Casuarina junghuhniana Miq.

Casuarinaceae

LOCAL NAMES
Chinese (shan di mu ma huang); English (she oak,red-tipped ru,mountain ru,forest oak); Indonesian (kasuari,cemara gunung,ajaob,adjaob); Javanese (cemara gunung); Swahili (mvinje); Thai (son-pradiphat)

BOTANIC DESCRIPTION
Casuarina junghuhniana is a fast-growing, deciduous tree 15-25 (max. 35) m tall; trunk diameter 30-50 (max. 65) cm; crown somewhat open. Branching dimorphic with normal woody branches and determinate, deciduous branchlets.

Leaves reduced to scales, in whorls of 9-11 (max. 13) that define articulations.

Flowers unisexual. Male inflorescence a cylindrical or slightly clavate spike, 3-8 cm long, borne on the apex of a deciduous branchlet; sheathing bracts hairy outside. Female inflorescence in the axil of scale leaves on permanent shoots, cone-shaped, ellipsoid, truncate, 1-2 cm long, reddish; bracts 18-20-seriate, broadly obtriangular; bracteoles oblong-obovate, rounded or very obtuse, thick, 5-6 x 2.5-3 mm.

Infructescence a woody conelike structure. Fruit a grey or yellow-brown winged nut (samara), small, 2-3 mm wide and 4-5 mm long including wing. Seed solitary.

Casuarina is from the Malay word ‘kasuari’, which indicates the supposed resemblance of the twigs to the plumage of the cassowary bird. One of the common names of Casuarina species, ‘she-oak’, widely used in Australia, refers to the attractive wood pattern of large lines or rays similar to oak but weaker.

BIOLOGY
Like other Casuarina species, C. junghuhniana is wind pollinated. Shoot growth tends to cease or to be less during the flowering period that coincides with the dry season.

ECOLOGY
C. junghuhniana is a pioneer species of deforested land such as rocky slopes and undisturbed areas. Grows naturally on the slopes of volcanoes. Rainfall in its natural habitat is monsoonal with a well-defined summer maximum. It is drought-tolerant and can survive prolonged waterlogging due to its ability to cope with oxygen deficiency. When trees reach a few metres in height they are fire resistant and sprout readily on being damaged by fire.

BIOPHYSICAL LIMITS
Altitude: 550-3 100 m, Mean annual temperature: 13-28 deg. C, Mean annual rainfall: 700-1 500 (2 000) mm

Soil type: Grows on a wide range of soils from light volcanic and sandy soils to heavy clays. It is tolerant of a wide pH range, from 2.8 in acidic clays to 8 in limestone-derived soils.

DOCUMENTED SPECIES DISTRIBUTION

Native: Indonesia
Exotic: Australia, China, India, Kenya, Tanzania, Thailand

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
Fuel: The wood is highly suitable for firewood and charcoal production. The air-dry density of the wood is 900-1000 kg/cubic m, and the density of charcoal is 650 kg/cubic m. The energy from the charcoal is 34 500 kJ/kg, which is among the highest among firewood species.

Fibre: The wood is suitable raw material for kraft pulp.

Timber: Very hard, reddish-brown wood, prone to splitting. In Thailand, it is a popular source of construction piles and for fish traps. Also used for pole production. It can be used to make hardboard in a mixture with Dipterocarpus species. Average durability of untreated wood is 4.5 years in direct contact with the ground. This can be increased to 15 years by treatment with creosote preservative.

Other products: Although it is not a fodder species, young trees are browsed by animals.

SERVICES
Shade or shelter: A suitable species for planting as a windbreak.

Reclamation: Rehabilitates degraded soils. In Java the species has been cultivated in revegetation and rehabilitation programmes dating back to the beginning of the 1900s. It is especially good as a pioneer on landslide-prone soils. In the low lying acid sulphate areas of Southeast Asia and North Australia, C. junghuhniana is grown successfully.

Nitrogen fixing: C. junghuhniana fixes atmospheric nitrogen by nodulation with actinomycete bacteria of the genus Frankia. The nodules are woody and perennial and can form large masses in the root system.

Soil improver: Widely planted to improve soil fertility. Branches and foliage are burnt and the ash is spread on village gardens in Timor. Branchlets decompose slowly and provide good mulch. Mycorrhizal fungi further enhance its adaptability in poor soils.

Ornamental: C. junghuhniana is sometimes planted as an ornamental.

Boundary or barrier or support: In Kenya, farmers plant the tree around fields as a live fence.

TREE MANAGEMENT
Seedlings can attain 3 m growth in height per year during the 1st 2-3 years. In plantations with a controlled water regime in Thailand, C. junghuhniana hybrid reaches 20 m in height and 15 cm in diameter in 5 years. Plantation-grown trees can be harvested throughout the year. In Thailand, a harvesting cycle of 5 years is used for poles and fuelwood planted at a spacing of 2 x 2-3 m. A mean annual increment of 10-15 cubic m/ha is generally obtainable. Weeding is necessary only during the 1st few years, after which the trees shed large amounts of branchlets to form a thick and dense mat of litter that suppresses weeds. The red-tipped C. junghuhniana is a poor self-pruner; it produces strong root suckers. Pruning in plantations up to a height of 2-2.5 m is often necessary to make the plantations more accessible for general maintenance. Trees respond well to coppicing and pollarding.

GERMPLASM MANAGEMENT
Seed storage behaviour is orthodox; can keep viability for up to 1 year at room temperature. 1-1.8 million seeds/kg.

PESTS AND DISEASES
Green branchlets are attacked by the Acrididae locust Aularches miliaris and insects of the family Lymantriidae. In dry areas, subterranean termites may destroy young plants by eating their roots. In Thailand, they are controlled by spreading a small quantity of a mixture of equal amounts of lime and salt in the planting hole.

Damping-off of seedlings in nurseries is caused by various fungi (Fusarium spp., Phytophthora spp., Pythium spp., Rhizoctonia spp., Sclerotium spp.). Butt and heart rot, caused by Ganoderma applanatum, may infest tree trunk after damage by fire. Schizophyllum commune may cause decay of the sapwood.

FURTHER READNG

El-Lakany MH, Turnbull JW, Brewbaker JL. 1991. Advances in Casuarina research and utilization. Proceedings of the Second International Casuarina Workshop. Cairo: Desert Development Center, American University.

Faridah Hanum I, van der Maesen LJG (eds.). 1997. Plant Resources of South-East Asia No 11. Auxillary Plants. Backhuys Publishers, Leiden, the Netherlands.

Little EL. 1983. Common fuelwood crops. Communi-Tech Association, Morgantown, West Virginia.

Mbuya LP et al. 1994. Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).

Sosef MSM, Hong LT, Prawirohatmodjo S. (eds.). 1998. PROSEA 5(3) Timber trees: lesser known species. Backhuys Publishers, Leiden.

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/)