



Ministry of Agriculture & Rural Development



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Collaboration for Agriculture & Rural Development (CARD) Program

Project Completion Evaluation Report

033/05VIE

Field evaluation and advanced vegetative mass-propagation technology for scaling up high-value plantations of *Pinus caribaea*

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Table of contents

<i>Executive Summary</i>	3
<i>1. Project's general information</i>	3
<i>2. Evaluation Objectives</i>	4
<i>3. Evaluation Methodology</i>	4
<i>4. Project evaluation</i>	4
4.1. Results achieved	4
4.2. Project progress	7
4.3. Relevance assessment	7
4.4. Impact assessment	8
<i>Annex 1 List of interviewees</i>	10
<i>Annex 2. : Project "Logframe": Progress against objectives, outputs and activities</i>	11

Executive Summary

The Project “Field evaluation and advanced vegetative mass propagation technology for scaling up high-value plantations of *Pinus caribaea*” was funded by Australian Government through the Collaboration for Agricultural Research and Development (CARD), and implemented by the Research Center for Forest Tree Improvement (RCFTI), Vietnam and Forest Plantations Queensland (FPQ), Australia. The Project aimed to identify the best varieties of *Pinus caribaea* and related hybrid for planting in development and management of pine hedge and containerized nurseries, and to promote farmers and forest growers to grow *Pinus caribaea* and related hybrids in key pine growing regions across Vietnam.

Currently, the project has completely implemented. In order to understand the completion and the success of the project, and provide suggestion and lessons learned, it is very necessary to assess the activities and results of the project. This report seeks to assess these results of the Project, and to evaluate the achievements of desired project outcomes.

1. Project’s general information

Project Number and Name: 033/05VIE Field evaluation and advanced vegetative mass-propagation technology for scaling up high-value plantations of *Pinus caribaea*

Vietnamese Institution(s): Forest Science Institute of Vietnam,
Research Centre for Forest Tree Improvement (RCFTI)
Vietnamese Project Leader: Dr. Ha Huy Think, Director. Email: rcfti@vnn.vn

Australian Partner Institution(s): Forest Plantations Queensland (FPQ), Formerly DPI Forestry
Australian Personnel: Mr. Ian Last. Email: ian.last@fpq.qld.gov.au

Date Approved: 2005 **Date Commenced:** 02/2006 **Date Completed:** 04/2008

Project budget (A\$):	Total: 413,812	From: AusAID:	225,000
		Vietnamese institution:	88,500
		Australian institution:	100,312

Objectives of the project

- To identify the most highly productive, well-adapted varieties and hybrids of *Pinus caribaea*, in comparison to other pine species currently planted, for priority pine planting zones
- To provide practical training and support to forest research institutes in Vietnam to enable the development and local adaptation of hedge and containerised nursery systems for the mass propagation of containerised pine cuttings.
- To create improved awareness amongst rural poor smallholders (particularly central highland minorities) and industrial forest growers in key pine growing regions, regarding the potential performance of improved varieties of Caribbean pine (including hybrids where appropriate) to supply a range of forest products and services via the establishment of large scale demonstration plantings in collaboration with local land owners / forest growers.

2. Evaluation Objectives

- To evaluate the completion and success of the project: “Field evaluation and advanced vegetative mass-propagation technology for scaling up high-value plantations of *Pinus caribaea*” in terms of relevance, effectiveness, efficiency, impact, and sustainability.
- To provide suggestions and lessons learned from the projects

3. Evaluation Methodology

- To study the project proposal, progress and final reports.
- To prepare a working plan and a checklist for the assessment.
- To collect information through site visits and discussions with project staff and beneficiaries, including:
 - Project implementation staff (at the Headquarters of the Center in Hanoi and its station in Cam Quy, Ba Vi)
 - Staff of the nursery institutions: in Ba Vi (RCFTI), Phu Ninh (FRC) and Dalat (LDFRC);
 - Trainees attended training courses and study tour
 - Some farmers participated in the project activities
- Visit the fields (site, nursery in Ba Vi (Hanoi), Phu Ninh (Phu Tho), Da Lat (Lam Dong), and Dak To (Dak Nong).
- Analyze collected data and information.

4. Project evaluation

4.1. Results achieved

In order to attain its 3 objectives, the project has completely implemented a number of activities, and attained the following results:

Result 1: Review and Report on comparative performance of tropical pines in Vietnam based on existing trials and related information.

