

POSTER ABSTRACTS

PEST AND DISEASE PROBLEMS OF NATIVE TREE SEEDLINGS IN NORTHERN THAILAND: SOME EXAMPLES

Tim Rayden¹

ABSTRACT

The Forest Restoration Research Unit (FORRU) is identifying 'framework' tree species for the restoration of northern Thailand's upper watershed forests. Since 1994, research at FORRU has focussed on collecting seeds of native species, and testing germination and growth rates in nursery conditions. However, the current emphasis is on improving nursery technology and increasing the production of high quality seedlings for planting. Large productivity step-downs occur at germination and potting stages, but losses to pests and diseases are also significant. It has been noted that the incidence of phytophagous insect outbreaks has increased with the age of the nursery, and that certain seedling species have encountered recurring problems with disease. Little information is currently available on the scale of these problems, or the types of disease that are present. This survey has highlighted areas for concern, with a view to developing elementary and cost effective management strategies. Some such strategies are suggested. With further monitoring of the prevalent pests and diseases, together with a more detailed assessment of the recommended treatments, it will be possible to make well informed decisions about seedling production targets and the overall suitability of certain tree species for forest restoration schemes.

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EFFECT OF CONTAINER TYPE AND MEDIA ON THE PERFORMANCE OF NATIVE TREE SPECIES TO RESTORE DEGRADED FOREST ECOSYSTEMS IN NORTHERN THAILAND

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ABSTRACT

Biodiversity in Thailand is fast disappearing because of deforestation. Restoring forests by planting native tree species can help promote biodiversity. Producing high quality planting stock can be achieved by using root-trainers. Furthermore, tree seedlings need a potting medium which encourages root growth and good root form. In this poster, we report on the performance of 2 native tree species; *Micromelum hirsutum* Oliv. and *Archidendron clypearia* var. *clypearia*, grown in a nursery under 6 treatments of container and medium type and then planted to restore forest in degraded areas in Doi Suthep-Pui National Park,

REX tray root-trainers with a mixed medium produced the best seedling performance in the nursery. Mean heights achieved in the nursery from seed germination to planting time of *Micromelum hirsutum* and *Archidendron clypearia* were 31.0 cm. and 25.9 cm. respectively. However, there was no significant difference in field performance after planting out. Relative performance indices, which combined survival and relative growth rate were higher for seedlings grown in with mixed medium, except in REX tray root-trainers. When container types were compared, plastic bags produced seedlings that performed best in the field after planting out. Further research is needed to determine whether container size would affect performance.

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CONTAINERISED SEEDLINGS FOR BETTER REFORESTATION

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ABSTRACT

The objective of this poster is to exhibit one of the activities of the Reforestation and Extension Project in the Northeast of Thailand (REX Project) in which JICA collaborated with the Royal Forest Department. The aim was to promote forest rehabilitation on deforested state land and private land by producing and distributing more than 89 million seedlings in 8 years from 1991 to 1998. The text focuses on the technique of growing seedlings in plastic-bags compared with multi-cavity containers, especially REX trays, which were introduced to improve seedling morphology and efficiency. More than 30 species of tropical hardwoods were grown in REX trays and various other containers with the appropriate nursery cultural practices. It has been found that 'rigid' containerised seedlings have better root development and lower costs than seedlings grown in plastic-bags in several aspects of tending, transportation and out-planting on the sites. This was then related to reforestation success.

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GENETIC CONSIDERATIONS IN FOREST RESTORATION AFTER DISTURBANCES

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ABSTRACT

The accelerating rate of deforestation in the tropics has raised global concerns regarding the conservation of forest genetic resources. In order to assess the loss of forest genetic diversity through deforestation, a study of the impact of logging on genetic diversity of several important timber species was made. The investigation showed a significant population structure for all timber species studied, which indicated a non-random distribution of genetic diversity within a population. The population structuring started at the sapling stage and continued to mature trees. Restoration of such forest must ensure the occurrence of gene flow in the regeneration process. Several management practices can be carried out; such as avoidance of the complete removal of a forest block which creates fragmentation, generating “stepping stones” between forest fragments, maintaining considerable genetic diversity within populations by retaining heterozygous individuals in logging activities and conducting enrichment planting in severely disturbed areas.

