

kai, biar

LOCAL NAMES

English (Himalayan white pine, Butan pine, blue pine); French (pin pleureur de l'Himalaya, pin du Bhoutan, pin de l'Himalaya); German (Tranenkiefer); Hindi (kail, biar); Trade name (kai, biar)

BOTANIC DESCRIPTION

Pinus wallichiana is a tree to 50 m tall with straight trunk and short, down-curved branches. Branches longer in solitary trees, creating a dome-like crown. Bark on young trees smooth, becoming fissured with age. Branches in regularly spaced whorls, smooth. Young shoots glaucous, later turning pale grey-green, smooth, ribbed, darkening with age. Winter buds grey with an orange tinge, ovoid-conic, pointed.

Leaves in fascicles of 5, basal sheaths deciduous, 15-20 cm long, often curved at the base, slender, flexible, abaxial side green, adaxial side with multiple bluish-white stomatal lines; usually pendant but in some trees spreading.

The male strobili are on lower branches, often in dense clusters on younger twigs. Female cones in groups of 1-6, 20-30 cm long, erect when young but later pendant, bluish-green when young, maturing to light brown with pale brown apophyses. Cone scales wedge-shaped, wide near the apex, apophysis grooved, ending in a blunt umbo; basal scales usually not, or only slightly, reflexed, very resinous.

BIOLOGY

Seeds production begins at 15-20 years. The trees are strongly out-breeding and self-fertilized seed usually grows poorly. Cones open and shed their seed whilst still on the tree. Leaf secretions inhibit the germination of seeds, thereby reducing the amount of plants that can grow under the trees.

New leaves appear in March or early April, according to location, and reach full size by August-September. The needles are shed between June and August. Male flowers appear on the lower branches of the trees in April and May at different altitudes before the emergence of the female cone and shed pollen by June.

Cones ripen from early September to November in most locations in its native range. The period between the first appearance of female flowers and the ripening of cones is about 16-18 months

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ECOLOGY

In Nepal it is found between 1800-3600 m, very occasionally to 4400 m. Often it is found mixed with *P.roxburghii*. Very characteristic of abandoned fields and grazing land, it extends as far as Afghanistan in the west and Bhutan in the east from Nepal. It is a strong light demander, tending to be invasive under favourable conditions.

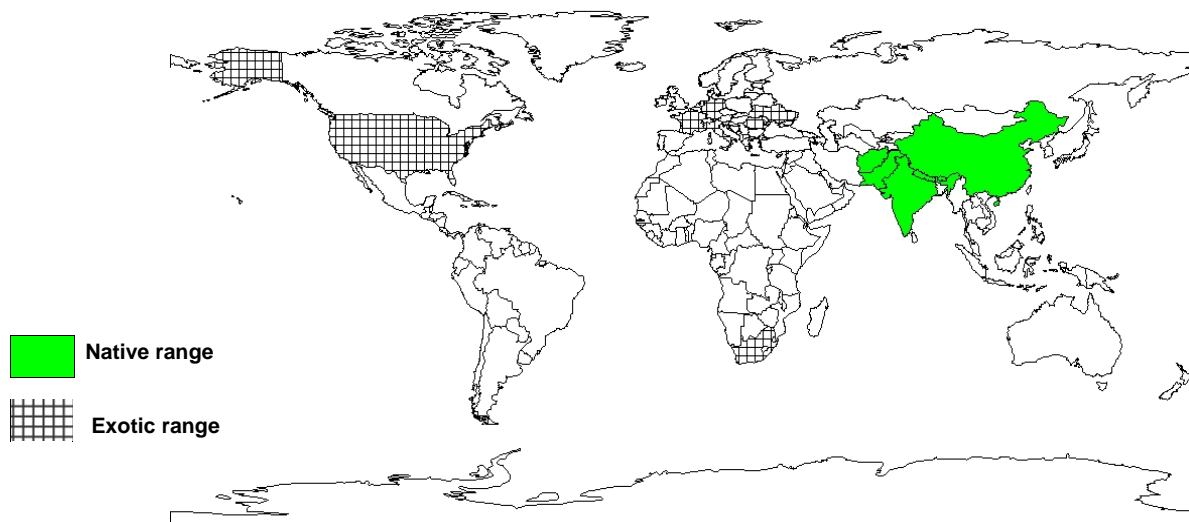
BIOPHYSICAL LIMITS

Altitude range: 1500 - 3600 m
Mean annual rainfall: 250 - 2000 mm
Rainfall regime: summer; winter; bimodal
Mean annual temperature: 12 - 17°C

Soil type: It prefers well-drained, porous soils, and can grow on limestone, provided the soil above the rock is deep enough.