A report was completed based on existing and newly collected data from 17 trials planted since 1976 by the Forest Research Centre (FRC) in Phu Tho Province and the Research Centre for Forest Tree Improvement (RCFTI) in Hanoi. The trials are located in four major biogeographic regions of Vietnam (Northern areas of Vietnam from Hanoi extending to the border with China; low elevation sites in Central Vietnam; the Central Highlands of Vietnam; and low elevation regions of Southern Vietnam in the vicinity of Ho Chi Minh City) on site-types believed to be suitable for pine plantations. The report has shown the general superiority of *Pinus caribaea* over the current plantation species (*Pinus merkussii*, *Pinus kesiya* and *Pinus massoniana*). It also describes the growth rate and potential benefit between varieties of *P. caribaea* and some other pine species planted in Vietnam and provides suggestions to assist *P. caribaea* breeding strategy in specific and tree improvement in general.

Result 2: Establish genetic evaluation trials to compare performance of locally available and introduced pines (especially PCH & hybrids) on multiple sites throughout North Central, Central Coast and Central Highlands regions of Vietnam.

A network of 6 genetic trials was established in the North (Ba Vi, Hanoi; Lap Thach, Vinh Phuc; Dai Lai, Vinh Phuc; Hoanh Bo, Quanh Ninh), in the Central Highlands (Lang Hanh, Lam Dong; and Pleiku, Gia Lai) to compare the “standard” and “improved” sources of *P. caribaea* (Queensland and Vietnam origins) and hybrids (Qld) with locally planted pine species.

These trials have well been established in 3 bio-geographical zones of Vietnam. Data and information of the trials for the first two years have also been collected and analyzed, resulting in the milestone 4 report submitted (see the report for milestone 4). The assessment team has visited the trials established in Lang Hanh (Lam Dong), Dai Lai (Vinh Phuc), and Ba Vi (Ha Noi). All trials were established in suitable sites, and following the designed approved. The trials in Ba Vi and Dai Lai are in good conditions in terms of tending and protection. The data collected from those are thought to be correct and useful. These trials are currently relatively young to assess and identify the highly productive, well-adapted varieties and hybrids of *Pinus caribaea* as most pine plantation rotation takes more than 20 years. Therefore maintenance and protection should be taken place in order to achieve desired outcomes. In the three sites visited during the evaluation, maintenance and protection is only in progress in Cam Quy station (Ba Vi). Lang Hanh (in Da Lat) and Phu Ninh (in Phu Tho) is no longer maintained the experimental sites as the project ended.

Result 3: Review pine genetic resources and related breeding strategies and capabilities / resources in Vietnam, particularly for PCH and related hybrids.

Tree improvement training provided as part of workshop held in November 2007, including provision of presentations and posters on Queensland grafting and pollination techniques. As a result of the CARD Project, RCFTI and FPQ are in contact regarding potential further exchanges of improved genetic material to support improvement of Caribbean Pine and hybrids in Vietnam

Result 4: Trained personnel able to establish and manage hedge beds, collect and set shoots and raise containerised cuttings.

Training in hedge establishment and management and containerised nursery systems for the mass vegetative propagation of pines was delivered to key Vietnamese technicians in Queensland (Gympie and Toolara Nursery, May 2006) and Vietnam (Ba Vi and Dalat, May 2007). Then a study tour at managerial level training for four persons was aimed to study management of conifer plantations in sub-tropical and tropical environments including an overview of tree improvement strategies, nursery practices, plantation establishment, management, assessment and protection and value adding, processing. In Vietnam, the project has held 2 training courses in nursery techniques for relevant staff. Total 16 persons were trained (see Table 1). The trainees highly appreciated the course held in Australia as they had opportunities to attain not only new techniques, skills and information, but also the partnerships between institutions and the two countries. They said that they could apply knowledge learned into their daily work, also for the training other people if they have opportunity to do. The training courses held in Vietnam were also successful in terms of training relevant people the nursery techniques. Some trainees said that the knowledge and skills learned from the courses are very useful for them, and they could apply those into their work.

Additional funding was secured under the **ATSE Crawford Fund**, an initiative of the Australian Academy of Technological Sciences and Engineering. This enabled Ms Nghiem Quynh Chi (one of the key project staff) to visit Queensland for 3 months (late

August– late November ‘06) to support project outcomes. Ms Chi participated in a wide range of capacity building activities covering: pine pollination, pine grafting, seed centre management, pine tissue culture, nursery and hedge management, genetic trials inspections, quantitative and molecular genetics theory.

