SEED LEAFLET

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Pinus merkusii Jungh. et de Vriese

Taxonomy and nomenclature

Family: Pinaceae

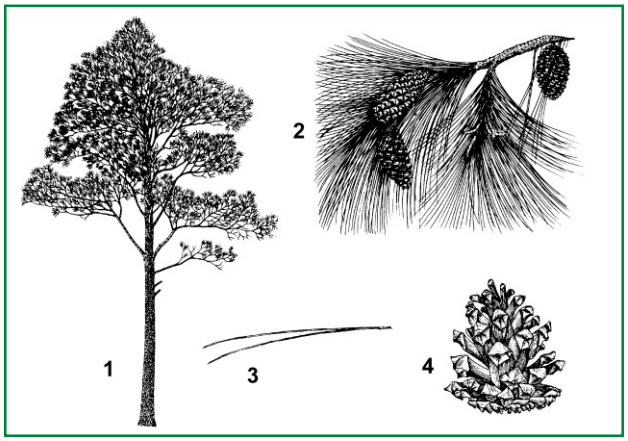
Synonyms: *Pinus sumatrana* Jungh.; *P. finlaysoniana* Wallich; *P. latteri* Mason; *P. merkiana* Gordon

Vernacular/common names: tusam (Indonesia); uyam (Aceh), son song bai (Thai); merkus pine (trade name); Mindoro pine (Philippines), tenasserim pine (English)

Distribution and habitat

P. merkusii is the only pine that occurs naturally south of the equator. The area of natural distribution is South-East Asia in Burma, Thailand, Laos, Cambodia, Vietnam, Indonesia (Sumatra) and the Philippines (Luzon and Mindoro islands). It is found from 23°N to 2°S. On the island of Hainan (China) it is believed introduced.

It has a large altitudinal range from 30 to over 1800 m above sea level. It grows naturally on many different types of soil, and under varying climates. Mean annual rainfall varies from 3800 mm in the Philippines to only 1000 - 1200 mm in Thailand and Burma. In the natural stands in Sumatra no month receives less than 50 mm rainfall, i.e. no dry months. Mean annual temperature varies from 19°C to 28°C.



1, Tree habit; 2, twig with young female cone; 3, pair of needles; 4, cone. (Soerianegara and Lemmens, 1994).

Uses

The timber is a general-purpose softwood, useful for light construction and joinery. It can be used for pulp, matches and chop-sticks. The species is a high resin yielder and commercial tapping is often practised. Old trees can yield 30-60 kg of crude gum per year, producing 20-40 kg of pure resin and 7-14 kg of turpentine per year.

It is often used for rehabilitation of degraded areas because of its tolerance to fire and poor soil conditions.

Botanical description

A large tree with a straight and cylindrical bole. Mature trees normally reach a height of 30 m and a diameter of 60 - 80 cm. Old trees may reach 45 m in height and 140 cm in diameter. Young trees have a pyramidal or conical crown form, whereas old trees have a flatter and spreading crown.

The bark on the young tree is grey, later becoming dark and deeply fissured.

Needles in fascicles of 2, each needle 16-25 cm long. The species is monoecious with unisexual flowers. Male and female flowers may occur on the same shoot. Male flowers are borne in 2-4 cm long strobili, mainly in the lower part of the crown, female strobili are most frequent in the upper third of the crown, and usually at the tip of branches.

Fruit and seed description

Fruit: the cone is cylindrical, 5-10 cm long and 2-4 cm wide, up to 10 cm wide after opening.

Seed: the winged seeds are borne at the base of cone scales. Each cone scale can support two winged seeds. The wing varies from 22 to 30 mm in length by 5-8 mm in width. The wing is attached to the seed with 'hooks' connected to hygroscopic tissue in the base of the wing. The result is that the seed is firmly held while in a dry condition, favouring wind dispersal, but the wing is quickly released when moist conditions suitable for germination are encountered. There are normally 35-40 seeds per cone and 50,000-60,000 seeds per kilo.

Flowering and fruiting habit

Male and female flowers can be found throughout the year. The peak flowering period in Indonesia is from end of March to end of June. Pollination is by wind. The development of the cones takes 11-15 months. There is variation between trees in the stand and between stands. In Indonesia, the peak fruiting season is May-July. Seed is produced from age 10-15 and normally in large quantities. Under natural conditions, seeds are dispersed by wind.

Harvest

The optimal time of collection is reached when the majority of cones have changed colour from green to brownish and some have started to open. Maturity can be confirmed by a cutting test. The cut seed should have a white and solid endosperm filling the entire space of the seed. Seed collection is by climbing the trees and picking the cones. A special hook sharpened on both sides can be used for pulling or pushing off the cones. This will avoid breaking the twigs.

Processing and handling

The cones require after-ripening before seed extraction as immediate sun-drying of freshly collected cones sometimes causes 'case-hardening'. The outer tissues dry too quickly before the inner tissues can lose moisture, and the cone scales fail to open properly. The period of after-ripening varies with the state of maturity of the cones. Mature, brown cones should be stored in the shade and with good ventilation in gunny bags or on racks for at least one or two days. Cones which are green-brown or green should be after-ripened until the colour is fully brown. This normally requires 5-10 days.

Seed extraction is by drying the cones in the sun on trays or on canvas until they open. During sun-drying, the cones should be stirred to facilitate seed extraction from the cones.

The common practice of seed extraction by splitting the unripe cone with knife or cone-cutter is not recommended. Many of the extracted seeds will be immature and will be damaged during storage leading to poor germination rate.

To make further seed processing and sowing in the nursery easier, the wing should be removed from the seed. For small quantities of seed, dewinging can be done manually by rubbing the seed between the hands, or against a screen or roughened surface, or by rubbing in a cloth bag. Spraying the seed with water will facilitate the dewinging process.

For large quantities of seed, mechanical dewinging may be used. The seed with wings is given 10 - 15 minutes dry dewinging (no water) in a concrete mixer. This will loosen many wing parts. Then 5 - 10 % water is added gradually by spraying and the seed rotated for approx. 15 minutes. Then the seed is cleaned and dried.

Storage and viability

The seed is classified as orthodox, and can be stored at moisture content 6 - 8% (fresh weight basis) and temperature 3 - 4°C (dry cold storage) for at least 5 years without major decrease in germination percentage. If seed is well dried (MC 6 - 8 %) and kept in an airtight container or plastic bag, the seed can be stored at room temperature (20 - 30°C) for at least one year without loss in viability.

Dormancy and pretreatment

The seed has no dormancy and no special treatment is needed to initiate germination. Soaking the seed in cold water for 24 hours before sowing is recommended to obtain even and fast germination.

Sowing and germination

Germination starts 7 days after sowing and often reaches 80% after 12-15 days. Seed can be sown directly in containers (1-2 seeds per container) or alternatively in sowing bed with later transfer to containers when the seedling is 3-4 cm tall. Mycorrhiza is required. The growth medium should be a mixture of sand and topsoil from a pine stand in the ratio 3:1. The growth of the seedling takes 9-10 months, i.e. rather slow compared to many other tropical species.

Selected readings

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Soerianegara, I. and R.H.M.J. Lemmens (eds). 1994. *Timber Trees: Major Commercial Timbers*. Plant Resources of South-East Asia No. 5 (1). PROSEA. Bogor, Indonesia.

Natural stand of *Pinus merkusii*, Lake Toba, N. Sumatra. Photo: Henrik Keiding, DFSC.

THIS NOTE WAS PREPARED IN COLLABORATION WITH INDONESIA FOREST SEED PROJECT

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