Ginkgo biloba

L.

maiden hair, ginkgo

Ginkgoaceae

LOCAL NAMES
Chinese (ya-chiao,ginkyo,ginnan,pakgor su,paikua su,yinxing,gong sun shu,icho,fozhijia); Dutch (Japanse notenboom,waaierboom,tempelboom,ginkgo); English (ginkgo,Kew tree,golden fossil tree,maiden-hair tree); French (arbre des pagodes,arbre de Gordon,noyer du Japon,ginkgo,ginkgo bilobé,arbre aux quarante ecus,arbre à noix); German (ginko,entenfussbaum,ginkgobaum,fächerblattbaum,Japanbaum,tempelbaum,silberaprikose,mädchenhaarbaum,Japanischer nussbaum,goldfruchtbaum,Goethe-baum); Italian (ginko); Japanese (ginnan,ginkyo,ichô); Portuguese (nogueira-do-Japão); Spanish (arbol de los 40 escudos,arbol sagrado); Swedish (ginko); Trade name (ginkgo,maiden hair)

Leaves at Kula Experiment Station, Maui, Hawaii (Forest and Kim Starr)

habit (Tamara Crupi, September 1996)

Leaves (Tamara Crupi, September 1996)

BOTANIC DESCRIPTION
Ginkgo biloba belongs to single plant division Ginkgopsida which consists of the single order Ginkgoales, a single family Ginkgoaceae and a single extant genus Ginkgo. The tree is deciduous reaching a height of 4 m, with a reddish bark. Male specimens show an upright and irregular form, female trees are low and spreading.

Leaves fan-shaped glossy green (resembling those of the maidenhair fern or Adiantum), with irregularly toothed upper margins. Numerously veined, with a split in the middle and therefore appears to have two lobes. The leaves turn golden yellow before they fall.

The flowers are rather inconspicuous and grow on short spurs.Trees flower after 20-35 years, females exhibiting an abundance of ovules in pairs on stalks each containing an egg cell, initially very green, but later turning greenish-yellow, then orange and brown. The male flowers are yellow catkin-like pollen cones (microsporangia), 3-6 on each short shoot in the spring.

A single naked ovule ripens into a drupe-like seed with an acrid, ill-smelling fleshy outer layer and a thin, smooth, horny inner layer. The fleshy-coated seeds silvery are frequently incorrectly designated as fruits or nuts.

The generic name Ginkgo comes from the Chinese (later also Japanese) word ginkyo meaning 'silver apricot'. The specific name biloba means two-lobed: bi from the Latin 'bis' meaning double and 'loba' meaning leaf, which is an obvious reference to the fan-shaped leaves which have a split in the middle.

BIOLOGY
The maidenhair tree is dioecious. A strong correlation is observed between blooming dates and meteorological factors, an increment of 1-3 deg C in monthly mean temperature enhances Ginkgo blooming in Japan. Ginkgo seeds contained well-developed embryos at the time of dispersal. Sex differentiation in Ginkgo is controlled by the balance of endogenous gibberellic acid (GA3) ethylene and cytokinins. The prevalence of GA3 is beneficial for male sex expression.

ECOLOGY
Ginkgo is a hardy tree tolerating a variety of climate and soil types. It does not tolerate extreme frost.

BIOPHYSICAL LIMITS
Altitude: up to 2000 m
Soil type: Tolerates a range of soil types.

DOCUMENTED SPECIES DISTRIBUTION

Native: China, Japan, Taiwan, Province of China, Turkey

Exotic: Czechoslovakia (Former), Estonia, Germany, India, Russian Federation, South Africa, United States of America, 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.

PRODUCTS
Food: Various foods and drinks are made from the fruits, seeds and leaves. The seeds may be roasted and are considered a great delicacy. Seeds are high in starch, but low in protein and oil.

Poison: 4'-O-Methylpyridoxine (ginkgotoxin) is a neurotoxic antivitamin B6 which occurs in G. biloba seeds and leaves. However, toxin amount is likely to be too low to exert detrimental effects after administration of the medication or ingestion of food. Leaf extracts of G. biloba are shown to be highly effective against the rice pest Nilaparvata lugens resistant to diazinon, carbofuran and fenobucarb (Kwon-Min et al. 1996). Extracts of powdered dried leaves were deterrent to P. brassicae and P. rapae at levels as low as 25-50 p.p.m.