Table 1 Results of training course for project beneficiaries

Training modules/courses	Courses delivered by CARD	
	No of course	No of Participants
1 Training in Nursery Techniques in Queensland	1	4
2 Queensland Study Tour	1	4
3 Training in Nursery Techniques in Vietnam	2	16
Total	4	24

Source: Project Milestone report

***Result 5:** Locally adapted Nursery Manual and related checklists developed.*

A comprehensive Manual, based on Queensland techniques and adapted to Vietnamese conditions, was prepared to assist with the establishment of hedge and containerised nursery facilities for raising pine cuttings. The manual is available in both English and Vietnamese.

***Result 6:** 3 Pilot scale hedge and containerised nursery facilities established and various prescriptions tested.*

Three pilot-scale hedge and containerised nursery facilities were established in Ba Vi (RCFTI), Phu Ninh (FRC) and Da Lat (Lamdong FRC) and small scale production of cuttings stock has commenced. All the facilities were well established at the beginning, and working well with the hedge area in Da Lat. The hedge area in Ba Vi, however suffered from widespread mortality following extreme heat in July 2007. The containerised nursery facilities therefore are not working properly. The hedge area and containerised nursery facilities in Phu Ninh are currently no longer working.

***Result 7:** Establish four demonstration trials with a large scale forest grower.*

Four demonstration trials comparing locally planted pines with Caribbean Pine have been established in co-operation with large and small-scale forest growers, including involvement and support from local ethnic minority groups in the Central Highlands region. These trials complement the smaller scale, replicated genetic trials which will be used for future statistical comparisons.

One of the demonstration trials visited during this evaluation period in DakP'lao (Dak Nong) is located in the Lam Dong FRC's land (not householders' land). Farmers and land owners in DakP'lao are interested in planting acacia species and coffee trees rather than in pines. According to the interviewees, it is now extremely difficult to convince farmers

in the research area to grow pines because, once again, pine plantation rotations are long, even they know pines are higher value tree species.

Result 8: Establish community and individual farmer managed plantings in collaboration with two local ethnic minority communities.

Following the recent construction of a new forest office and nursery at Dak P'Lao, it is likely that further demonstration pine trials would be planted involving the local ethnic minorities. This initiative is being co-ordinated by the Lam Dong Forest Research Centre. Staff at this new facility would benefit from additional training, based in the techniques developed as part of this CARD Project.

However, as mentioned above, farmers in DakP'lao (including ethnic minorities) prefer to grow acacia rather than pines resulted in there are no-one interested in buying pines produced by Lam Dong FRC.

4.2. Project progress

In general, the project has well been organized and implemented. All activities have been done to attain 8 outputs. The progress reports and final reports have been timely submitted. To the end of the project (2/2008), the following outputs have been implemented:

- Inception meeting held in Hanoi (2/2006)
- Study tour to Australia by Vietnamese researchers (6/2006)
- Output 1.1: Completed (milestone 8)
- Output 1.2: Completed (milestone 4)
- Output 1.3: Completed (part of milestone 8)
- Output 2.1: Completed nursery training in Queensland (6/2006) and Vietnam (5/2007)
- Output 2.2: Completed nursery manual (June-July 2007)
- Output 2.3: Completed construction and operation of pilot hedge sites in Bavi, Phu Ninh and Da Lat
- Output 3.1: Completed planting of demonstraion trials in Dak P'Lao (Dak Lak)
- Output 3.2: Completed planting of demonstration trials with commercial forest growers in Lam Dong, Nghe An, and Quang Tri provinces.

4.3. Relevance assessment

The project has implemented a number of activities to attain 8 outputs and that to fulfil its 3 objectives. The project is very good and useful for the RCFTI and other research institutions that are concerned about the valuable PHC and hybrid pines, and people who like to grow those species. The project also has high potential value as pine species are still valuable for the 5 million ha program of the country. The varieties and the massive propagation methods are therefore important in terms of introducing and improving those species in Vietnam.

The project however has limited value for the local people. One study site of the project locates in Lam Dong, but people here seem to prefer other fast growing species such as

acacia or eucalyptus. In this place, people also have a native pine species with high capacity of natural regeneration. The partner in Lam Dong therefore finds it hard to introduce PCH and hybrid pine to local people and companies. In some places of Dak Nong, some local people also said that they like to grow fast growing species as they could get quick money from the plantation. Pine plantation on the other hand takes a long time for one rotation and that it will also takes them a long time to get money back. The situation is the same in Phu Ninh (Phu Tho), as local people like to focus on fast growing species. Hedge bad and containerized nursery facilities are therefore no longer working in this place as the requirement for pine seedlings is quite low.

