Cryptomeria japonica (L.f.) D. Don.

Taxodiaceae

LOCAL NAMES
English (Japanese red cedar,Japanese cedar,elegans); French (cryptomeria du Japon); German (Japanische Sicheltanne,crittomeria del Giappone); Japanese (sugi); Spanish (criptomeria)

BOTANIC DESCRIPTION
Cryptomeria japonica is an evergreen tree that grows to a height of 35-60 m and attains a bole diameter of 1-3 m. Trunk straight, in old trees massive, buttressed; bark thin on young trees, smooth, purplish-brown, on large trees 2-3 cm thick, reddish-brown, weathering grey, exfoliating in long, shredding strips. Branches spreading to assurgent, forming a conical crown in young trees, self-pruning to leave a clear bole in large trees.

Branch foliage dense, with leaves lasting 6-12 years, shedding not individual leaves but ultimate lateral branchlets which persist 4-8 years, these variable in length, spreading but incurved in various degrees, directed forward, linear-subulate, slightly flattened laterally, distinctly keeled abaxially, leathery, stiff, green, 3-20 (-25 but free up to 18 mm long) by 1-2 mm, apex acute; in juvenile leaves there are 2-3 resin ducts, in mature leaves this number is usually reduced to a single duct on the abaxial side of the stele.

Flowers monoecious, male catkins long, clustered at the end of branchlets, anther cells 3-5 at the base of scales, near but above seed cones, axillary and crowded toward the ends of 2nd year branchlets, 3-6 x 2-3 mm, elongating up to 10 mm when ripe to shed pollen.

Seed cones terminal on down-curved branchlets with normal leaves, often aggregated or solitary, occasionally with proliferating vegetative short shoot at apex, globose, squarrose with spreading bract-scale complexes, soft, woody, 12-25 mm diameter.

Seeds 2-5 per bract-scale complex depending on space available when intercalary scale tissue develops, 4-5 by 3 mm, flattened, irregularly ovate with 2 wings of unequal (1-1.5 mm) width forming a strip around the seed.

This is a monotypic timber-yielding genus. The generic name is derived from the Greek works cryptos (hidden), and meros (part), because the parts of the flower are not easy to distinguish.

BIOLOGY
Flowes in February and March. Seeds ripen from October to March. The tree is monoecious, self-fertile and wind pollinated.The cones are produced from about age 10 in most areas and the crop can be heavy. Seed is usually available annually.

Xmas tree at Makawao Forest reserve, Maui, Hawaii (Forest and Kim Starr)

Habit at Crater Rd
Maui, Hawaii (Forest and Kim Starr)

Habit at Crater Rd
Maui, Hawaii (Forest and Kim Starr)

ECOLOGY
This is a shade tolerant species that can withstand frost. It occurs in mountains and hills in areas of higher rainfall in south and central Japan but is rarely spontaneous. Plants are fairly wind-tolerant. Prefers a deep rich moist alluvial soil and a sheltered position in full sun.

BIOPHYSICAL LIMITS
Altitude: 650-2 400 m
Mean annual temperature: 10-18 deg C
Mean annual rainfall: 1 500-2 500 mm
Soil type: The tree prefers free draining, deep, rich, moist alluvial soil. Tolerates very acid to somewhat alkaline soils, but becomes chlorotic on shallow soils over chalk.

DOCUMENTED SPECIES DISTRIBUTION

Native: China, Japan
Exotic: Canada, India, Indonesia, Iran, New Zealand, South Africa, Tanzania, United Kingdom, United States of America

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
Timber: Trees grown in India produce soft, light and fragrant wood. The sapwood is white, heartwood is reddish brown and sometimes even black as in aged trees in Japan. The timber is extensively used in Japan for staves, tubs, casks, for building and furniture. It is durable, easy to preserve, saw and season. It is used for light construction, boxes, veneers and plywood. Old wood that has been buried in the soil turns a dark green and is then much esteemed.

Gum or resin: The tree exudes a resin from which cryptopimaric acid and a phenolic acid are isolated.

Tannin or dyestuff: The bark contains 6 % tannin.

Essential oil: Wood on steam distillation yields 1.5 % essential oil, Sugi Oil or Japanese Cedar Wood Oil which is a viscous, greenish liquid containing 40 % sesquiterpine alcohol. Leaves yield about 0.7 % essential oil that is brownish yellow with a strong aroma. The bark yields an essential oil containing a sesquiterpene and its corresponding alcohol.

Medicine: Oil and/or a resin from the plant is depurative and also used in the treatment of gonorrhoea.

Other products: The leaves are very aromatic and are used as incense sticks.

SERVICES
Shade or shelter: This tree is used as shade on agricultural land. A fairly wind-tolerant tree, it can be used in shelterbelt plantings.

Reclamation: It is used widely for afforestation purposes.

Ornamental: The sugi makes a dramatic landscape element for open lawns or streets with its characteristic billowy pyramidal form. The reddish brown bark is ornamental, peeling off in long strips, and is the most pronounced characteristic on old trees. The tree is tolerant of compacted soil and performs well in parking lots and other difficult urban sites.

Boundary or barrier or support: The tree is used as a windbreak, it makes a good accent, screen, or border tree for small properties due to its compact, dwarf habit.

TREE MANAGEMENT
Pricking out at a spacing of 90-120 cm is effected in June. Shade is removed after 3 months, and seedlings are transplanted when 3 years old to the field at a spacing of 5.4 m in June or December-January. Pure plantation produces better quality wood than mixed stands where the trees tend to grow fast.

The sugi should be grown in full sun, sheltered from harsh winds and where the air circulation is good especially in summer to prevent leaf blight. Although plants may grow 60-120 cm /yr when young, they rarely require pruning if properly located in the landscape. The tree may require pruning for access beneath the canopy. It thrives best with afternoon shade in the southern part of its range. Unlike most conifers, this species can be coppiced.

GERMPLASM MANAGEMENT
There are about 330 000-400 000 seeds/kg. Seed storage behaviour is orthodox, viability is maintained for 4 years in cold hermetic air-dry storage. At room temperature, seeds lose viability in a year, however viability is maintained for long periods in cold hermetic air-dry storage. Complete loss in viability after 3 years hermetic storage at 0 deg. C with 6-8 % moisture content, but no loss in viability after 6 years at –20 deg. C with these moisture contents.

PESTS AND DISEASES
No pests or diseases are of major concern but the tree occasionally suffers from leaf blight and leaf spot. Mites sometimes infest the foliage.

FURTHER READNG

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Gilman EF, Watson DG. 1993. Cryptomeria japonica. Fact Sheet ST-218. United States Forest Service.

Schuler S. (ed.) 1977. Guide to trees. Simon & Schuster Inc. New York.

Webb DB, Wood PJ, Henman GS. 1984. A guide to species selection for tropical and sub-tropical plantations. Tropical Forestry Papers No. 15, 2nd edition. Commonwealth Forestry Institute, Oxford University Press.

SUGGESTED CITATION

Orwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestree Database:a tree reference and selection guide version 4.0 (http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp)