

# TRAINING SUPPORT FOR 8 VILLAGE SCHOOL NURSERIES AT DOI MAE SALONG



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## Background

Thailand's Supreme Command, in collaboration with IUCN and FORRU-CMU (Forest Restoration Research Unit, Chiang Mai University), aims to restore forest on 1,440 ha of degraded land at Doi Mae Salong (DMSL), Chiang Rai Province (more than 1,200 m above sea level). This 14-year project has been adopted by IUCN's 'Livelihoods and Landscapes' Initiative, with the forestry component sponsored by Plant a Tree Today (PATT) Foundation. The sites being restored are exhausted former agricultural areas on steep land at risk of soil erosion and landslides. The objectives are i) to transform degraded areas into forest to honour the Royal Family and ii) to prevent soil erosion.

Over 2007-08, FORRU-CMU contributed to this project by providing technical and scientific assistance to restore the forest landscape, so that a self generating ecosystem can once again be created. Sixty participants from DMSL (including village leaders, local authority officers, school teachers and forestry officers) attended 3 workshops, implemented by FORRU-CMU staff in Chiang Mai, on the general concepts and skills needed for forest restoration.

Subsequently, IUCN organized construction of tree nurseries at 8 village schools in the project area. The purpose of the work report here was to provide training in tree nursery techniques on-site at the 8 school tree nurseries during 2009. The FORRU-CMU team ran a series of educational and training events at the schools over the year, covering seed germination, potting trees, care of trees in the nursery, as well as tree planting and aftercare. Seed collection was identified as an area requiring special attention. To address this, FORRU-CMU organized a "forest children" (*"look mai pah"*) club program. Children got involved in labelling target seed trees, collecting seeds from them and also helping to germinate them. Participating children became members of the club, and accumulated points on a membership card, in exchange for a reward.

In addition, as part of this program, an experimental plot was established to test the suitability of the framework species method of forest restoration (FORRU, 2006) near Ban Lo Yo, in collaboration with the village committee there. FORRU-CMU carried out monitoring of this plot over the year and a technical report, presenting initial results on performance of the planted trees, was submitted to IUCN in December 2009.

*Training project staff and teachers at FORRU-CMU's FLR demo site in Doi Suthep-Pui National Park, January 2008.*



**Table 1 - Events and Activities**

Date	Event No.	Theme	FORRU-CMU staff Person-days input on-site
13-16/1/2009	1	Planning - visited all 8 communities, discussed training needs and readiness, assessed initial condition of nurseries, selected seed collection areas etc. arranged dates for subsequent program of events.	16
26-29/3/09	2	Training - framework concept, seed collection plan, labeling mother trees (Ban Krang and Ban Santikhiri), seed collection, specimen collection, seed/fruit structure, data collection	16
22-26/6/09	3	Establishing " <i>look mai pah</i> " program, species identification, seed collection and germination - nursery work planning and maintenance (Panasawan, Rumjai, Rachpatana, Ban Mai Santi, Mae Ter). PLUS special event tree planting activity (all schools).	15
14-16/7/09	4	Establishing " <i>look mai pah</i> " program, species identification, seed collection and germination - nursery work planning and maintenance (Santikhiri, Ban Klang and Santikhiri Withayakom)	12
5-8/8/09	5	Mid project evaluation + follow up on adoption of " <i>look mai pah</i> " program, seed collection, seedling care (all schools). Meeting to introduce local stake holders to MMC project components (leverage).	16
24-26/8/9	7	Nursery maintenance – "working together" day (4 schools 1 day each).	12
8-11/9/09	8	Nursery maintenance – "working together" day (4 schools 1 day each). Introduction of study site to MMC project participants concerned with carbon assessment (leverage).	12
24-26/11/2009	9	Final assessment of 8 school nursery outputs and knowledge increase. Preparation of score system for nursery award giving.	12
3-4/12/2009	Extra event	Facilitate visit of IUCN VIP's.	4
7-8/01/2010	Extra event	Assisting Supreme Command with National Children's Day events.	5
13-14/01/2010	10	Closing event – "best nursery awards", teachers' discuss of project strengths and weaknesses.	10
34 days	12 events		130 person-days

A total of 12 events were run under this project (10 training events and 2 extra events). The first event, a stakeholders meeting and assessment of the initial condition of the 8 school nurseries, was conducted in early 2009, to develop a suitable training program for the schools. Capacity building in March 2009, focused on explaining the framework tree species concept and assisting each school to select suitable local tree species and develop a seed collection schedule chart.