4.4. Effectiveness assessment

The project appears to be systematically designed and well implemented during two years period. It generally attained desired outputs and objectives were timely achieved. However, the project had some limitations, that is:

- There was no overall goal or purpose stated in the log-frame leading to difficulties in evaluation.
- Objective 3 was partly achieved as smallholders do not pay attention to grow *pinus caribaea* and pinus hybrids as those species's rotation are so long. Therefore the project failed to recognize the risk and assumption.

4.5. Efficiency assessment

The project has been well implemented in terms of timeliness and relevance. Implemented staffs have all benefited from training courses and study tour that would strength institutional partner (Vietnamese institutions). Nonetheless, once again, the purpose of smallholder development and poverty reduction was not obtained, particularly in poor ethnic minorities. Also, Forestry Companies are also no longer interested in planting pines. That is, therefore, leading to containerized nurseries and pilot scale hedge are abandoned in Phu Ninh. This should be previously recognized by CARD to change the project design or objectives.

4.6. Impact assessment

4.6.1. Improve the quality of varieties of PCH and hybrid pines, and improve the capacity of RCFTI and other project partners.

A comprehensive study and improvement of varieties of PCH and hybrid pines has well been implemented. A manual of massive propagation methods for those species is available for interested people.

It is obvious that the project has strongly impact on the work and capacity of project partners, particularly for RCFTI. A total of 24 staff have been trained or taking study tour to Australia to learn new knowledge and skills. This is very good for those organizations to improve the capacity and research on those species.

4.6.2. Social impact

That is very good that the project has held several training courses on new species and new techniques to produce mass propagation for local researchers. The project has also implemented several demonstration trials at the local level. This is very good to improve knowledge and skills of local researchers and people in terms of improving plantations of pine species, particularly PCH and hybrid pine plantation for timber for local people.

These species however seem to have limited attraction to local people. Local people [Da Lat (Lam Dong), Dak To (Dak Nong), Phu Ninh (Phu Tho), study sites of the project]

seem to prefer fast growing species such as Acacia and Eucalyptus or high value species such as rubber. It is therefore very good if the project staff could find better ways to introduce those species to local people.

The project also helps to strengthen the relationships between Vietnamese institutions and Australian institutions. It also improves the link and collaboration among Vietnamese institutions and making a techniques transfer to local people.

4.6.3. Environmental impact

The project has positive impact on the environment as its objectives and outputs are to improve quality and quantity of pine plantation (particularly PCH and hybrid pines) in Vietnam.

4.6.4. Sustainability of the project

This is clear that the techniques and skills learned from the project are useful for RCFTI staff. They can use those for their further research and production. Unfortunately, this is less useful for other institution (such as Phu Ninh and Da lat) as local people prefer other species. The demonstration trials in some places are not well tended and protected. In order to get good data and results from those, it is wise to continue tending and protecting these trials even though the fund from the project has completed. It is also very good that the project monitoring board could maintain these trials for a long time and that the results from those will be very useful for the plantation program of the country.

5. Conclusions and suggestions:

- The project has timely implemented. All the progress and final reports have been submitted to CARD. The project board has completely implemented the approved activities and achieved 8 results and that to support the project 's objectives. The project is successful in terms of improving varieties of PCH and hybrid pines, also to improve the capacity of research institutions. For mass propagation of PCH and hybrid pines to need more continuing research works, such as: nursery hygiene, establishment and maintenance of pine hedges, collecting and setting cuttings, potting mix formulations and container types and stock-raising including watering, irrigation regime and pest and disease management. A result of these research works is guideline for mass propagation of PCH and hybrid pines.
- Plant trials are no longer maintained after the project ended (except for the trial in Cam Quy, but that is the case as Cam Quy station belongs to RCFTI). Nevertheless, the value of established trials will increase as they become older. Institutions involved should pay attention to that.
- The project however still has limited attraction to local people. Local people could participate in the project if they have direct benefit from that. On the other hand, they may not apply the new varieties of PCH and hybrid pines and the new methods to produce seedlings and establish plantations as they prefer fast growing species with much shorter rotations. The project board therefore should think about new approach to local people and companies to convince them to use the results of the project. For example: to show people the area only suitable and effective for PCH and hybrid pine plantation.
- Given some evidence of the trend of cutting down forest plantations (pine plantations may be a victim) for rubber plantations, FSIV should form a lobby to ensure that various suitable regions are designated for (especially hybrid) pine plantations for pulp and board processing.

