Pinus merkusii

Junghuhn & de Vriese

Pinaceae

Merkus pine

LOCAL NAMES

Burmese (tinyuben); English (tusam,Tenasserim pine,Sumatran pine,Mindoro pine,Merkus pine); Filipino (tapulau); Indonesian (damar bunga,damar batu); Thai (son-songbai,son-haang-maa (central),kai-plueak-dam); Trade name (Merkus pine); Vietnamese (th[oo]ng nh[uwj]a,th[oo]ng hai l[as])

BOTANIC DESCRIPTION

Pinus merkusii is a large tree up to 50(-70) m tall with a straight and cylindrical bole free of branches for 15-25 m and an average diameter of 55 cm, but occasionally up to 140 cm, thick bark which forms plates and is grey-brown underneath, but scaly and more reddish tinged upwards, and heavy horizontal or ascending branches.

Needles in pairs, slender but rigid, 16-25 cm long, with persistent basal sheaths.

Cones solitary or in pairs, almost sessile, cylindrical, 5-11 cm long, after opening twice as thick and ovoid, generally falling off soon; apophysis broadly tetragonal with a smooth, almost depressed umbo.

Seed small with a deciduous wing of c. 2.5 cm long.

The normal architecture of pines is Rauh's model. The trunk is monopodial and grows rhythmically, and develops tiers of branches; the formation of cones does not affect shoot construction. Sometimes ""foxtails"" occur, plants without branching and without growth rings in the wood.

Merkus pines of the Asian mainland and the Philippines differ slightly from those of Sumatra: the seedlings have a ""grass stage"", the needles are slightly longer, the cones are less cylindrical, and the seeds nearly twice as heavy.

In Sumatra three different strains of P. merkusii have been recognized (the Aceh, Tapanuli and Kerinci strains) which differ markedly in e.g. stem form, branching, bark, resin content and susceptibility to attack by the moth Milionia basalis.

BIOLOGY

In plantations, trees of P. merkusii reach sexual maturity when about 20 years old. They bear cones every year, although seed production varies. In Sumatra ripe seeds are produced most abundantly between July and November, but viable seeds are produced throughout the year.

ECOLOGY
It is the southernmost occurring pine of all pines, and the only one whose natural distribution extends into the southern hemishpere.

The naturally occurring pines of South-East Asia (P. kesiya and P. merkusii) inhabit a wide range of forest and savanna habitats. They are pioneers and their natural range is extended by colonization following disturbances such as fire. They grow, for instance, scattered in fire-prone grassland and woodland. The trees are increasing in number in recently disturbed areas. They are strongly light-demanding and habitually grow in pure stands. Pines grow naturally in South-East Asia only in strongly seasonal environments.

BIOPHYSICAL LIMITS
Altitude: Up to 2000 m
Mean annual rainfall: 1000-2800(-3500) mm
Mean annual temperature: 21-28 deg.C
Mean maximum temperature of the hottest month: 24-32 deg. C
Mean minimum temperature of the coldest month: 18-24 deg. C.

DOCUMENTED SPECIES DISTRIBUTION

Native: China, Indonesia, Myanmar, Philippines, Thailand
Exotic:

The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Gum or resin: Good quality oleoresin is collected from this species, often on plantation scale.

Fuel: The energy value of the wood is 20 300-23 200 kJ/kg.

Timber: Merkus pine is a general-purpose timber; it can also be used for construction work, flooring and boat building as it is fairly durable and heavy.

Medicine: Ethyl alcohol extracts of P. merkusii showed anti-cancer activity in tests in the Philippines.

SERVICES
Intercropping: In Indonesia P. merkusii has been successfully intercropped with Irish potatoes.

Shade or shelter: The tree is used to shade out alang-alang grass with fairly good results.

TREE MANAGEMENT
Husbandry: In plantations of P. merkusii the first thinning is usually carried out in the 9th or 10th year, and about every 5 years thereafter. Rotation cycles of 30 years are needed for optimal timber production and have been stipulated by the Indonesian forestry administration. For the production of pulpwood, a cutting cycle of 15 years is usually practised. Mycorrhizae are required for successful growth and allow seedlings to survive in more adverse sites.

P. merkusii and P. kesiya require more weeding than P. caribaea and P. oocarpa. The prolonged ""grass stage"" often present in young trees of P. merkusii means increased weeding requirements when compared to P. caribaea, P. oocarpa and P. kesiya.

: For an average site quality (4) the mean annual increment of P. merkusii is 22.4 m¦/ha in a 25-year rotation, but it may reach 30 m¦/ha for better site quality (6) in a 20-year rotation. In Sumatra 30-year-old stands of P. merkusii trees (with an average diameter of 58.5 cm) may have a standing volume of 397 m¦/ha with a total yield of 814 m¦/ha. The yield of resin from P. merkusii is 420-750 kg/ha.

GERMPLASM MANAGEMENT
The seeds can be stored for several years, provided they are kept dry, cold and in an airtight container. However, seeds of P. merkusii are reported to have a rather short viability; seeds from Sumatra can be stored dry for only 1-2 years, and those from continental Asia during even shorter periods. The weight of 1000 seeds of Sumatran P. merkusii about 17 g, and of continental provenances of P. merkusii 25-33 g.

PESTS AND DISEASES

FURTHER READNG

Andrew IA, Burley J, 1972. Variation of wood quality of Pinus merkusii Jungh. and de Vriese: five trees 16-18 years old in Zambia. Rhodesian Journal of Agricultural Research. 10(2):183-202.

Berger TJ, Lysholm G, 1978. Nineteen provenance trials with four pine species, Uganda. Lysholm, G.-Project-leader:-EAC-NORAD-Lowland-Afforestation-Project,-1973-1975, Technical Report No. 15, 67 pp.

Booth TH, Jovanovic T, 2000. Improving descriptions of climatic requirements in the CABI Forestry Compendium. A report for the Australian Centre for International Agricultural Research. CSIRO - Forestry and Forest Products, Client Report No. 758.

Brandis D. 1978. Indian trees: An account of trees, shrubs, woody climbers, bamboos and palms indigenous or commonly cultivated in the British India empire. London. 767pp.

Burkill IH. 1966. A dictionary of the economic products of the Malay Peninsula. Revised reprint. 2 volumes. Ministry of Agriculture and Co-operatives, Kuala Lumpur, Malaysia. Vol. 1 (A-H) pp. 1-1240. Vol. 2 (I-Z) pp. 1241-2444.

Chadnoff, M. 1984. tropical timbers of the world. Agricultural Handbook 607. USDA Forest Service, Washington, D.C. 464 pp.

Changtragoon S, Finkeldey R, 1995. Patterns of genetic variation and characterization of the mating system of Pinus merkusii in Thailand. Forest Genetics. 2(2):87-97.

Cooling, ENG. 1968. Pinus merkusii. Fast growing timber trees of the lowland tropics No 4. Commonwealth Forestry Institute, Department of Forestry, University of Oxford. 169 pp.

Suhardi, Sosef MSM, Laming, PB. & Ilic, J.1994. Pinus L. In Lemmens, R.H.M.J. & Soerianegara, I. (Eds.): Plant Resources of South-East Asia No 5(1). Timber trees: Major commercial timbers. Prosea Foundation, Bogor, Indonesia. pp 349-357.

SUGGESTED CITATION

Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestree Database:a tree reference and selection guide version 4.0 (http://www.worldagroforestry.org/af/treedb/)