One of the main activities over the year was the establishment of “look mai pah” program. Literal translation of this is “forest children”, but we also use the term “treasure tree” program, since it is design to demonstrate that trees are precious as a source of seeds for forest restoration. We developed a logo to give the program identity – a tree seedling growing up from a diamond and this logo was placed on seed trees around the schools, to indicate their value.

“Look Mai Pah” club activities included:-

- “Look Mai Pah” membership - all students who joined the training with FORRU received a member card and other students who wanted to join could apply, as well.
- Selecting tree species - local knowledge and the framework tree species concept were used for species selection. After that, each school worked on its own seed collection schedule, according to the fruiting patterns of the selected species (from FORRU’s previous phenology research).
- The treasure tree logo was nailed on selected seed trees around the schools and along roads to villages.
- Seed collection - students checked the charts to determine the fruiting species each month, then collected the seed from the labeled trees. Any student who collects seeds (50 seeds/species), was stickers (“diamonds”) for their membership card.
- Seed germination - any seeds that were collected were transferred to germination trays in the nursery. If a student helped with germination activities, they received more stickers.
- Potting – seedlings were transplanted into plastic bags following FORRU’s technique. Again, for helping with this activity, students received stickers for their membership card.
- Aftercare - seedlings in the nursery were cared for by watering, applying fertilizer, grading, weeding and disease control.
- Planting - students were encouraged to join planting events in the schools or villages.

To help students and teachers identify relevant activities in their nurseries, the processes of the “Look Mai Pah” program were displayed on a colorful chart, which was distributed to all schools.

*Explaining the “Look Mai Pah” concept with a colourful poster.*



*Assessing training needs at Mae Ter School.*



After initial training sessions, FORRU staff visited all schools to establish the program and to conduct training in nursery techniques, seed collection, seed germination, potting, nursery care and planting techniques. During this training, participants were introduced to FORRU's monthly report form, which is used to inform FORRU of the school's progress each month. In August, a mid-year evaluation was carried out, which showed that some schools needed extra help with nursery organization and additional

encouragement. Therefore, in August and September, FORRU staff spent a full-day in every school on "working together" sessions and motivational activities. The final nursery assessment was conducted in November 2009, during which FORRU staff scored schools for nursery performance and accumulation of knowledge and skills from the training provided. A closing ceremony was held in January 2010, at which prizes were awarded to the three best nurseries. At this event, nursery materials were contributed to all schools to ensure they have adequate supplies to continue their work through 2010.

Additional events (not in the original plan) were also run at DMSL over the project period often in combination with the main project activities.

In August, a meeting with key local stakeholders was held to introduce the Making the Mekong Connect (MMC) Project, which will add significantly to outputs from this FLR site. The MMC project, co-ordinated by ICRAF in China and Goettingen University in Germany, involves quantifying and valuing carbon and biodiversity assets with important 'stepping stone' sites in Thailand, Laos, China and Myanmar. DMSL was selected as Thailand's 'stepping stone' site, at which carbon, biodiversity and social values will be determined. German researchers visited the area in September to observe the forest restoration sites at Ban Lo Yo and Ban Pahka Sukjai, the natural forest behind the military center, and rubber plantations.



FORRU-CMU staffs were also requested to join IUCN VIP's in December on an inspection tour of the study site, which showcased the forest restoration demonstration plot at Ban Lo Yo and tree nursery management at Panasawan school and also in January to help the Supreme Command with activities for national Children's Day.

*FORRU-CMU staff, Kwankhao Sinhaseni teaches Santikhiri school children how to make a seed collection schedule.*

## VILLAGE REPORTS

### Pana Sawan School

At the time of the initial assessment, the nursery, originally built for the project, had been destroyed by a hail storm and was undergoing reconstruction. Five tree species were already present in the nursery, but the seedlings were in poor condition, needing root pruning and transfer to bigger plastic bags. Ten tree species around the school grounds were identified as ‘mother trees’ for seed collection. There was no the fence around the nursery to protect it from animals. The water supply came from a natural all-year water source. Additional supplies of equipment and materials were provides from the IUCN budget provided to FORRU to help with reconstructing the nursery.