Annex 1 List of interviewees

1. Mr. Phi Hong Hai, Vice director, RCFTI
2. Mr. Mai Trung Kien, RCFTI
3. Mr. Bui Tien Hung, RCFTI
4. Mr. Nguyen Tien Nhan, Lam Dong Silvicultural Experimentation Research Centre
5. Mr. K. Tieng, Ma ethnic minority, Dak To, Dak Nong.
6. Mr Luc Nhu Trung, Research staff, Phu Ninh FRC
7. Ms Vu Thi Tho, Research staff, Phu Ninh FRC
8. Mr Pham Van Hung, Nursery staff, Phu Ninh FRC
9. Mrs. Pham Kim Thanh, Head of Tissue Culture Section, Phu Ninh FRC
10. Mr. Le Van Binh, Northeastern Vietnam Forest Science and Production Centre.

Annex 2. : Project “Logframe”: Progress against objectives, outputs and activities

Narrative	PROPOSAL			COMPLETION REPORT
	Information Required	Performance Measures	Assumptions	Information Required
OBJECTIVE 1	Identify, for the benefit of existing and prospective pine growers in Vietnam, the most highly productive, well-adapted varieties and hybrids of <i>Pinus caribaea</i> , in comparison to other pine species currently planted, for priority pine planting zones.	i. Existing trials reviewed ii. New trials established Pine breeding strategy and related capacities reviewed and strengthened	1. Trials can be translated and collated in an appropriate time frame. 2. Suitable sites can be identified for trials. 3. Interference/ disturbance to trial areas can be minimised. 4. UQ researcher can obtain sufficient information from relevant Vn staff during & after field visits	Project Objective and related performance measures (i) and (ii) achieved. RCFTI has the institutional capacity to ensure the long-term sustainability of the outcomes achieved, including maintenance and assessment of existing and new trials arising from project. The project has provided additional information and options to strengthen Vietnam’s pine breeding strategy and tree improvement program. These matters need to be considered in further detail by RCFTI in the context of competing priorities.
Output 1.1	Review and report on comparative performance of tropical pines in Vietnam based on existing trials and related information.	Timely delivery of “easy to read” report that takes account of all relevant & available information, including information from recent trial assessments.	1.Existing information & data can be readily located (& translated if necessary) & provided to UQ researcher 2. Priority trials can be accurately re-assessed in a timely fashion. 3. UQ researcher can analyse available information & prepare report on time	<ul style="list-style-type: none"> • Output achieved (Milestone 8 Report) • This report can be made widely available (from RCFTI) to interested parties throughout Vietnam to inform future pine plantation considerations.
<i>Activity 1.1.1</i>	Consult with past & present Vn researchers regarding existence of pine trials and related data	Jan-Feb ’06 (UQ – incl. Site visits)	In Progress Report 1	<ul style="list-style-type: none"> • Activity completed
<i>Activity 1.1.2</i>	Obtain relevant reports and related data & inspect trials within limits of project resources	Jan-Feb ’06 (UQ)		Activity completed. Inspections / discussions revealed some shortcomings in existing data. (Not a major issue to overall objective)
<i>Activity 1.1.3</i>	Identify priority trials & re-measure	Feb – March’06 (UQ/RCFTI/FRC)		Activity completed

