

Sophora japonica

Japanese pagoda tree

LOCAL NAMES

Chinese (guo huai, zhong guo huai, huai shu); English (Japanese pagoda tree, umbrella tree, Chinese scholar tree, pagoda tree); French (sophora du Japon, arbre des pagodes du Japon); German (Japanischer Schnurbaum, Schnurbaum); Indonesian (sari cina); Italian (sofora del Giappone); Spanish (acacia del Japón); Trade name (Japanese pagoda tree); Vietnamese (hoe)

BOTANIC DESCRIPTION

Sophora japonica is a deciduous, small to medium-sized tree up to 15(-30) m tall; bole generally short; bark surface corrugated, dark greenish-brown or dark grey-green and spreading branches, with paler lenticels; crown broad.

Leaves arranged spirally, imparipinnate, 15-25 cm long; stipules early caducous; leaflets alternate to subopposite, 7-17, elliptical to ovate-lanceolate, 1.5-6 cm x 1-2.5 cm, acute or sometimes obtuse at apex, mucronate, glabrous or sparsely hairy above, short-haired below, shortly petiolulate; stipellae absent or small and setaceous.

Flowers in a terminal, 15-35 cm long panicle, papilionaceous; bracteoles present; calyx 3-4 mm long; stamens 10, filaments joined near the base; ovary superior, pilose.

Fruit an indehiscent pod, 3-12 cm x 7-12 mm, constricted between the seeds, stipitate, glabrous, beaked, 1-8-seeded.

Seeds ellipsoid to nearly globose, 8 mm x 4-5 mm, yellowish-brown.

Seedling with epigeal germination; cotyledons emergent; first few leaves imparipinnate or sometimes 1- or 3-foliolate.

BIOLOGY

The tree starts flowering when about 3-4 years old, though sometimes only when about 30 years old. In Vietnam, trees flower from May to August and fruit from September to November. In China, flowering is in August-September, fruiting in October-November.

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Fabaceae - Caesalpinioideae



Bough with inflorescence (Darren Kimmber)



fruit (Darren Kimmber)



Leafy branch (Darren Kimmber)

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ECOLOGY

Japanese pagoda tree is well adapted to dry weather conditions. Being native in temperate and subtropical regions, cultivation in the tropics is only possible in drier regions or at the higher altitudes. Under temperate conditions *S. japonica* is tolerant of heat and drought, whereas it also tolerates severe frost (up to -25 deg. C) except when young.

BIOPHYSICAL LIMITS

Soil types: The tree is well adapted to great variety of soils, and even waste land, but thrives best in well-drained, sandy loam.

DOCUMENTED SPECIES DISTRIBUTION

Native: China, Korea, Republic of

Exotic: Croatia, Italy, Spain, Thailand, United Kingdom, United States of America, Vietnam



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

Fodder: The shoots, including the pods, seem to be suitable as fodder, but some plant parts, especially the pods and seeds, have been reported to be poisonous. . The leaf protein concentrate, used as fodder, is a product relatively poor in protein and carotenoid pigments, and very rich in lipids. Leaves contain 18.2% crude protein based on dry weight. The wet fractionation process was applied to twigs, leaves and pods. The leaf-protein concentrate obtained from the green juice after pressing contained 16% total lipids, which is very high; both values were determined on a dry matter basis. Seeds contain 9.9% fatty oil which is rich in linoleic acid (52.8%), but is poor in drying properties. The seedcake contains 30% protein, but glycosides should be removed before using it as fodder.

Timber: The wood is durable and tough and can be used for window and door frames, and for agricultural implements.

Gum or resin: A gum similar to that from carob (*Ceratonia siliqua* L.) can be extracted from the seeds.

Tannin or dyestuff: The flower buds can be used for dyeing yellow or a beautiful granite-grey. The pods are rarely used for this purpose. In China and Vietnam this dye was only used to colour silk, embroidery thread and hat tassels, but not for other materials because of the many flower buds needed to prepare a dye-bath. Mixed with indigo, the dye gives a green colour. In Java, dried flower buds were imported from China for the batik industry. In the fine 'soga-batik' process they were used in the last fixing and colouring bath after the real colouring process, in a mixture together with rice flour, camphor, lime juice, sugar and water. Nowadays much cheaper synthetic dyes are used instead.

Medicine: The flower buds of *S. japonica* are astringent and possess styptic properties. They are a reputed remedy for the prevention of various types of haemorrhages (e.g.) haemoptysis, epistaxis, metrorrhagia), haemorrhoids, and are useful for the treatment of hypertension. Flower buds and young pods are an important source of rutin, which has 'vitamin P'-like properties and is used in the treatment of conditions characterized by increased capillary permeability and fragility. An extract from the pods is toxic, but also can be used to lower blood pressure. *S. japonica* is also reputed to show oestrogenic activity.

Other products: In China, an extract of the leaves and pods is used to adulterate opium.

SERVICES

Ornamental: In temperate and subtropical regions the Japanese pagoda tree is commonly cultivated as an ornamental in gardens and parks, and as a road-side tree. Several cultivars are grown as ornamentals.

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TREE MANAGEMENT

GERMPLASM MANAGEMENT

PESTS AND DISEASES

Among the pests and diseases reported are leafminers such as *Odontata dorsalis*, aphids (*Aphis* spp.), and fungi such as *Uromyces truncicola* which cause a canker disease in seedlings.

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FURTHER READING

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SUGGESTED CITATION

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