By the end of the project, the nursery had been successfully reconstructed and expanded. The “Look Mai Pah” program had been implemented very well by the teachers. Twenty one students had joined the program and ten had participated in enough activities to earn project T-shirts as reward. All students in the school had participated in nursery activities as a part of their agriculture classes. A total of 2,840 forest tree seedlings of 12 species were growing in the nursery by December 2009, including *Dipterocarpus alatus*, *Azelia xylocarpa* and *Eugenia* species. The teacher was waiting for fruiting of *Erythrina subumbrans*, *Prunus cerasoides*, *Melia toosendan* and *Castanopsis* species to increase the number of species. The overall quality of the seedlings in the nursery was good; trees are upright with no weeds, healthy, graded appropriately and species had been separated. The plan for 2010 is to plant trees at; i) student’s houses and fields, ii) along village roads, and iii) degraded areas near the temple in Ban Krang village. This school is collaborating with Ban Krang School and Rach Pattana School and has attracted matching funds from PTT group and PLAN organization (IUCN should add this as “leverage” for the project). Some activities have been recorded by video and monthly reports had been written. During the project, responsibility for the nursery passed from Prachidchai Janthatard and Pinit Yaowasak (school representatives who had joined previous FORRU workshops in Chiang Mai) to Miss Titikorn Ruangkam, a new school teacher since June 2009. She is very active and diligent about the nursery work, keeping excellent records. It was largely because of her enthusiasm that this school was ranked among the top three schools



acknowledged at the final award event.

Award-winning Pana Sawan nursery.

## Santikhiri Primary School

At the initial assessment, the nursery was well constructed and in good condition with reliable water supply and well protected by a fence. Seedlings of four tree species were being grown. A few problems were identified, such as fungal infections and the need for root pruning and repotting of trees that had been provided by the military. The nursery lacked some equipment and materials, which were subsequently provided by the project. Seven tree species around the school were identified for treasure tree labeling as seed sources.

By the final assessment, 36 school students have become treasure tree members and several had participated in enough activities to be awarded T-shirts. The teacher mentioned that the treasure tree program for this school was very active for seed collection in the first semester, while in the second semester, the students had several activities such as sports day and father's day, so they paid less attention to seed collection. Seed germination and seedling planting activities have still been well-attended by students, teachers, and school officers. A total of 3,717 seedlings of 9 species were growing in the nursery, as of December 2009, including *Artocarpus gomezianus*, *Prunus cerasoides* and *Cassia fistula*. The seedlings were generally healthy and species had been separated. Some plastic bags were too big and shallow, but most were the correct 9x2.5-inch size. Some domestic species (for decorating the school garden) are also growing in this nursery. The tree seedlings produced will be planted in the school in special events, and given to students, villagers and the military centre. The nursery budget had been supplemented from school budget and Mr Surapong, a resort business owner at DMSL, had funded domestic plant and livestock project (which could be viewed as "leverage" for the IUCN report).



The representatives from this school who attended FORRU's workshops in Chiang Mai were Amnarch Muangprem and Surachai Kamkhong and Mr. Amnach was still running the seedling production nursery very well at the end of the year (telephone number 084-6203438). This school was recognized as one of the top 3 in the project at the final award ceremony.



Caring for trees at Santikhiri

## Ban Mai Santi school

At the initial assessment, the nursery was found to be in good condition and fairly well equipped, but hard to access and the teacher was concerned about the soil quality around school. Ten species were already growing in the nursery, well graded into species blocks, but seedling quality was generally poor, especially for the trees that had been delivered from the military.