<i>Activity 1.1.4</i>	Data analysis	April-May'06 (UQ)		Activity completed
<i>Activity 1.1.5</i>	Draft Report & seek feedback from partners	June'06		Activity completed
<i>Activity 1.1.6</i>	Final report	July'06		Final report submitted under Milestone 8
<i>Activity 1.1.7</i>	Presentation at Stakeholders Workshop	Sept-Oct'07		Activity completed. (at November'07 Workshop)
Output 1.2	<p>Establish genetic evaluation trials to compare performance of locally available and introduced pines (esp. PCH & hybrids) on multiple sites throughout North Central, Central Coast and Central Highlands regions of Vietnam.</p> <p>(Output will support local research institute capacity building in relation to planning & implementation of field trials. Well established / maintained/ assessed trials will provide valuable medium - long term information on performance of various pines in Vietnam, to support longer term social & economic development options).</p>	<ul style="list-style-type: none"> ▪ Trials properly established on 5-6 sites using agreed replicated design and taxa treatments 	<p>Suitable sites can be readily confirmed & prepared for planting</p> <p>Sufficient stock for each treatment x site can be raised in time for planting season</p> <p>Skilled labour is available to establish trials at each site & weather conditions are favourable</p> <p>FPQ staff are available to provide field support / training including assist with report preparation</p>	<p>Project Outputs completed (exceeded)</p> <p>8 Genetic trial sites established. (Refer Milestone 4 Report submitted March'07)</p> <p>Note: Since 2 of the trials were not planted until December 2007, it is planned to update MS 4 report so that it includes actual (not planed) details for the final two Central Coast sites</p> <p>The long-term impact of these trials will depend on the extent to which project partners maintain the trials in good condition (eg protection from weeds, fire, grazing damage, other disturbances) and continue to periodically collect data from each site.</p> <p>Proposed responsibilities are outlined in MS 4 report.</p>
<i>Activity 1.2.1</i>	Identify trial partners, trial sites, trial design, including genetic treatments and working plan(s) for each site	Jan-Feb 06: (DPI Forestry, UQ, RCFTI & relevant Vn partners)		Activity completed.
<i>Activity 1.2.2</i>	Raise plants for trials including imports from Queensland, raising seedlings and cuttings to meet best planting seasons for each trial	5- 6 months before planting (see below), ASAP for material to be imported from Qld		Activity completed

<i>Activity 1.2.3</i>	Prepare site(s) for planting	6-8 weeks before planting (see below)		Activity completed
<i>Activity 1.2.4</i>	Plant trials and complete “entry check” to ensure quality control	North/Hanoi – May – August’06 Central Coast: Nov-Dec’06 Central Highlands: June – Aug’06		Activity completed
<i>Activity 1.2.5</i>	Early age assessment of trials	Jan – March’07		Activity completed. Periodic assessment and reporting should continue beyond life of project as per MS 4 recommendations.
<i>Activity 1.2.6</i>	Progress report & presentation at Stakeholders Workshop	Sept – Oct’07		Activity completed. (at November’07 Workshop)
<i>Output 1.3</i>	Review pine genetic resources and related breeding strategies and capabilities / resources in Vietnam, particularly for PCH and related hybrids	Overview report including recommendations for future directions Tree improvement training provided to selected Vn researchers		Output completed Refer Milestone 8 report Tree improvement training provided as part of November’07 workshop, including provision of presentations and posters on Queensland grafting and pollination techniques. As a result of the CARD Project, RCFTI and FPQ are in contact regarding potential further exchanges of improved genetic material to support improvement of Caribbean Pine and hybrids in Vietnam
<i>Activity 1.3.1</i>	Consult with past & present Vn researchers regarding relevant pine	Jan-Feb ’06 (UQ – incl. Site visits)		Activity completed

	trials, breeding populations, institutional / staff capabilities/facilities and related data			
<i>Activity 1.3.2</i>	Prepare Review report including recommendations	Oct'07		Activity completed
<i>Activity 1.3.3</i>	Deliver training to selected Vn researchers on aspects of tree improvement including hybridisation, pollination, grafting and breeding strategy development	June'07		Activity completed Includes an ACIAR sponsored trainee who received training in Queensland (3 months Aug – Nov'06)
<i>Activity 1.3.4</i>	Present key findings at Stakeholders Workshop	Sept – Oct'07		Activity completed. (at November'07 Workshop)
Objective 2	Based on proven technology and systems in Queensland, provide practical training and support to forest research institutes in Vietnam to enable the development and local adaptation of hedge and containerised nursery systems for the mass propagation of containerised pine cuttings	<p>i. Trained personnel able to establish and manage hedge beds, collect and set shoots and raise container cuttings.</p> <p>ii. Locally adapted Nursery Manual and related checklists developed</p> <p>iii. 3 Pilot scale hedge and containerised nursery facilities established</p>	<ul style="list-style-type: none"> • Availability of suitable staff to attend & deliver training • Manuals & checklists are an acceptable form of tech transfer for nursery management & techniques • Land, water, other infrastructure & facilities, skilled labour, institutional support and in-kind resources are available to establish pilot facilities at each site. Qld equipment & materials is readily imported to target sites. 	<p>Project objective achieved</p> <ul style="list-style-type: none"> ▪ Training completed (Qld and Vietnam) ▪ Nursery Manual completed and distributed ▪ 3 pilot hedge facilities and nurseries constructed and operational, however 2 suffered widespread hedge death following extreme heat event in July'07. (See relevant output for further details).
Output 2.1	Trained personnel able to establish and manage hedge beds, collect and set shoots and raise containerised	Number of "accredited" staff following training sessions	Training methods and facilities are relevant and suitable for proposed training program.	Output achieved. 4 Trainees received intensive practical training in Queensland (May'06) and a further 16 received