DOCUMENTED SPECIES DISTRIBUTION

Native: Afghanistan, Bhutan, China, India, Myanmar, Nepal, Pakistan
Exotic: France, Germany, Italy, Romania, South Africa, Ukraine, US, Yugoslavia (Former)



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

Food: Seed has a very resinous flavour and so is not much relished, honeydew from the aphid-infested leaves is eaten as a manna. There are reports that a manna-like substance that exudes from the leaves and twigs is eaten or used like honey. A vanillin flavouring is obtained as a by-product of other resins that are released from the pulpwood.

Medicine: The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge. It is a valuable remedy used internally in the treatment of kidney and bladder complaints and is used both internally and as a rub and steam bath in the treatment of rheumatic affections. It is also very beneficial to the respiratory system and so is useful in treating diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and tuberculosis. Externally it is a very beneficial treatment for a variety of skin complaints, wounds, sores, burns, boils etc and is used in the form of liniment plasters, poultices, herbal steam baths and inhalers. The wood is diaphoretic and stimulant. It is useful in treating burning of the body, cough, fainting and ulcers.

Gums and resins: This tree is a commercial source of turpentine and tar. It is said to be superior to *P. roxburghii* but not produced so freely. Oleo-resins are present in the tissues of all species of pines, but these are often not present in sufficient quantity to make their extraction economically worthwhile. The resins are obtained by tapping the trunk, or by destructive distillation of the wood. In general, trees from warmer areas of distribution give the higher yields. Turpentine consists of an average of 20% of the oleo-resin and is separated by distillation. Turpentine has a wide range of uses including as a solvent for waxes etc, for making varnish, medicinal etc. Rosin is the substance left after turpentine is removed. This is used by violinists on their bows and also in making sealing wax, varnish etc. Pitch can also be obtained from the resin and is used for waterproofing, as a wood preservative etc.

Tannins or Dyestuffs: A tan or green dye is obtained from the needles

Fuelwood: The wood is a good firewood but it gives off a pungent resinous smoke. The wood is rich in resin and can be splintered and used as a torch.

Timber: It is a well-known and extensively used joinery wood in India, Nepal, Bhutan and Pakistan. The timber is used for construction, in joinery, house fittings, light furniture, packing cases, lamin-boards, flush doors, plane tables and railway sleepers after treatment. The wood is durable under cover but is non-durable in exposed conditions. It is easy to treat with preservatives and can be seasoned well both in air and kilns.

Other products: The leaves are used as a stuffing for pillows etc. The needles contain a substance called terpene, this is released when rain washes over the needles and it has a negative effect on the germination of some plants, including wheat.

SERVICES

Intercropping: *P. wallichiana* is a multiple purpose species. It has been recommended for agroforestry and wasteland planting. It provides protection to the steep slopes in the Himalayan mountains on which it grows extensively.

TREE MANAGEMENT

A very hardy but relatively short-lived tree in cultivation, the seedlings are frost-hardy. It is considerably less fire-resistant, but young trees scorched by the fire will sometimes shoot from the base. Small seeds may suffer from drought after the end of the monsoon. They can withstand competition from shrubby growth, but dense matted grass is harmful to them. Browsing easily damages the seedlings. It is a very fast growing tree when young, with new shoots up to 1 metre long per year. 30 years old trees reach 20 metres tall. Growth in height diminishes rapidly when trees are 25 metres tall, probably due to their dislike of exposure at that height.

The trees have always been managed under selection systems, but this is changing more to regular shelterwood system with fixed periodic blocks. The rotation varies from 120 to 200 years in different forests. Weeding and cleaning are usually not required in young blue pine crops. Thinning, though desirable, is generally not carried out for economic reasons.

GERMPLASM MANAGEMENT

Studies on seed from eight sources in northern Pakistan also showed that dry, cold conditions are optimum for storage to compensate for years when harvests are poor. Best germination was found with stratification in moist sand for 120 days, followed by nursery sowing at a soil temperature of 15-20°C. It is best to sow the seed in individual pots in a cold frame as soon as it is ripe if this is possible otherwise in late winter. A short stratification of 6 weeks at 4°C can improve the germination of stored seed.

PESTS AND DISEASES

The species is also susceptible to a number of pests and diseases. Cones and seeds of *P. wallichiana* are seriously damaged by *Dioryctria abietella* in the North Western Himalayan region of India. Extensive mortality of this pine was also observed in western Bhutan in 1975 by bark beetles identified as *Ips stebbingi*. A severe outbreak of *Biston regalis* was observed for the first time on blue pine forests in Pakistan in 1980.

Among the white pines, it has gained world-wide attention for its resistance to blister rust disease. Brown-needle disease (*Mycosphaerella gibsonii*) and Dothistroma needle blight (*Mycosphaerella pini*) have been reported on *P. wallichiana*.

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SUGGESTED CITATION

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