During the final evaluation, it was noted that Mr. Nuttapon, the agriculture teacher at the school, had taken over from Mr. Weerapong (who had trained in workshops in Chiang Mai) as nursery manager since June 2009. The nursery was being used to grow medicinal plants as well as and trees for the restoration project. Thirty-three students had joined the “Look Mai Pah” club and had collected seeds and/or helped in the nursery to do germination and potting, with 10 students having earned T-shirts, and a total of 130 stickers having been given out to members. More than 1,000 seedlings had been produced over the year but by December 2009 only 372 trees of 12 species were still growing in the nursery. Most of the seedlings produced before the final assessment had been planted by the students and their parents around their houses and fields and for special events, such as father’s and mother’s days. Species remaining in the nursery included *Cassia siamea*, *Bauhinia variegata* and *Hovenia dulcis*. The seedlings in nursery were healthy and well graded.



The plan for planting during 2010 was to contribute to the “State fence, Family fence, School fence” project; planting trees as living fences in each area. This school received very good support from parents, which has allowed them the run the program well. They are planning to expand the nursery. This school was among the top 3 winning awards at the final project event.



Labeling a treasure tree; seedlings in the nursery and showing “Look Mai Pah” member cards.



## Ban Mae Ter School

This village school had the most serious problems with nursery establishment and tree growing. At the initial assessment, Mr. Peerasak Jakkeaw (telephone number 053-160053, who had represented the school at workshops in Chiang Mai) was in charge of a very small nursery, which had been constructed with project funds. The nursery was in a very poor position at the bottom of a steep slope, which resulted in heavy shading and water logging. The nursery was poorly equipped and had hardly any materials. No germination of seeds was going on and seedlings present were of very low quality, delivered by the army.

Unfortunately even this rudimentary facility had to be dismantled because the school authority required the land for other purposes. By the end of the year, a better piece of land (more suitable for a nursery) had been selected but no new nursery had been built. Trees in the original nursery had been planted in the school and at students' houses. Eleven students had become "Look Mai Pah" members and 4 had earned T-shirts, but we could find no evidence of seed collection going on. Another problem was lack of budget for nursery reconstruction because the money had already been spent on the first nursery.

The failure of this nursery was a disappointment because the school is very well positioned, surrounded by a great variety of forest tree species, making it a prime location for seed collection trees.

*Although children at Mae Ter displayed plenty of enthusiasm on training days – in the end, this school failed to establish a working nursery, since the school authority gave it low priority..*



## Ban Klang School

When FORRU staff first visited this school in January, the nursery was in good condition, with good facilities for nursery activities. This was the only school to have a proper seed germination facility - protected from rats by wire netting and with benches to hold the germination trays. It was also the only village to be actively growing trees from locally collected seeds. The teacher in charge Mr. Yotin Pinitjantanon (telephone number 085-6156423) attended workshops in Chiang Mai and students from the school's "Rakpah club" worked in the nursery. A fence around the nursery protected it from animals, and a reliable water supply had been installed. The students selected suitable tree species from the list of framework tree species provided and they developed a flowering and fruiting chart for their selected species. Ban Klang school was selected as the host location for a workshop for 4 schools. This workshop went very well, with students learning about the treasure tree program, labeling selected trees, learning about phenology, collecting plant samples, seed treatment, seed germination and potting.



*Good nursery facilities at Ban Klang*

During the mid project evaluation, it became apparent that although the nursery facilities were excellent, no new seed germination trays or seedlings growing had been established. It appeared that the teacher was not devoting the time required to motivate the students and that there was a poor relationship between teacher and students. We asked students who joined this event, and they also raised these problems. Follow-up events at this school focused on seed collection, germination and potting. Most of students worked really well, remembering all the techniques which they had learned.



When FORRU staff came back for final evaluation on November, the students had produced 400 seedlings of 11 species, although only 5 of these species were framework tree species. We quizzed students about the framework tree species concept and nursery techniques and most of them could answer correctly. Overall, this school had good nursery conditions and well trained students, but the teacher was failing to provide supervision and encouragement needed to put the facilities and training to practical use. If the personality conflicts between the teacher and students could be resolved, this school nursery could be amongst the best on Doi Mae Salong.

