NOTES

A NOTE ON THE INSECT PESTS OF MULTIPURPOSE TREE SPECIES IN THAILAND

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The shortage of fuelwood and other basic products in rural communities has prompted a search for multipurpose tree species to meet these needs. With that view, four species of the multipurpose trees were selected by the Forestry/Fuelwood Research and Development (F/FRED) Project managed by Winrock International to evaluate site requirements, growth rates and other uses. The trial species are *Acacia mangium* Willd., *Acacia auriculiformis* Cunn., *Leucaena diversifolia* Benth. and a *L. leucocephala* × *L. diversifolia* hybrid. In Thailand, the field trials were established on five sites in July 1987.

Insect pests can alter the performance of tree species significantly. So, in addition to the silvicultural data for the final species selected, the insect pests of the species were also examined. This study was conducted at the trials in Ratchaburi Forest Experiment Station. The experimental design is set up for the network research purposes as a randomized complete block with four replications and consisting of 72 plots. There are seven trees in each row, seven rows in each plot, and total of 49 trees per plot. Spacing used is 2 *m* between rows and 1 *m* between trees.

The site was visited each month from January to December 1988. All insects observed in each plot were collected with insect nets and identified. Immature stages were reared for adults and identified.

Damage from insects on trees was examined and calculated as a percentage of trees infested. Damage on trees was grouped into three types and damage limits were assigned as follows:

Damage type	Damage limit (%)
Main stem damage or induce mortality	10
Damage on branch	20
Defoliation	30

Insects that caused damage above 30% are considered key pests.

Many insects were found associated with the tree species. Only four insect pests gave detectable damage (Table 1). *Sinoxylon* species and leucaena psyllid were the only key pests. The important insect pests and their effects are described below:

Sinoxylon, (*S. anale* and *Sinoxylon* sp.), the powder-post beetles, attacked small stems and branches, girdling and breaking them.

Damage from this beetle in the survey plots was first noticed in February and markedly increased in April and May. The percentage of infested trees was somewhat constant after May with a slight increase at the end of the year.

S. anale was also found feeding and breeding in dead plants of cassava (*Manihot esculenta* Crantz) that were left in nearby fields after harvesting. Therefore, intercropping of *Acacia* and *Leucaena* with cassava must include removal of cassava residues after harvesting.

In Thailand, the beetles have been reported as important pests since 1977 when they caused substantial damage to *A. auriculiformis* in Surin, Chiangmai and

Ratchaburi provinces (Anonymous 1977). In 1987, their activity was reported from Chanthaburi province (Hutacharern 1987).

Infestation from the leucaena psyllid *Heteropsylla cubana* Crawford, in the survey area was noticed in January and the severely infested trees were completely defoliated and this can cause mortality. In February and March, the foliage sprouted and the trees recovered. From April to August, the psyllid disappeared and occurred again in September. The population increased gradually until the end of the year.

The psyllid is a well known insect pest of *Leucaena* in many tropical countries. The distribution of *H. cubana* is now throughout much of Asia and the Pacific. In Thailand, *H. cubana* was first observed in Chachoengsao in September 1986 (Napompeth 1988). By early March, 1987, the psyllid infestation was reported in all regions of Thailand except the northern highlands.

Zeuzera coffeae Nietner, the coffee borer, a widespread species was also found. As a caterpillar, it bored woody stems of young living saplings and living branches of bushes. The stem broke off at ground level, but most often at a higher point. In this survey the *Leucaena* spp. were not attacked by this caterpillar (Table 1).

Flat-headed borers, *Sternocera aequisignata* Saunders and *S. ruficornis* Saunders were found during the monthly field examinations. The larvae caused death of the host through attack on the root collar, and trees died within one year after being infested. In this study, one larva was found on each infested tree. The prepupal stage was discovered in May. In Ratchaburi, the adults are abundant in October and November. The beetles feed on leaves of many trees and seemed to aggregate in the plots of *A. auriculiformis* more than other plots.

There were significant interactions in the susceptibility of each of the tree species to the key insect noted during the surveys (Choldumrongkul *et al.* 1989). These are discussed by species.

Table 1. Percentage of trees infested by important pests at Ratchaburi Forest Experimental Station in December 1988

	Acacia mangium		*A. auriculiformis*		*Leucaena* spp.	
*Seedlot No.	15677	15642	15477	15648	K743	K156
Insects:						
Leucaena psyllid (defoliation)	0	0	0	0	0	0
Powder-post beetle (branch girdling)	1.0	1.9	25.6	20.2	29.6	56.5
Coffee borer (stem boring)	0.8	2.1	1.6	0.6	0	0
Flat-headed borer	0.2	0.4	1.1	0.4	0	0

(Source of seeds: 15477 - Morehead, Queensland; 15642 - Boite, Papua New Guinea; 15648 - Bensbach/Balamuk, Papua New Guinea; 15677 - Iron Range, Queensland; K156 - Hawaii; K743 - Hawaii)

Acacia mangium

Few pests of this species have been reported, and most are not significant yet (Anonymous 1987). We too found no insects to cause serious damage. Pests of the tree include sap suckers, defoliators, stem borers and root borers.