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BIODIVERSITY AND STATUS OF MYCORRHIZAE ON TROPICAL TREES IN INDONESIA

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ABSTRACT

Arbuscular mycorrhizal fungi (AMF) have novel functions as biofertiliser inoculum for improving growth and health of plants. They may also be an agent for bioremediation of soil contaminated by heavy-metals by fostering early seedling establishment on degraded sites. A survey of the status of local species of arbuscular mycorrhizal fungi and plant mycorrhizal in different disturbed forest ecosystems (disturbed forest, grassland, secondary forest, mine sites, peat forest and semi-arid forest) was conducted. Representative soil and root samples were collected from different rhizosphere trees. Using standard methods, the roots were stained, and the AMF spores were extracted from the soil, isolated and identified.

Spores of AMF were found in all forest ecosystems except in swamp and mangrove forest. Among the forest ecosystems studied, the number of AMF spores found in degraded peat forest were highest, whilst the number of AMF spores found in alpine/sub-alpine forest (3,200-4,255 m asl.) were the lowest. More than 23 different spores types were found in a range of Indonesian forests and the AMF species richness (based on spore types) varied among the ecosystems. The species richness of AMF was higher in recolonised tailings and *Imperata* grass-land compared to other ecosystems. The genera *Glomus*, *Sclelocystis*, *Acaulospora*, *Scutelospora* and *Gigaspora*, and AMF species *Glomus oculatum* and *Acaulospora morrowaiae* were commonly found in all ecosystems. Root staining indicated that, of 112 forest trees assessed, 87% formed mycorrhizae, indicating that mycorrhizae may be required for their establishment on degraded sites. Using a test tube culture technique, more than 14 indigenous AMF isolates were obtained in pure cultures and maintained in the Bank of Tropical Indigenous Glomales-IUC-IPB as a tropical indigenous culture collection.

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RAINFORESTATION FARMING: AN ALTERNATIVE TO FOREST RESTORATION

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ABSTRACT

Efforts to preserve the biological diversity of the Philippine islands and to simultaneously sustain human food productivity led to the development of a “Closed Canopy and High Diversity Forest Farming System”, popularly termed “Rainforestation Farming”. The system aims to replace the more destructive forms of “kaingin” or slash-and burn practices, form a buffer zone around the primary forests, conserve biodiversity, help maintain the water cycle of the islands and provide farmers with a stable and higher income.

Contrary to the conventional paradigm of farm management, the concept works with the hypothesis that a farming system is increasingly more sustainable the closer its physical structure and species composition is to the original local rainforest. Consequently, the biological and physico-chemical diversities of remaining forests of Leyte are being studied in detail. This reforestation scheme utilises local tree species, particularly Dipterocarps and high premium tree species, whilst incorporating fruit trees and agricultural crops in accordance with farmers’ need.

Species monitoring in rainforestation sites showed that birds, reptiles, arthropods and other organisms readily inhabited the newly established forest. Species composition, particularly birds, insects, reptiles and mammals was monitored. In the sixth year after the establishment of a rainforestation farm on formerly degraded grassland and shifting cultivation area, the Samar Tarictic Hornbill (*Penelopides samarensis*) and flying lemur (*Cynocephalus volans*) from the nearby forest visited the farm regularly. The highly diverse tree plantation likewise allowed re-establishment of arthropods, Philippine Tarsier (*Tarsius syrichta*), birds and lizards, which derive food, nesting places and moist, cool microclimates from the newly forming ecosystem.

