% to citrus.

- Lack of knowledge and understanding at the scientific, extension and farmer levels is the primary limitation to the effective management of the disease in Vietnam.

6. Project Abstract (From proposal):

Diseases caused by Phytophthora pathogens affect a wide range of fruit, vegetable, timber and other agricultural crops in Vietnam, resulting in reductions of up to 70% in yield in some seasons, with consequent economic losses. The effective management of these diseases is currently limited by the lack of knowledge and understanding of Phytophthora diseases at the scientific, extension and farmer levels, however in previous research on durian and cocoa we have demonstrated sustainable and effective control of these diseases through farm management. This project aims to extend recommendations to a wider range of horticultural crops throughout Vietnam, thereby improving smallholder outcomes by reducing crop losses due to Phytophthora diseases of pineapple, citrus, black pepper, rubber, litchi, tomato and potato, identified as priority crops in each area. The Australian and Vietnamese project team will run a series of training workshops, supervise short research projects to develop integrated disease management recommendations, and organize specialist training in Australia for selected scientific staff. Scientific staff will train Provincial Plant Protection Sub-Division staff, who will then supervise participatory research and other extension activities involving smallholder farmers

7. Objective of the Project:

- *Overall objective*: To extend sustainable and effective disease control and management recommendations to a range of horticultural crops throughout Vietnam to reduce crop losses due to *Phytophthora* and improve farmer incomes.
- *Specific objectives:*
  - Improve institutional capacity to diagnose and development a range of appreciate management strategies for the disease
  - Improve extension capacity in diagnosis and implementation of integrated management strategies
  - Improve farmer awareness of Phytophthora disease
  - Reduce yield and quality loss

8. Milestones Produced:

1. First six monthly report:
2. National Reference Laboratory and Regional Laboratories operational and effective
3. Second six monthly report
4. Third six monthly report
5. Epidemiological and sero-surveillance programs operational
6. Fourth six monthly report
7. FMD vaccine efficacy testing and FMD vaccination recommendations
8. Fifth six monthly report
9. Competency assessment of laboratory staff and field veterinarians in Sub-DAHs, increased awareness and implementation of recommended practices by farmers in target areas.
10. Project completion report

9. Members of Evaluation Team:

1. Mr. Nguyen Viet Hai (Team Leader), Science Technology and Environment Department
2. Mr. Dinh Vu Thanh, Science Technology and Environment Department
3. Mr. Lam Van Man, Agri. Engineering and Post Harvest Technology (Hanoi)
4. Mrs. Do Thi Thanh Van, Animal Husbandry Institute
5. Mr. Keith Milligan, CARD

10. Date of Evaluation: March 19th to 21st 2007

PROJECT EVALUATION MATRIX FOR THE PROJECT
Management of *Phytophthora* diseases in Vietnam horticulture

	Relevance	**Impact**	**Effectiveness**	**Efficiency**	**Sustainability**
Objective 1	*Improve institutional capacity to diagnose and development a range of appreciate management strategies for the disease*				
Output 1.1 Improved skills in diagnosis of the disease	**A**. Essential to researchers to solve the problems	A. Improve capacity for VN researchers	A. High currency	A. Low cost and simple technique	B. could be applied in future, but unclear for better improvement
Output 1.2 Developed Training and	B. Improved researcher's knowledge and	B. Improve capacity for VN			B. Further improvement

	Relevance	Impact	Effectiveness	Efficiency	Sustainability
Extension materials	meet the need of farmers and extensionists	researchers			
Output 1.3 Developed appreciate management strategies for the disease	**A.** Very important for Phytophthora disease management	**A.** Scientists, Extensionists and farmers can manage Phytophthora diseases	**A.** Scientists, Extensionists and farmers can diagnose symptom and control Phytophthora diseases	**A.** Increased yield and reduced quality losses	**B.** Moderate sustainability for Scientists, Extensionists but not sure for all farmers
Objective 2	*Improve extension capacity in diagnosis and implementation of integrated management strategies*				
Output 2.1 Improved extension worker's skills in diagnosis and implementation of the disease	**A.** Extension capacity diagnosis and implementation of integrated management strategies program	**A.** Improved the knowledge and skills of Phytophthora diseases management for Extensionists	**B.** Highly effectiveness of Extension program	**B.** Highly efficiency of Phytophthora diseases management	**A.** Highly sustainability due to improvement of the knowledge and skills of Phytophthora diseases management
Objective 3	*Improve farmer awareness of Phytophthora disease*				
Output 3.1 Farmer's awareness of the disease	**A.** Phytophthora diseases affect a wide range of fruit and vegetable	**A.** Improved the knowledge for farmers of Phytophthora diseases	**A.** Improved farmer awareness of Phytophthora diseases	**A.** Control Phytophthora diseases	**B** Farmers do not know how to purchase chemical for treatment of seeds of horticulture and to get the guide books of Phytophthora diseases
Output 3.2 Farmer's practice changes	B. To meet farmer's need	B. Farmer's willing			C. Need chemicals are not available, improved technique
Objective 4	*Reduce yield and quality loss*				
Output 4.1 Proven technique for the disease management	A. To meet farmer's need	A. Increased yield and quality, resulting in improved farmer's incomes (increased yield of 3.8 MT/ha)	A. Reduced disease to below 5% only as compared with that of 21-25% (potato)	B. Low investment cost	C. Need chemicals are not available and improved technique

FURTHER DETAILS ON IMPACTS

A. Financial Impact

- **For the Potato**

I Farm Financial Analysis		
Without Project		Year 1
Area (ha)	Traditional	1.00
	Improved	0.00
	Total	1.00
Prodution (tonnes/ha)	Traditional	20.10
	Improved	0.00
Total production (tonnes)	Traditional	20.10
	Improved	0.00
	Total	20.10
Sales revenue per tonnes (VND million)	Traditional	1.20
	Improved	0.00
Total sales revenue (VND million)		24.12
Farm operating costs per ha (VND million)	Traditional	4.500
	Improved	0.000
Total farm operating costs (VND million)		4.50
Number of farmers adopting improved package		0.00
Investment cost of improved package (VND million) a/		1.34
Total costs (VND million)		5.84
Net Financial Benefit Without Project		***18.28***
a/ Investment cost of improved package per farm		1.3
With Project		Year 1
Area (ha)	Traditional	1.0
	Improved	0.0
	Total	1.0
Prodution (tonnes/ha)	Traditional	20.1
	Improved	3.8
Total production (tonnes)	Traditional	20.1
	Improved	3.8
	Total	23.9
Sales revenue per tonnes (VND million)	Traditional	1.2
	Improved	0.3
Total sales revenue (VND million)		35.9
Farm operating costs per ha (VND million)	Traditional	4.500
	Improved	1.300
Total farm operating costs (VND million)		5.8
Number of farmers adopting improved package		400.0
Investment cost of improved package (VND million) a/		1.3
Total costs (VND million)		7.1
Net Financial Benefit With Project		***28.8***
Incremental Financial Benefits		12
Incremental Financial Costs		1
Net Financial Benefit to Farmers		10.5

- **For the Pineapple**

I Farm Financial Analysis			
Without Project		**Year 1**	**Year 2**
Area (ha)			
	Traditional	1,00	1,00
	Improved	0,00	0,00
	Total	1,00	1,00
Prodution (tonnes/ha)			
	Traditional	26,00	26,00
	Improved	0,00	0,00
Total production (tonnes)			
	Traditional	26,00	26,00
	Improved	0,00	0,00
	Total	26,00	26,00
Sales revenue per tonnes (VND million)			
	Traditional	1,10	1,10
	Improved	0,00	0,00
Total sales revenue (VND million)		28,60	28,60
Farm operating costs per ha (VND million)			
	Traditional	7,62	7,62
	Improved	0,00	0,00
Total farm operating costs (VND million)		7,62	7,62
Number of farmers adopting improved package		0,00	0,00
Investment cost of improved package (VND million) a/		2,50	2,50
Total costs (VND million)		10,12	10,12
Net Financial Benefit Without Project		18,48	18,48

a/ Investment cost of improved package per farm 2,5 million VND

With Project		**Year 1**	**Year 2**
Area (ha)			
	Traditional	1,0	1,0
	Improved	1,0	1,0
	Total	1,0	1,0
Prodution (tonnes/ha)			
	Traditional	26,0	26,0
	Improved	40,0	40,0
Total production (tonnes)			
	Traditional	26,0	26,0
	Improved	40,0	40,0
	Total	66,0	66,0
Sales revenue per tonnes (VND million)			
	Traditional	1,1	1,1
	Improved	1,1	1,1
Total sales revenue (VND million)		44,0	44,0
Farm operating costs per ha (VND million)			
	Traditional	7,617	7,617
	Improved	12,587	7,087
Total farm operating costs (VND million)		12,6	7,1