	cuttings.			theory presentations and hands on training in Vietnam at workshops in Ba Vi and Dalat (May'07)
<i>Activity 2.1.1</i>	Visit partner nurseries in Vn to meet key staff, conduct situation analysis	Jan – Feb'06 (DPI Forestry)		Activity completed
<i>Activity 2.1.2</i>	Deliver “hand on” intensive training in Qld to 4 Vn participants	April – May'06 (DPI Forestry)		Activity completed
<i>Activity 2.1.3</i>	Maintain contact with Vn partners via periodic e-communications	Throughout (& beyond) project duration		Activity completed (and planned to continue informally beyond life of CARD project)
<i>Activity 2.1.4</i>	Follow up face to face contact in Vn & broader based training to a wider range of participants, following several month local experience using the “Qld system”	April – May'07 (DPI Forestry)		Activity completed
<i>Activity 2.1.5</i>	Presentations by Vn & Qld trainees/trainers at Stakeholder Workshop	Sept – Oct'07 (DPI Forestry & Vn nursery partners)		Activity completed (at November'07 Workshop)
Output 2.2	Locally adapted Nursery Manual and related checklists developed	Manual & Checklists produced	Vn partners can arrange timely and accurate translations	Output achieved. (Milestone 5) Manual is periodically revised as new information becomes available
<i>Activity 2.2.1</i>	Review relevance of Qld Manuals / Checklists following initial visit to Vn	March'06 (DPI Forestry)		Activity completed
<i>Activity 2.2.2</i>	Develop Draft Documentation (V1) & seek feedback from Vn partners	April – May'06 (DPI Forestry)		Activity completed
<i>Activity 2.2.3</i>	Further “Road Testing”	Ongoing (Vn nursery partners)		Activity completed.
<i>Activity 2.2.4</i>	Presentation of Draft (V2) Manual & Checklists to Vn Workshop	April – May'07 (DPI Forestry)		Activity completed.

	Participants			
Output 2.3	3 Pilot scale hedge and containerised nursery facilities established & various prescriptions tested.	3 functioning pilot scale hedge / containerised nursery complexes	Management support will be secured early to minimise any delays in securing suitable sites, equipment & personnel to establish facilities	Output achieved with pilot scale hedge and nursery sites developed at Ba Vi, Phu Ninh and Dalat. However, the hedges at Ba Vi and, to a lesser extent Phu Ninh, suffered widespread mortality following extreme hot weather in July'07. It is believed that the combination of soil type, soil moisture and (at Ba Vi) weed mat effectively "cooked" the root systems of the hedges. Recommendations for revised hedge establishment and management protocols have been provided for these sites. The Dalat hedges are performing quite well, where soil and climatic conditions are much more favourable.
<i>Activity 2.3.1</i>	Confirm proposed design & scale for proposed facilities with respective partners, including materials list	Jan-Feb'06 (DPI Forestry & Vn nursery partners)		Activity completed
<i>Activity 2.3.2</i>	Complete site works, source materials & construct facilities	Mar-April'06		Activity completed
<i>Activity 2.3.3</i>	Raise hedges and containerised stock in pilot facilities, (including various prescriptions) providing regular feedback to all partners on problems & progress	Ongoing		Activity completed
<i>Activity 2.3.4</i>	Follow up site inspections of all facilities and face to face discussions with site managers including recommended modifications	April-May'07 (DPI Forestry & nursery partners)		Activity completed
<i>Activity 2.3.4</i>	Report progress at Stakeholders	Sept-Oct'07 (DPI Forestry & nursery)		Activity completed (at November'07 Workshop)