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EARLY SURVIVAL AND ESTABLISHMENT OF TEN NATIVE TREE SPECIES PLANTED IN THREE DEGRADED HILLSIDE SITES IN HONG KONG, CHINA

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ABSTRACT

Early survival and growth of 10 native tree species planted in upland grassland, lowland grassland and lowland shrub-land were studied for two years. The survival of all species at all sites was very high in the first three months, which shows that good post-nursery care can effectively reduce the transplantation shock and minimise transplantation losses. All species except *Sapium discolor* had high survival rates over two years in both grassland sites (70 – 100%) and most species showed no difference between the two grassland sites. In the shrub-land, survival varied from zero in *Sapium* to 100 % in *Cinnamomum camphora*. The relative growth rates of *Cyclobalanopsis neglecta*, *Machilus breviflora*, *Choerospondias axillaris* and to a lesser extent, *Schefflera octophylla*, were higher than the other species at all three sites. *Cyclobalanopsis* and *Choerospondias* had the highest final mean stem height (96 – 140 cm and 100 – 156 cm). The final mean stem heights of *Machilus* (50 – 79 cm) and *Schefflera* (26 – 37 cm) were smaller than those of *Schima* (70 – 129 cm), *Castanopsis* (57 – 81 cm) and *Mallotus* (102 – 119 cm), despite higher growth rates. Longer term monitoring is needed to determine if *Machilus* and *Schefflera* could maintain their high relative growth rates. If so, they will become taller than these three species in a few years time and would be better choices for forest restoration in Hong Kong. In summary, all species except *Sapium* have the potential for wider use in forest restoration in Hong Kong, especially the four faster growing species.

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A GLIMPSE OF ONGOING CONSERVATION PROGRAMMES OF FOREST GENETIC RESOURCES IN THAILAND

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ABSTRACT

This poster briefly outlines the contribution to biodiversity and environmental stability made by the Forest Genetic Resources Conservation and Management Project (FORGENMAP). The poster lists FORGENMAP's criteria for species conservation and those sites selected for in-situ conservation activities. The nature of gene conservation activities in Thailand, carried out within the last 30 years, under the Thai-Danish co-operation programme, are described.

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GROWTH PERFORMANCE OF TEN INDIGENOUS TIMBER SPECIES ON DEGRADED FOREST LAND IN NEGERI SEMBILAN, MALAYSIA

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ABSTRACT

A study on the growth performance of ten indigenous timber species was undertaken in June 1998 on trial plots that were established in August 1995. The objective of the study at Compartment 121, Pasoh Forest Reserve, Negeri Sembilan, Malaysia was to evaluate growth performance of timber species planted on degraded sites by an open planting technique. Plots were arranged using a randomised complete block design. The species used in this study were *Azadirachta excelsa*, *Cinnamomum iners*, *Dryobalanops aromatica*, *Hopea pubescens*, *Neobalanocarpus heimii*, *Shorea acuminata*, *Shorea bracteolata*, *Shorea leprosula* and *Shorea parvifolia*. Twenty six months after planting, the survival rate of all species planted ranged from 17 to 85%, with *C. iners* attaining the highest rate, while the lowest was recorded by *S. acuminata*. Growth increments in diameter and height were significantly different ($P \leq 0.05$) for all species tested. *A. excelsa* exhibited the highest growth increment, both in terms of basal diameter (13.00 mm (dMAI = 24.18 mm y⁻¹)) and total height (82.79 cm (hMAI = 173.06 cm y⁻¹)). This was followed by *C. iners*, with a growth increment of 7.71 mm (dMAI = 16.19 mm y⁻¹) and a total height of 35.41 cm (86.29 cm y⁻¹). *S. acuminata* showed the lowest basal diameter and total height increments, with only 1.93 mm (5.31 mm y⁻¹) and 14.70 cm (56.42 cm y⁻¹), respectively. The growth and survival rates attained in this study indicate that an open planting technique of some of indigenous timber species can be adapted to rehabilitate degraded forest lands.

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