

## TREE IMPROVEMENT IN MALAYSIA<sup>1</sup>

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Malaysia has no indigenous, long-fibred species which can be managed economically. My FAO assignment was to make recommendations regarding species to plans to supply a proposed pulp and paper industry.

Fortunately for me the Forestry Department had been establishing small species provenance trials since 1951. I obtained seed and established more extensive trials for future decisions, but my recommendations were based largely on trials 10-15 years old.

Operating on the "one picture is worth 1,000 words" concept, I have slides showing four of the many species which have been tried in Malaysia. Only two species appear to me to have value as future sources of pulpwood.

This Pinus merkusii plantation in Malaysia was 15 years old. The seed came from the Atjeh area in nearby northern Sumatra, about 150-200 km to the west across the Malacca Straits. The plus tree in front had super growth and at least average form in this plot. Six months later termites feasted on the cambium. Then birds stripped the outer bark to get the termites.

In Atjeh, Sumatra cones were being collected by limbing or felling trees. Many of the trees had poor form like this. All of the Pinus merkusii plantations which I saw indicated a high rate of inheritance of sinuous stems. But in Atjeh there are many well-formed, fast growing trees. This truly plus tree has bark typical of the Atjeh strain-thick and dark.

This is a typical Tapanuli-strain, plus tree. The bark is thin and gray. If you leave the roads, you can find many plus trees in Sumatra, but after three visits totaling about six weeks, I had collected only a few grams of filled seed. The problem is illustrated here. On any day a single large branch may yield a similar harvest: cone buds with tight scales; receptive conelets; aborted conelets; conelets which closed a short time ago; conelets which were pollinated 2 to 12 months ago; and open cones. If all the branches on a large tree are cut, perhaps 20 to 100 mature cones may be collected with 0 to 10 filled seeds per cone. Occasionally climatic conditions may favor a collectable crop of cones, but I suspect this occurs only once every several years.

Before leaving Sumatra, let's look at a picture of Lake Toba, a delightful lake in a volcanic crater at 900 m. Poinsettias grow wild. Rice paddies, too, are beautiful all year, blending from green to gold. Some paddies on the hillsides are engineering marvels.

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Back in Malaysia, Pinus caribaea var. hondurensis seems to be the most promising species now. Seed from Potosi, Honduras was used to start this trial. The plus tree in the center was 23.6 m. tall and 35 cm. in diameter at 11 years. It grew 5 cm. in diameter in the next two years, then the termites moved in.

This tree, a neighbor of the first plus tree which you can see at the right, was 3 m. taller, 2 cm. larger at 11 years. However, it had foxtailed for about 3 m. during two of its last three years, so it is not desirable as a plus tree. At 13 years the two trees were the same diameter: 40 cm. Possibly the foxtailing fling resulted in decreased diameter increment.

Uniform internodal growth is a characteristic of plus Pinus caribaea trees in Malaysia. Distance between nodes is usually less than 45 cm. Three to four nodes per year are not unusual.

A close-up of a plus tree at breast height shows typical Pinus caribaea bark formation.

A recently transplanted graft made on a potted root stock appears healthy. After a year most of the grafts were 1.5 to 2 m. taller and looked vigorous.

We walked a footlog for over a year to get to our air conditioned office. This structure diverted most of the rain during a cloud burst. The temperature here never goes below 20°C (68°F). Pinus caribaea in Malaysia often develops foxtails like this. This is still Malaysia, not Disneyland.

Sometimes this foxtailing growth continues for five or six years and nine to ten meters, then normal growth may resume. The inverted pendulum effect causes compression wood and tree tops often break out. Sometimes one tree can continue to grow normally when all about it have gone berserk. At low elevations, where the climate fluctuates between 20°-35°C (68°-95°F) day after day, foxtailing seems more common than at 500 to 1,500 m.

Kozlowski had a report on Malaysian foxtailing in *Unasylva*, the FAO publication in 1970.

Pinus oocarpa from Central America at six years. This plot is across the highway from the Pinus caribaea plus trees you have seen. The form is better, but the growth rate of Pinus oocarpa is less.

In a nearby plantation, a two-year-old Pinus oocarpa has been claimed by termites.

Pinus elliottii var. densa from Florida was almost smothered by vines before they were removed so I could take this picture. The trees four years old, still growing like foxtails.

Many other species have also proved they were not adapted to the lush, tropical Malaysian environment. In view of the costs of clearing, planting, repeated removal of competing vegetation, control of termites, possible soil degradation, etc., is it possible and economical to grow pines on a large scale in Malaysia? I am confident that pine, like rubber or oil palm, can be mass produced in the tropics. If all the values of a new pulp and paper industry are considered, conifer plantation forestry will probably have a net positive value to the country.