	Workshop	partners)		
3	Create improved awareness amongst rural poor smallholders (particularly central highland minorities) and industrial forest growers in key pine growing regions, regarding the potential performance of improved varieties of Caribbean pine (including hybrids where appropriate) to supply a range of forest products and services via the establishment of large scale demonstration plantings in collaboration with local land owners / forest growers.	i.Establish 2 demonstration trials with a large scale forest grower (Vinapaco) ii.Establish community and individual farmer managed plantings in collaboration with local ethnic minority community near Dak P'Lao, Dak Lak and Lam Dong FRC	Suitable sites can be confirmed & partners are willing to commit the necessary in-kind resources, including labour to plant, maintain	Project objective achieved, (although with different partners and at different sites compared to initial expectations) All trial sites are still very young and will need ongoing care and maintenance to ensure they become sustainable demonstration areas.
Output 3.1	Establish demonstration trials with a large scale forest grower (Extend knowledge & awareness of PCH potential vs currently planted pines (<i>P. kesiya</i> & <i>P. merkussii</i>) by initially involving large scale growers. Pending successful trials (beyond life of project), Vinapaco may seek wider involvement via outgrower partnerships with local small holders)	Successful demonstration plantings in major plantation regions with pine potential viz: ▪ Dak To, Kon Tum (central highlands) ▪ Thanh Hoa, north coast	Seek high level Vinapaco support to ensure that local partners can secure necessary resources to establish, maintain & protect trials	Project Output achieved (although at different locations and with different partners). Sites planted at : ▪ Lac Duong, Dalat ▪ Dong Ha, Quang Tri ▪ Nam Dan, Nghe An Refer Milestone 9 Report for details
<i>Activity 3.1.1</i>	Confirm scale, location and treatments for demonstration plantings at each site	September'06		Activity completed
<i>Activity 3.1.2</i>	Prepare site, source seed, raise stock, plant trials	7 months leading up to planting in June-August'07		Activity completed
<i>Activity 3.1.3</i>	Periodic monitoring & ongoing	July'07 onwards		Activity completed

	maintenance & protection			
<i>Activity 3.1.4</i>	Report & present progress at Stakeholders Workshop	Sept-Oct'07		Activity completed (Refer MS 9 Report)
Output 3.2	Establish community and individual farmer managed plantings in collaboration with local ethnic minority community near Dak P'Lao, Dak Lak and Lam Dong	Demonstration plantings established that take account of special requirements of local ethnic minority community. Recommendations developed for further involvement by local community	Encourage high level of ownership and responsibility by local community, supported by relevant hands on training, to ensure successful establishment & protection of demonstration plantings.	Project Output achieved Site planted November'07 Following the recent construction of a new forest office and nursery at Dak P'Lao, it is likely that further demonstration pine trials will be planted involving the local ethnic minorities. This initiative is being co-ordinated by the Lam Dong Forest Research Centre. Staff at this new facility would benefit from additional training, based in the techniques developed as part of this CARD Project.
<i>Activity 3.2.1</i>	Meet with ethnic minority community to discuss proposed demonstration planting(s), including perceived benefits & seek feedback on any special requirements.	July'06 (LD FRC)		Activity completed
<i>Activity 3.2.2</i>	Prepare site (3-5 ha), source seed, raise stock, plant site	7 months leading up to planting in June-August'07 (LD FRC, local community)		Activity completed
<i>Activity 3.2.3</i>	Periodic liaison with community to promote monitoring & ongoing maintenance & site protection	July'07 onwards (LD FRC)		Activity completed, and ongoing via Director, Lam Dong FRC
<i>Activity 3.2.4</i>	Report & present progress at Stakeholders Workshop	Sept-Oct'07 (LD FRC)		Activity completed (at November'07 Workshop) and also in MS 9 report
Objective 4	Project Management meets requirements of funding agency and all partners	i. Partners regularly & adequately informed of progress (including problems / delays) associated with		Project objective achieved. No major issues encountered

		Project ii. Milestones met and timely submission of progress reports iii. Timely and compliant financial reporting and acquittal / transaction of fund		
Output 4.1	Effective Project Management	i. Reports provided as per schedule indicating progress with project output ii. Procurement of equipment All transactions carried out	Ensure frequent communication between partners to manage any unforeseen staff/organisational changes with minimal disruption to project.	Project Output achieved, although some delay in completing final milestones due to staff shortages (3 on maternity leave!) and competing priorities
<i>Activity 4.1.1</i>	Inception meeting (1) (Hanoi) to meet project staff & clarify partner roles & responsibilities	Jan-Feb'06 (all partners)		Activity completed
<i>Activity 4.1.2</i>	Meeting (2) in Australia, incorporating Study Tour (4 Vn delegates)	May'06		Activity completed
<i>Activity 4.1.3</i>	Progress Reports (6 monthly)	March 2006, Sept'06, March'07, Sept'07		Activity completed
<i>Activity 4.1.4</i>	Timely & accurate financial acquittals & records	March'07, Feb'08		Activity completed