

Pinus kesiya

khasi pine

Royle ex Gordon

Pinaceae

LOCAL NAMES

Burmese (tinyu); English (khasya pine, benguet pine, khasi pine); Filipino (khasya pine, tapulao); French (pin a trois feuilles); Hindi (saral, far, ding-se, dingsa, dieng-kysi); Lao (Sino-Tibetan) (mai hing); Thai (chuang); Trade name (khasi pine); Vietnamese (x[af] nu)

BOTANIC DESCRIPTION

Pinus kesiya is a large tree up to 45 m tall with a bole free of branches for 15-20 m and up to 100 cm in diameter, a thick, reticulately and deeply fissured bark, and often pruinose branchlets with a waxy bloom.

Needles in bundles of (2-)3(-4), very slender and flexible, (10-)12-21(-25) cm long, bright grass green.

Mature cones up to 3 together, pendulous, ovoid to ovoid-conical, (4-)5-8(-10) cm long, sessile or on a short stalk up to 10 mm long; apophysis beaked or flattened with a short, blunt, deciduous umbo.

Seed small with a short, 1.5-2.5 cm long wing.

The union of *P. khasya* and *P. insularis* into *P. kesiya* has been argued, because of their different field characteristics and products, and some authors contend that *P. kesiya* has not been properly described.

BIOLOGY

In Sumatra ripe seeds are produced most abundantly between July and November, but viable seeds are produced throughout the year.



Woman tapping resin. (William M. Ciesla, Forest Health Management International, www.forestryimages.org)



Stand in Vietnam. (William M. Ciesla, Forest Health Management International, www.forestryimages.org)

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ECOLOGY

Benguet pine is locally common in northern Luzon, often occurring in open pure stands on steep slopes at elevations of 300-2700 m. 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: 300-2700 m

Mean annual rainfall: 700-1800 mm and a pronounced dry season

Mean annual temperature: 17-22 deg. C

DOCUMENTED SPECIES DISTRIBUTION

Native: Cambodia, China, India, Laos, Myanmar, Philippines, Thailand, Vietnam

Exotic: Malaysia, Papua New Guinea



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.

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PRODUCTS

Fibre: It is used for the manufacture of particle board and pulp, but its usefulness depends on the quality of the wood.

Timber: Timber of *P. kesiya* from the Philippines and Burma has an average density of 560 kg/m cubic at 12% moisture content. The timber of *P. kesiya* is easy to cut into smooth, tight veneer of uniform thickness at a cutting temperature of 50-70 deg. C. During drying the veneer shows slight to moderate shrinkage and warping, and is usually split-free. To obtain an acceptable quality of veneer it is often necessary to patch or fill imperfections in the wood due to the presence of knots and localized raised grain, and then to sand the surface. Benguet pine is a general purpose timber.

Gum or resin: Oleoresin of good quality is tapped from the trees. Several methods of harvesting the resin are practised. The resin is found in the intercellular canals in the wood (especially sapwood) and products are often termed "naval stores" because of their historic use for ship caulking. Living pine trees are tapped (wounded), the first cut of about 1.3 cm wide and 30 cm long being made 30-40 cm from the ground, followed by a series of chippings until breast height.

SERVICES

Other services: Another viable agroforestry system in the Philippines is raising goats in forest of *P. kesiya* at a stocking rate of 4 goats/ha.

TREE MANAGEMENT

Seedlings of *P. kesiya* may already be suitable for transplanting after 4-6 months. Field planting is carried out at spacings of 4 m x 4 m (for resin production) or 3 m x 1-2 m (for timber production). In the Philippines Benguet pine is recommended as a shade tree for coffee plantations. It is planted at a spacing of 3 m x 3 m, and after 5-7 years, when the pines have reached a height of at least 4 m, young coffee is planted.

Husbandry: Weeding is necessary for about 3 years until the canopies of the growing pine and coffee have completely overtopped the grasses. *P. kesiya* require more weeding than *P. caribaea* and *P. oocarpa*. In Thailand weeding in *P. kesiya* plantations is carried out 4 times a year. 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*. *P. kesiya* is the preferred species for reforestation on highland sites in Thailand.

In early stages of growth, trees of *P. kesiya* are prone to fire damage. The annual growth rate of Benguet pine (*P. kesiya*) in the Philippines is 0.8-1.9 cm in diameter and 54-142 cm in height.

Trees of *P. kesiya* are sometimes commercially tapped for resin prior to harvesting of the main product, which is timber. Trees in the Philippines older than 20 years yield an average of 1800-2450 g of resin per tree.

GERMPLASM MANAGEMENT

The seeds can be stored for several years, provided they are kept dry, cold and in an airtight container. The weight of 1000 seeds of *P. kesiya* is 16-18 g.

PESTS AND DISEASES

Pests: In the Philippines bark beetles (*Ips calligraphus*) may cause problems in plantations of *P. kesiya*, and pine shoot moths (*Diorctria rubella*) in stands of *P. kesiya*. Pine shoot moth is effectively controlled by using the insecticides fenitrothion (0.1%) and fenvalerate (0.2%). The main pests in northern Sumatra are members of the Psychid and Geometrid families (e.g. *Milionia basalis*), shoot- and stem-boring Pyralids, and local squirrels.

FURTHER READNG

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SUGGESTED CITATION

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