

## *Pinus merkusii* Jungh et de Vriese

**Family:** Pinaceae

**Vernacular names:** Merkus pine, Mindoro pine, Tenasserim pine (English), Damar Batu, Damar Bunga, Uyam (Indonesia), Tapulau (Philippines), Son Song Bai, Son Haang Maa, Kai Plueak Dam (Thailand), Thong nhua, Thong hai la (Vietnam).

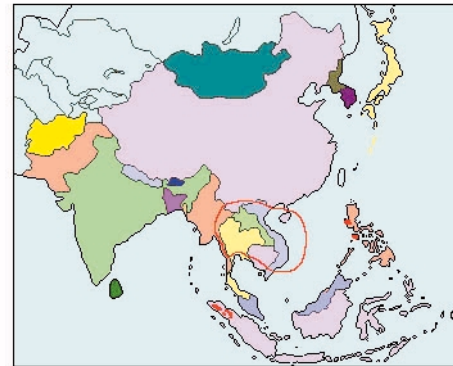
**Description:** A medium to large-sized tree species, commonly reaches a height of 30-35 m and diameter of 60-80 cm. Exceptional trees may reach 45 m in height and 140 cm in diameter. Trunk straight and cylindrical, very resinous. Bark thick, reddish-brown, splitting deeply longitudinally. Leaves dark-green, 15-25 cm long, with typical fascicles of two needles. Cones mature after two years. Scales of the first year cones spineless. The second year cones cylindrical or long ovate with pedicel about 1 cm long. Scale-surface rhomboid, margin sharp. Seeds ovate, slightly flat, bearing a thin wing, 1.5-2 cm.



Fruits and needles of *P. merkusii*.

**Natural distribution and ecology:** *P. merkusii* is one of the few truly tropical pine species of the world, occurring naturally in South-east Asia: Myanmar, Thailand, Laos, Vietnam, Cambodia, Indonesia (Sumatra) and the Philippines (Luzon and Mindoro islands). The latitudinal range is approximately from 23 0N to 2 0S. The species is found also in China (Hainan island) but it is thought to have been introduced there. The species has a discontinuous distribution. The biggest areas of *P. merkusii* forest can be found in northwestern Thailand, southeastern Myanmar and northern Sumatra.

*P. merkusii* has a large altitudinal range from 30 m to over 1800 m above sea level. It is found on a diversity of soil types and under different climates that vary from markedly seasonal (up to six dry months) in dry monsoon climates to humid tropics. Mean annual rainfall varies from 3800 mm in Zambales in the Philippines to only 1000-1200 mm in some areas of continental Asia. Mean annual temperature varies from 19 0C to 28 0C.



Distribution restricted to Southeast Asia

The species is light-demanding, heat and drought tolerant, growing well on sandy and red soils. The continental provenances are well adapted to withstand fire in a seasonal climate. Natural regeneration is good, especially in open areas. *P. merkusii* is flowering in May – June, while fruits mature in October – November of the following year.

**Uses:** Sapwood and heartwood distinctive. Sapwood is yellowish and heartwood reddish-brown. Wood heavy, wood density varies between 0.64 and 0.80 g/cm<sup>3</sup>. They are used in construction, match making, pulp and paper, common furniture, pit props, electricity poles, ships and vehicle-building. The species gives high content of resin. Resin can be extracted from 15-year-old trees and each tree gives 4-6.5 kg of resin per year for 40-50 years. The resin is used in medicine, paints, printing and perfume industries.

Large areas of *P. merkusii* plantations have been established in Indonesia, Thailand and Vietnam. In the late 1980s, there were more than 100 000 ha of plantations of the Sumatran provenance established mainly in Java and almost 1000 ha in Zambia. By the end of 1999, Vietnam established 218 056 ha of plantations of pine species including *P. merkusii*, *P. massoniana* and *P. kesiya* of which about 100 000 ha is *P. merkusii*. The species is a very important tree species for planting on bare hills, mainly in northern and central Vietnam to prevent soil erosion, extract resin and supply timber. Young trees grow slowly during the first 5 years, later they grow much faster.

**Genetic diversity and conservation status:** Due to its wide and disjunct distribution, the species shows differences in growth and other characteristics. There are two separate provenances called Sumatran (island) and continental provenances. The two provenances show differences in seed weight, presence (continental provenance) or absence (island provenance) of grass-stage in the seedlings, nodal habit, needle and cone dimensions, wood density patterns, oleoresin constituents, tree size and bole form, and natural habitat (Cooling, 1968).

The standard seed source areas for *P. merkusii* are Sumatra and Thailand. Seedlings raised from Sumatran seeds often miss the “grass stage” and show better growth

in plantation, therefore the sources of genetically superior *P. merkusii* seed in Sumatra should be protected. Natural stands and good plantations of *P. merkusii* in Cambodia, the Philippines, Thailand and Vietnam should be earmarked for seed collection and gene conservation.

In Cambodia, Indonesia, Laos, Philippines and Thailand, *P. merkusii* is a threatened tree species which can be found in the list of priority species for conservation (Koskela *et al.*, 2002). *P. merkusii* seed stands, seed orchards as well as ex situ conservation stands have been established in Indonesia, Thailand and Vietnam. In Aceh (Indonesia), *in situ* conservation for *P. merkusii* was made in 1993 by designating 20 natural 20 ha stands as conservation stands, each contains at least 1000 individuals. *Ex situ* conservation has also been carried out by collecting seeds from natural populations in Aceh and establishing breeding populations and conservation stands in Java. In Vietnam, 710 ha of plantations of *P. merkusii* has been marked for seed sources and conservation.