*Preparing seeds for germination at Ban Klang School*

## Ban Roum Jai School

At the project outset, Ban Roum Jai School had a well constructed nursery and the school was well positioned for seed collection with several framework tree species growing nearby. The nursery contained many seedlings donated by the military, but most of these plants had fallen over and were diseased. The school was also growing ornamental plants. The nursery manager was Mr. Jarean Saisorn (telephone number 080-6718189), with 3 other teachers (including Mr. Sakson Treesakorn, who attended FORRU's workshop in Chiang Mai) and students helping with nursery work. The nursery manager raised the issue of the water supply to the nursery, which sometimes dried up in the dry season. The school needed nursery equipment and materials, which were subsequently provided by the project budget.

This school joined the opening ceremony, and joined the treasure tree workshop at Ban Santi Khiri School. However, by the mid-project evaluation, recommendations to discard diseased plants and to repot the seedlings that had been supplied by the military had not been followed. Some of the students had collected seeds and given them to their teacher, but these had not been germinated. During the evaluation, FORRU staff helped students with some repotting and pruning work and made suggestions for re-arrangement and cleaning up of the nursery. However there was still a lot of work for students to follow up.

In September, FORRU staff conducted a "working together" day at this nursery. A fence was constructed to protect the standing-down area from dogs and chickens. Seedlings supplied by the military were finally repotted and pruned, graded and separated by species. Seed collection was carried out and collected seeds treated and sown into germination trays. FORRU staff also helped the students to clear an area inside the nursery for a bare-root germination bed.

By the final evaluation, 8 students had earned "Look Mai Pah" T-shirts. Six hundred seedlings of 11 framework tree species were present in the nursery.

Some of seeds germinated during the last training session were ready for potting. FORRU staff quizzed students on the framework tree species concept and nursery techniques and the students scored very highly. In summary, this school had developed a suitable nursery facility but the students required more motivation and supervision from the teacher to increase the quantity and the quality of the trees produced.

*"Look Mai Pah" members at Roum Jai School proudly display their member cards and treasure tree fruits they have collected.*



## Rajapattana school

This school is located on the eastern side of the Doi Mae Salong project area, 6 kms from the military centre. The school nursery was established down a hill behind the school building. The nursery manager was Mr. Todsapol Lumduan (telephone number 087-1744382) who attended one of FORRU's workshops in Chiang Mai. When FORRU visited this school for the first time, they already had a well constructed nursery, with a fence around the nursery to protect it from animals, and a training area with tables and chairs in front of the nursery, although no germination had been started. The problems at this school were that the bags used as containers were too small and seedlings were not separated by species and graded correctly. The nursery required more equipment and materials, which were subsequently supplied from the project budget.

The second and third training sessions at the military centre and at Ban Klang School taught students about phenology, techniques for collecting plant samples and the treasure tree program. The mid project assessment was conducted in August, and by that time some "Look Mai Pah" members had already earned T-shirts. However, an inspection found not many seedlings growing in the nursery. Seedlings were generally healthy, but the nursery was too dark for optimal growth. The school needed more potting media for doing seed germination and potting and more plastic bags, which were subsequently provided. They had already started seed germination, but were germinating directly into soil rather than using seed germination baskets. FORRU staff suggested that to achieve the best germination results, the school needed to build a bench for germination baskets. The students at this school were collecting a lot of seed from their houses and around school. FORRU staff and students worked on seed germination together and helped to build a rack for germination trays. Students had collected enough seeds to share with other schools. This school also completed monthly reports to keep track of species collected.

The final evaluation December, recorded few seedlings in the nursery as students had planted most of them at their houses or around the school 2-3 weeks earlier. As well as taking time to plant seedlings, the students had also been busy germinating seeds, and the germination baskets were full. FORRU staff quizzed the students on the framework tree species concept and nursery techniques and most of them could answer all the questions correctly. In summary, this school has done very well with nursery activities, but has plenty of scope to increase production and expand their standing down areas onto sunnier terraces adjacent to the nursery.

*The teacher and students at Rajapattana School proudly display seedlings they have grown themselves.*



## Santikhiri Wittayakom

This is the biggest school in the Doi Mae Salong area. The nursery manager is Mr. Sompong Kornrattanosak (telephone number 084-4851081). This nursery was constructed before the project started, but was initially only growing ornamental species. The nursery has a lot of equipment, but is small and difficult to access. Framework tree species growing around the nursery included *Ficus* spp as well as *Prunus cerasoides*.