Medicine: In Traditional Chinese Medicine the seeds (used as an astringent for the lung, to stop asthma, enuresis, and excessive leucorrhea and regulate urinary frequency) are considered more important than the leaves. However, in the west ginkgo leaves are exalted. The leaves of ginkgo, known in Chinese medicine as bai-guo-ye are first mentioned in Lan Mao's Dian Nan Ben Cao (Pharmaceutical Natural History of Southern Yunnan), published in 1436 during the Ming dynasty, are used externally to treat skin and head sores as well as freckles. Internal use of the leaves is noted in an imperial commissioned work recorded in 1505 for the treatment of diarrhoea. Over 300 scientific studies on the chemistry, pharmacology and clinical effects of gingko leaf have been conducted by European researchers over the last 20-30 years. The experimental results indicate ginkgo leaf extracts have a wide range of biological effects. The most well-known use among Americans is the perceived ability of the products to improve short term memory. Ginkgo extracts have been widely used in Europe for a wide variety of clinical conditions including vertigo, tinnitus (ringing in the ear), treatment of poor circulation, heart disease, eye diseases, chronic cerebral insufficiency, accidents involving brain trauma, dementia, and various conditions associated with senility. Studies have shown that the constituents ginkgoic acid and ginnol inhibit certain bacteria and fungal infections. New uses for ginkgo leaf extracts are emerging as more is being learned, especially those involving circulatory problems such as erectile dysfunction and improved memory, blood circulation. Also marketed as Shun Tian capsules, containing gingko leaves and ginseng.

Other products: A ginkgo product, referred to in scientific literature as Egb761 has unique leaf bioflavonoids (ginkgolides A, B and C and bilobilides) believed to be responsible for its biological activity. The ginkgolides are very selective antagonists of platelet aggregation, induced by platelet-activating factor (PAF). PAF is involved in various inflammatory, cardiovascular, and respiratory disorders, the PAF antagonist effect of ginkgolides explain Ginkgo's broad-spectrum biological activity. In former times the senescing leaves, beautiful gold in colour, were expensive objects of trade.

SERVICES
Shade or shelter: The maidenhair tree is an excellent shade tree.

Reclamation: This tree is hardy, surviving polluted environments remarkably. Ginkgo is a suitable tree for urban forestry.

Nitrogen fixing: G. biloba roots are colonized by the fungus Glomus epigaeum, forming vesicular arbiscular mycorrhiza.

Soil improver: Leaf litter of the maidenhair tree improves soil fertility.

Ornamental: Ginkgo has been widely adopted as an ornamental tree in many European and American cities.

Other services: Ginkgo figures strongly in legend and lore of China, and has been lovingly adopted by most cultures in the temperate regions of earth.

TREE MANAGEMENT
Generally the tree is very adaptable, tolerating all climates and soils. The tree takes 30 years to reach a height of 10 metres. Application of pollen by spraying was found to be the best method for increasing fruits quantity and quality. For ornamental gardens it is advisable to plant male trees only, because the female trees produce malodorous fruits.

GERMPLASM MANAGEMENT
Removal of the sarcotesta significantly increases the total germination. In one study cold stratification, an unnecessary treatment, improved seed germination percentage.

PESTS AND DISEASES
Ginkgos are long-lived trees, remarkably resistant to disease, pests, and fires. They also are extremely tolerant of air pollution, and are often planted in harsh city environments where most trees will not survive. The pyralid, Etiella zinckenella infests gingko fruits. Metabolus flavescens attacks young ginko trees. The root rot (Fusarium sp.), stem rot (Macrophomina phaseoli [M. phaseolina]) fungi and the insect pests Brachytrupes [Tarbinskiellus] portentosus, Agrotis ipsilon and Gulcula panterinaria are the main cause of mortality in young seedlings. The first record of a bacterial pest, Pseudomonas syringae, causing leaf spots and stem cankers of Ginkgo is reported from Sacramento, California. The larvae of Pammene sp., a pest of ginkgo attack twigs and branches, impairing growth and seed yield. The longicorn beetles, Monochamus subfasciatus and 3 species of Acalolepta cause damage to the maidenhair trees. Phellinus punctatus causes ginkgo wood rot.

FURTHER READNG

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SUGGESTED CITATION

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