**Research on genetic conservation and breeding:** Most of the research work has been done for planting techniques and breeding of *P. merkusii*. Genetic conservation is integrated within breeding work.

A nine-year-old trial (including 8 Thai and 6 non-Thai provenances) established in Thailand showed that two provenances from eastern Thailand (Sangkha and Huey Ta) exhibited the best growth and stem form, then followed by the Papua New Guinea landrace of Sumatran origin (second in growth but poorest form), then followed by two provenances from Mindoro and Zambian landrace of Vietnamese origin. The other provenances from Thailand and the Philippines gave the slowest growth (Hubertz and Winai Sirikul, 1983).

Similar results were obtained in trials in Tanzania (Madoffe *et al.*, 1984). At 10 years of age, a landrace of Sumatran origin had best growth but poorest stem form, while eastern Thailand provenance (Surin) was the second one. The trial established in Zambia (Mubita, 1984) showed that a local landrace of Myanmar origin showed the fastest height growth, followed by two eastern Thailand provenances, then Java plantation provenance.

Considerable efforts also exist for breeding of the species for growth. Seed orchards have been established in Zambia (26.9 ha) between 1963 and 1968 (Mubita, 1984), Thailand (Granhof, 1983), Papua New Guinea between 1967 and 1976 (Howcroft, 1978), Indonesia (36 ha clonal and 288 ha seedling seed orchards) in 1985 (Hendi Suhaendi, 1985). In 1990s, the Forest Science Institute of Vietnam also tried to select high resin yielding plus trees and established clonal seed orchards for resin.

The trials of provenance hybrids of *P. merkusii* in Thailand showed that hybrids of Thailand and Papua New Guinea provenances had better survival and length-growth than local provenances.

**Agencies active in genetic conservation and/or research of the species:** At least three agencies within the Indonesian Ministry of Forestry deal with forest genetic resources: the Directorate General for Forest Protection and Nature Conservation, the Directorate of Forest Tree Seed and the Centre for Forest Biotechnology and Tree Improvement. In the Philippines, the Department of Environment and Natural Resources (DENR) and the Ecosystems Research and Development Bureau (ERDB) are active in this area. The others include the Royal Forest Department in Thailand, the Forest Science Institute of Vietnam and the Vietnam Central Forest Seed Company.

## References

- Cooling, E.N.G.** 1968. *Pinus merkusii*. Fast Growing Timber Trees of the Lowland Tropics No. 4, Commonw. For. Inst. Oxford.
- Granhof, J.** 1983. Progress and Strategy for the Early Improvement of 4 Major Pine Species. *In: Thai-Danish Pine Project 1969-1979, Vol. 1: Review of Research and Applied Techniques, F12-F19.* Royal Forest Dept., Bangkok and DANIDA, Copenhagen.
- Hendi Suhaendi** 1985. Management for Production of Improved Seed in Indonesia. *In: Appendix to the Report of the ASEAN-Australia Workshop on Forest Tree Improvement, Bangkok, Thailand, August 1985.*
- Howcroft, N.H.S.** 1978. Progress in a Preliminary Tree Improvement and Seed Production Programme with *Pinus merkusii* Jungh et de Vries in Papua New Guinea. Pp. 699-706 *in Progress and Problems of Genetic Improvement of Tropical Forest Trees. Proceedings of Joint IUFRO Workshop, Brisbane, Australia, April 1977.* (Nikles *et al.*, eds.), .
- Hubertz, H. & Winai Sirikul** 1983. Growth and Variation in *Pinus merkusii* Jungh et de Vries at high Elevation in northern Thailand. *In: Thai-Danish Pine Project 1969-1979, Vol. 1: Review of Research and Applied Techniques, F12-F19.* Royal Forest Dept., Bangkok and DANIDA, Copenhagen.
- Koskela, J., S. Appanah, A.P. Pedersen & M.D. Markopoulos (eds.)**. 2002. Proceedings of the Southeast Asian Moving Workshop on Conservation, Management and Utilization of Forest Genetic Resources. FORSPA, Bangkok, June 2002.
- Madoffe, S., J.A. Mushi & S.C. Mathias.** 1984. Performance of Five *Pinus merkusii* Jungh et de Vries Provenances at Buhindi, Mwanza, Tanzania. Pp.335-340 *in Provenance and Genetic Improvement Strategies in Tropical Forest Trees* (Barnes and Gibson, eds.). Proc. Jt. Conference of IUFRO Working Parties, Mutate, Zimbabwe 9-14 April 1984.
- Mubita, A.C.** 1984. *Pinus merkusii* Jungh et de Vries Provenance Trial in Zambia. Pp.371-379 *in: Provenance and Genetic Improvement Strategies in Tropical Forest Trees* (Barnes and Gibson, eds.). Proc. Jt. Conference of IUFRO Working Parties, Mutate, Zimbabwe 9-14 April 1984.
- Reungchai Pousujja, J. Granhof & R.L. Willan** 1986. *Pinus merkusii* Jungh et de Vries. DANIDA Forest Seed Centre. 26pp.

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