This school joined the opening ceremony and a workshop at Ban Santikhiri Primary School. The mid project evaluation noted that the school was growing some framework tree seedlings, and during the evaluation, FORRU staff worked with students on potting and grading seedlings. Students also labeled up many treasure trees for future seed collection around the school and verified species identifications. But by that time no seeds had been germinated in the nursery due to a lack of space. Therefore a full day “working together” event was run in September, during which FORRU-staff helped the students to build proper germination benches and do germination treatments and potting techniques as well as label up more treasure trees in forest behind the school.

At the final schools evaluation, 900 seedlings of 10 framework species were growing in the nursery. The nursery was clean and well organized. Twenty students had joined the “Look Mai Pah” club and several had gained their T-shirts. Students all easily answered questions about the framework tree species technique and demonstrated perfect potting methods.

In summary, this school now has the motivation and ability to run the nursery on their own, but would benefit from a new nursery being constructed, with easier access and more space for greater seedling production.



At the start of the project (left) the nursery was empty but by December (right) it had filled with 900 seedlings of 10 framework tree species.

## OUTPUTS SUMMARY

The eight schools produced a total of 9,762 containerized seedlings of 24 forest tree species, with an additional 12 species waiting in germination trays to be potted (see Table 2). These are sufficient to restore approx 20 rai of totally denuded land, or perhaps double that area of partially degraded forestland. It is a small part of the overall area to be planted but it does provide local people with a sense of direct involvement with the tree planting project, which will hopefully result in a further sense of protective “stewardship”. Some of the containerized seedlings were small, and many more were germinating in trays waiting to be potted. Therefore, the ongoing task for the nurseries is to take care of their current planting stock and accelerate seedling growth with fertilizer, so that plants are big enough for planting in the 2010 rainy season. The nurseries must produce plants 30-50 cm tall by May to qualify for payment.

At each school 1-3 teachers and a minimum of at least 20+ student members had been involved in the project; totally at least 200 students and teachers had attended training events and most had joined more than one event. Technical competence of the school staff and students had definitely been increased, but in some cases lack of motivation and other conflicting interests had limited the actual number of plants produced. The critical factor was the dedication of the main teacher in charge of the nursery. The children were always enthusiastic, but the teachers must take the initiative in organizing working sessions for seed collection and nursery care on a regular basis.

Outputs of the project are of very mixed types, ranging from countable numbers of trees and species produced to more intangible benefits, such as awareness raising and team spirit. To try to capture all these aspects, a scoring system was devised for the final evaluation. The criteria assessed were i) number of tree species being grown, ii) number of seedlings in pots, iii) number of stickers/T-shirts distributed under the “look mai pah” program, iv) test of knowledge of the framework species concept, v) practical test of potting technique, vi) record keeping and submission of monthly reports, vii) extra activities (leverage/-matching funds etc.) and viii) sound nursery management (weeding fertilizer application etc.). All factors were weighted equally with a maximum score of 5 for each. For countable measurements (e.g. i) and ii)), the school with the maximum number was given a score of 5. Scores for the other schools were then calculated as a proportion of the maximum multiplied by 5. The results are shown in Table 3.



Happy award-winner.