Acacia auriculiformis

The key pests were common to both provenances. *Sinoxylon* species is the only pest that caused serious damage. Stems and branches were broken off. The flat-headed borers were seen to feed on the root collar and cause wilting and death to a few trees. *Z. coffeae* gave the same effect but to a lesser extent. Most of the plots of *A. auriculiformis* were moderately affected by *Sinoxylon* spp. except one plot which was located on the Thayang Soil Series, while the rest were on the Muak Lek Series. Thayang soil is shallow with low water holding capacity, and the trees are stunted, bushy with wilting noticeable during the dry season. Drought stress could be a factor inducing the beetle's attack.

Leucaena diversifolia (K 156) and *L. leucocephala* × *L. diversifolia* (K 743)

Fewer insects were found in *Leucaena* than in the other species. The number of insects found in *L. diversifolia* and the leucocephala hybrid were similar. The bark feeding longhorn beetle *Niphona* sp., was found only in *L. diversifolia*. The key pests were the powder-post beetle and the leucaena psyllid.

The psyllid was a major pest and heavily defoliated both leucaena entries. The insect was noticed in January 1988 when this project started. In February, the population declined and by April no psyllids were observed. The psyllid infestation occurred again in September and the population built up until the end of the year.

Resistance of *L. diversifolia* K 156 to the leucaena psyllid was observed. Damage in *L. leucocephala* K 743 resulted in yellowish leaf and defoliation. Leucaena psyllid seemed to prefer the *L. leucocephala* hybrid over *L. diversifolia*, as reported elsewhere (Yantasath *et al.* 1988).

This study shows that *Sinoxylon* spp. and the leucaena psyllid are serious insect pests of the multipurpose tree species in Ratchaburi province. *Sinoxylon* specie caused serious damage to *A. auriculiformis* and both species of *Leucaena*. Sanitation is recommended to prevent the build up of the beetle population (Hutacharern 1987). The *Sinoxylon* infestation usually occurred at times of low rainfall or long drought period. Therefore, selection of site for planting the affected tree species needs careful consideration.

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A NOTE ON PLANTING BAMBOO SPECIES OF THE TEMPERATE ZONE INTO MALAYSIA

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In mid-1986, a temperate zone monopodial bamboo genus, *Phyllostachys* was introduced into Malaysia from the Bamboo Garden in Nanjing Forestry University, People's Republic of China. Species introduced were *P. glauca, P. nigrahexonis, P. pubescens,* and *P. viridis.*

The planting material was brought in as rhizome-offsets and planted in plastic containers for a year before transplanting in the field in Bukit Fraser and Genting Highlands, in the state of Pahang. 150 *g* of Christmas Island Rock Phosphate (CRIP) and 1.5 *kg* of organic fertilizer were applied in the 30 × 30 × 30 *cm* planting holes. Altogether, four clumps of *P. pubescens,* two clumps each of *P. glauca, P. nigrahexonis* and *P. viridis* were planted in Bukit Fraser. In Genting Highlands, two clumps each of *P. glauca* and *P. nigrahexonis* and one clump of *P. viridis* were planted. Both sites are 1000 *m* above sea level and their mean annual rainfall, relative humidity and temperature are identical at 2432 *mm*, 87% and 19°C. At Nanjing Forestry University where the bamboo originated, the temperature is much colder, with an annual mean temperature of 15°C, mean annual rainfall of 1038 *mm* and a relative humidity of 80%.

The growth rates of the bamboo species in Malaysia are as shown in Table 1. *P. glauca* grew best, producing an average number of 12 sprouts, with a mean height of 171.8 *cm* 24 months after transplanting. Although *P. nigrahexonis* and *P. viridis* produced seven to ten sprouts each, growth was slow and stunted. *P. pubescens* produced the lowest number of sprouts.

For comparison, the growth rates of local bamboo species that are on trial are shown in Table 2. At 24 months, the average number of sprouts for the local bamboos was similar to that of the temperate region. However, mean height growth by the local bamboos was generally superior, ranging from 175 - 450 *cm*. Only *P. glauca* of the temperate region showed good sprout production as well as height growth. At this early stage, therefore, this species appears good for cultivation in parts of Malaysia.