Number of farmers adopting improved package	0,0	0,0
Investment cost of improved package (VND million) a/	2,5	0,0
Total costs (VND million)	15,1	7,1
Net Financial Benefit With Project	28,9	36,9
Incremental Financial Benefits	15	15
Incremental Financial Costs	5	-3
Net Financial Benefit to Farmers	10,4	18,4

B. Social and environmental impact

By nature, it is very difficult to measure and evaluate the social and environmental impacts. Under training conditions such as lack of data recoded by monitoring, limitation of resources (time and money) in evaluation and data that need to be collected and analyzed from *Ex post* evaluation (the evaluated project is just finished and some data are estimated), so no evident is available for judgment and recommendations.

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Under sub-tropical and tropical climate conditions accompanying with introduction of new crops and intensive farming practices, a lot of new diseases occurred and cause big loss. The project addressed to the problem's nature from on the occurrence, distribution of the various *Phytophthora* species present in Vietnam, disease transmission and progression, and suitable control methods. Several achievements made by the project are:

- Firstly, Researchers have been capable to diagnoses accurately Phytophthora disease by using simple and low cost technique of *Phytophthora* isolation (using petal roses) and develop appropriate management of Phytophthora disease successfully for different crops (pineapple, citrus, black pepper, rubber, litchi, tomato and potato).
- Secondly, Extension workers become capable of accurate symptom description and diagnosis and are aware appropriate management strategies to the diseases
- Thirdly, Improvement of the farmer's knowledge on Phytophthora diseases and they can recognize Phytophthora symptom and are willing to apply recommended technologies in disease control and farming practice changes.
- Fourthly, Management strategies of the diseases (mainly chemical treatment planting materials) are high effective (lower rate of tree death, higher yields ...)

B. Recommendations

- Disease caused by *Phytophthora* is serious and present at a wide range of different plant species to be grown in Vietnam. Increase of knowledge of the disease (disease identification and management) is urgent need, especially for extension workers and farmers through appreciate training approaches.
- Alternative management strategies of the disease should be developed, such as biological management (crop rotation and so on) to over come limitation of chemical in treatment and further negative effect to the environment.

Annex 1: Comparative study on the effect of various treatments to potato

Treatment	Rate of death trees after 3 months (%)	Yield (MT/ha)	Additional value (Thou. VND/ha)	Additional investment (Thou. VND/ha)	Additional profit (Thou. VND/ha)
Control	25.5	20.1	#	#	#
Treatment 1	21.7	20.9	960	#	960
Treatment 2	4.4	23.8	4,440	500	3,940
Treatment 3	4.0	23.7	4,320	1,270	3,050
Treatment 4	4.1	23.9	4,560	1,344	3,216

Note:

- *Control: (Drainage + NPK + farm manure)*
- *Treatment 1: (Drainage + NPK + Chicken manure)*
- *Treatment 2 : (as treatment 1 + Chemical treatment by Thiram50WP0.2%)*
- *Treatment 3: (as treatment 2 + spraying Zinep80WP0.3%)*
- *Treatment 4: (as treatment 3 + spraying Ridolmil gold 68-0.2%)*

Annex 2. Benefits

Items	**Benefits**
Farmers	- Greater understanding of factors that contribute to disease
	- Capacity to select from a variety of disease management options
	- Reduce disease and increase yield
Researchers	- Scientists become capable of accurately diagnosing Phytophthora disease and develop appropriate management recommendation for crop
	- Improved method of isolation of Phytophthora
Extensionists	-Greater understanding of the pathogen of disease
	- Improve capacity to identify disease symptom and develop disease control option
	- Promote extension of more effective disease management recommendation

Annex 3. Costs

Items	**Public/ private**	**Investment/ recurrent**	**Cash/ Non-Cash**	**Who pay**
1. Staffs/Labors	Both public and private	Both investment and recurrent	Cash	-VN and Australia Institutions - Farmers
2. Equipments and materials	Public	Both investment and recurrent	Cash	AusAID
3.Training	**Public**	Both investment and recurrent	Cash	AusAID
4. Administration	**Public**	Both investment and recurrent	Cash	AusAID
5. Others	**Public**	Both investment and recurrent	Cash	AusAID