**TABLE 2 – TREE SPECIES GROWN AT THE 8 NURSERIES OVER 2009**

Local Name	Scientific name	Family	Santikhiri Primary	Panasawan	Santikhiri Withayakom	Banmai Santi	Rachpattana	Ruamjai	Mae Ter	Ban Klang	TOTAL
กระถิน	<i>Leucaena leucocephalade</i>	Leguminosae (M)				100		G			100
กระบก	<i>Irvingia malayana</i>	Irvingiaceae				G					-
กล้วยงา	<i>Diospyros glandulosa</i>	Ebenaceae			G			G			-
ก่อเดือย	<i>Castanopsis acuminatissima</i>	Fagaceae		G	G						-
ก่อเดี่ย	<i>Quercus aliena</i>	Fagaceae		G							-
ก่อนก	<i>Lithocarpus polystachyus</i>	Fagaceae						G			-
ก่อแป้น	<i>Castanopsis diversifolia</i>	Fagaceae						3			3
ก้ามปู	<i>Albizia sp.</i>	Leguminosae (C)								50	50
กำลังเสือโคร่ง	<i>Betula alnoides</i>	Betulaceae								20	20
ขึ้นเหล็กหลวง	<i>Cassia siamea</i>	Leguminosae (C)	200		350						550
แคขาว	<i>Dolichandrone serrulata</i>	Bignoniaceae		G							-
จวงหอม	<i>Cinnamomum caudatum</i>	Lauraceae	150			2					152
จันทน์	<i>Dracaena lourieri</i>	Dracaenaceae				G					-
ตะแบก	<i>Lagerstroemia cochinchinensis</i>	Lythraceae		G							-
ตีนเป็ด	<i>Alstonia scholaris var. scholaris</i>	Apocynaceae			120	3					123
เดียม	<i>Bischofia javanica</i>	Euphorbiaceae	200					80			280
นางพญาเสือโคร่ง	<i>Prunus cerasoides</i>	Rosaceae	400	G		2		140			542
ฝาละมี่	<i>Alangium kurzii</i>	Alangiaceae		70						20	90
พิบูล	<i>Adinandra sp.</i>	Theaceae								20	20
มะกอก	<i>Spondias pinnata</i>	Anacardiaceae				G					-
มะกอกเกลื้อน	<i>Canarium subulatum</i>	Burseraceae					G				-
มะกอกห้ารู	<i>Spondias axillaris Roxb.</i>	Anacardiaceae		150	G		20	G		55	225
มะขาม	<i>Tamarindus indica</i>	Leguminosae (C)	150					30			180

มะค่าเห็ด	<i>Canarium subulatum</i>	Burseraceae				G					-
มะค่าโมง	<i>Azelia xylocarpa</i>	Leguminosae (C)		300	50		45				395
ยางนา	<i>Dipterocarpus alatus</i>	Dipterocarpaceae		2,000			300				2,300
ราชพฤกษ์	<i>Cassia fistula</i>	Leguminosae (C)	2,040		100			210			2,350
สะเดาช้าง	<i>Acrocarpus fraxinifolius</i>	Leguminosae (C)								30	30
สัก	<i>Tectona grandis</i>	Verbenaceae				50					50
สีน	<i>Dillenia sp.</i>	Dilleniaceae		G							-
เลื้อยดอกขาว	<i>Bauhinia variegata</i>	Leguminosae (C)	107	50		60	30	30			277
หมอนหิน	<i>Hovenia dulcis</i>	Rhamnaceae	20		70	60				25	175
หว้าป่า	<i>Eugenia sp.</i>	Myrtaceae		220			50	60			330
หางนกยูง	<i>Caesalpinia pulcherrima</i>	Leguminosae (C)			30					50	80
หาดหนูน	<i>Artocarpus gomezianus</i>	Moraceae	600				250	G		50	900
อินทนิล	<i>Lagerstroemia sp.</i>	Lythraceae				540					540
		TOTAL PLANTS	3,867	2,790	720	817	695	553	0	320	9,762
		TOTAL SPP.	9	12	9	12	7	12	0	9	24

\*G: Germination

TABLE 3 – SEMI-QUANTITATIVE SCORES FOR PROJECT OUTPUTS

CRITERION	Panasawan	Ban Mai	Santikhiri Primary	SK Wittayakom	Rachapattana	Ban Krang	Ban Rumjai	Mae Ter	Mean
Species number	5.00	5.00	3.75	3.75	2.90	3.75	5.00	0.00	3.64
Seedling number	3.60	1.06	5.00	0.93	0.89	0.41	0.71	0.00	1.58
Treasure tree program	2.98	1.77	1.05	2.71	2.58	2.29	0.97	5.00	2.42
Framework species quiz	4.00	3.10	2.60	4.70	2.30	4.60	4.80	3.00	3.64
Potting technique	4.00	4.00	4.50	4.00	4.50	4.00	3.00	4.00	4.06
Monthly report	5.00	5.00	0.00	0.00	2.00	0.00	0.00	2.00	1.75
Extra activities	5.00	5.00	3.00	3.00	3.00	2.50	0.00	1.00	2.81
Nursery management	4.75	3.25	3.50	4.00	4.25	4.00	3.25	0.00	3.38
<b>Total</b>	<b>34.33</b>	<b>28.18</b>	<b>23.40</b>	<b>23.09</b>	<b>22.42</b>	<b>21.55</b>	<b>17.73</b>	<b>15.00</b>	<b>2.91</b>



## **DISCUSSION AND RECOMMENDATIONS**

### **Final teachers' discussion**

A discussion session with teacher representatives from all 8 schools, as well as other project stakeholders (Supreme Command, IUCN, PATT, FORRU-CMU etc.) was incorporated into the final award ceremony event. Prior to the event, questionnaires were conducted for each school over a one month period, and were returned on the day of the event as guidelines for discussion. The main themes of the meeting were identifying problems and solutions for further nursery work as well as identifying any further requirements for inputs from FORRU. The main points raised by each school were as follows.

#### **Santikhiri Witayakom**

The nursery manager had not joined previous training programs in Chiang Mai. Problems identified included i) lack of materials and equipment ii) students' low level of understanding of forest ecosystems and iii) lack of time available for nursery activities (since most students joining the project were Mathayom 5-6, preparing for exams. He suggested that the project should target Mathayom 3-4 grade students, who can spend more time in the nursery.

#### **Mae Ter**

The main problem identified was limited land for a nursery due to the very steep slopes around the school. School authorities needed all the flat land to construct teachers' housing.

#### **Mai Santi**

The main barrier to nursery activities, identified by the teacher was a lack of suitable equipment.

#### **Ban Pana Sawan school**

The only problem at this nursery identified was fungal infection of some of the seedlings, but the problem can now be solved.

#### **Santikhiri**

The budget for construction and running the nursery is now supported by the school budget, with matching funds from other organizations. The teacher report enthusiastic participation in the project by his students and that he visits students' houses after they have planted trees around their homes, to check the health of the trees. No major problems were identified from this nursery.

## **Ruamjai**

The main participants in nursery work were Prathom 4-Mathayom 3 students in agriculture classes. The problems in the nursery were i) lack of water and ii) frequent changes in the students and teachers involved in the nursery. However, around the school, there are plenty of areas for planting and the school continues to participate in planting activities.

## **Ban Klang**

Water shortage at the school used to be a problem but a reservoir has now been constructed. The main problems at this school have been a lack of equipment and low student motivation (secondary school). The teacher suggested that i) students are always interested in outsiders, so when other organisations provide activities, students will often join, ii) incentives (such as the treasure tree T-shirt) can motivate students to join the nursery work, and iii) seed exchange between schools should happen.

### **Plan for seedlings produced in 2009**

Many teachers said that some of the trees would be planted around the schools and in students' villages.

However the main objective is to strengthen involvement of the communities in the forest restoration program of the Supreme Command, so some of the trees should be purchased from the schools to act as a future incentive to continue to grow trees. It was decided that FORRU-CMU staff and military officers would jointly count the trees that could be sold to the project in mid-May, just before the annual tree planting event. Prices paid for the trees would be 4 baht for >30-cm-tall tree, 5 baht for >40 cm and 6 baht for >50 cm. There should be enough money left over from the budget allocated to FORRU-CMU to cover the cost of evaluation of suitable trees and their purchase, which should not exceed 60,000 baht totally.

### **Suggested Future Activities**

- Further “working together” days. Whilst it is clear that technical skills have been successfully transferred to children and teachers, it is clear that further activities to build motivation and “team spirit” would be beneficial. Therefore, we would like to suggest further work days to maintain and organize the nurseries and boost seed collection to produce the 2011 tree crop.
- Seedling quality control – FORRU-CMU agreed to work together with Supreme Command to measure seedlings produced ready for planting and to transfer the appropriate payments to each school in mid-May 2010 (this can be combined with one of the suggest “working together” sessions).

- The Doi Mae Salong Supreme Command recommends that nursery training and non-formal education sessions should be conducted in other villages, as most students are working as farmers, so they are an effective group to promote the military's forest restoration project.

The work described in this report has all been conducted well within the allocated budget (the financial report will show an under-spend of >150,000 baht). Therefore most of the suggested future activities list above could probably be conducted without the need of extra funding.