

## Diospyros kaki

L.

Ebenaceae

### LOCAL NAMES

English (persimmon, oriental persimmon, keg fig, kaki plum tree, Chinese fig, Chinese plum, Japanese persimmon, date plum); French (kaki, Plaqueminier kaki); German (Kakipflaumenbaum); Italian (cachi); Japanese (kaki); Spanish (kaki del Japon, caqui, kaki)

### BOTANIC DESCRIPTION

*Diospyros kaki* is a multi-stemmed or sometimes single-stemmed deciduous tree up to 6(-18) m tall and typically round-topped, fairly open, erect or semi-erect, sometimes crooked or willowy; seldom with a spread of more than 4.5-6 m. Branches somewhat brittle and can be damaged in high winds.

Leaves alternate, entire, ovate-elliptic, oblong-ovate, or obovate, 7.5-25 cm long, 5-10 cm wide, leathery, glossy on the upper surface, brown-silky beneath; bluish-green, turning in the fall to rich yellow, orange or red; petioles 2 cm long, brown-hairy.

Flowers inconspicuous surrounded by a green calyx tube, borne in leaf axils of new growth from one-year old wood. Female flowers solitary, cream-colored; male flowers pink-tinged, borne in threes. Commonly, 1-5 flowers per twig emerge as the new growth extends.

Fruit round, conical, oblate, or nearly square, capped by the persistent calyx, skin thin, smooth, glossy, yellow, orange, red or brownish-red; flesh yellow, orange, or dark-brown, juicy, gelatinous, seedless or containing 4-8 seeds. Generally, the flesh is bitter and astringent until fully ripe, when it becomes soft, sweet and pleasant, but dark-fleshed types may be non-astringent, crisp, sweet and edible even before full ripening.

Seed flat, oblong, brown, 2 cm long.

From the Greek *diospyros*, composed of *dios* (divine), and *pyros* (grain), from the edible fruit of some species. The specific epithet is derived from the Japanese word for plant, *kaki-no-ki*.

### BIOLOGY

*D. kaki* trees flower in March; are usually either male or female, but some trees have both male and female flowers. On male plants, occasional perfect (bisexual) flowers occur, producing an atypical fruit. A tree's sexual expression can vary from one year to the other. Many cultivars are parthenocarpic, although some climates require pollination for adequate production. When plants are pollinated, they will produce fruits with seeds and may be larger and have a different flavor and texture than do their seedless counterparts. Many cultivars begin to bear 3-4 years after planting out; others after 5-6 years. Shedding of many blossoms, immature and nearly mature fruits is characteristic of the Japanese persimmon as well as the tendency toward alternate bearing. Harvesting takes place in fall and early winter. Late ripening cultivars may be picked after hard frosts or light-snowfall.



Tree with fruits. (Arnoldo Mondadori Editore SpA)



Fruit in Frascati (Italy) fresh fruit market selling for Italian Lire 4,000/Kg., i.e. \$(US)2.00/Kg at exchange rate when picture was taken in December, 2000. (Putter CAJ)



Detail of fruit and seed. (Unknown)

**ECOLOGY**

D. kaki needs a subtropical to mild-temperate climate. It may not fruit in tropical lowlands. In Brazil, the tree is considered suitable for all zones favourable to Citrus, but those zones with the coldest winters induce the highest yields. The atmosphere may range from semi-arid to one of high humidity.

**BIOPHYSICAL LIMITS**

Altitude: 0-2 500 m

Soil type: D. kaki can withstand a wide range of soil types as long as the soil is not overly salty, but does best in deep, well drained loam. A pH range of 6.5 to 7.5 is preferred.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: China, India, Japan, Myanmar

Exotic: Afghanistan, Algeria, Australia, Brazil, Egypt, France, Indonesia, Israel, Italy, Korea, Republic of, Palestine, Philippines, Russian Federation, Union of Soviet Socialist Republics (Former), 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.

**PRODUCTS**

**Food:** Fully ripe fruits are usually eaten out-of-hand. The flesh may be added to salads, blended with ice cream mix or yoghurt, used in pastries, puddings, mousse, or made into jam or marmalade. Ripe fruits can be frozen whole or pulped. Drying is commonly practiced. Roasted seeds have served as a coffee substitute. Tea can also be made from fresh or dried leaves. Kaki is high in vitamin and a moderate source of ascorbic acid.

**Timber:** Wood fairly hard and heavy, black with streaks of orange-yellow, salmon, brown or grey; close-grained; takes a smooth finish and is prized in Japan for fancy inlays, though it has an unpleasant odor.

**Tannin or dyestuff:** Tannin from unripe fruits has been employed in brewing sake, also in dyeing and as a wood preservative.

**Alcohol:** Fruit may be converted into molasses, cider, beer and wine.

**Poison:** Juice of small, inedible wild fruits, crushed whole, calyx, seeds and all, is diluted with water and painted on paper or cloth as an insect- and moisture-repellent.

**Medicine:** A decoction of the calyx and fruit stem is sometimes taken to relieve hiccups, coughs and labored respiration.

**SERVICES**

**Ornamental:** It is a handsome ornamental with drooping leaves and branches that give it a languid, rather tropical appearance.

**Boundary or barrier or support:** Trees can be planted as a hedge or as a screen if pruned heavily.

**TREE MANAGEMENT**

The soil should be well prepared—deeply plowed and enriched with organic matter. Trees should be set out at spacing ranging from 4.5 x 1.5 m to 6 x 6 m, depending on the habit of the cultivar. In Japan, 1 000 plants/ha may be planted at the outset, and thinned down to 200 trees/ha in 10-15 years.

Good results have been obtained with a fertilizer mixture of 4-6% N, 8-10% P and 3-6% K at the rate of 0.45 kg/tree per year of age. Over-fertilization or excessive amounts of nitrogen fertilizer causes shedding of fruits.

Young trees are pruned back to 0.7-0.9 m when planted and later the new shoots are thinned with a view to forming a well-shaped tree. Annual pruning during the first 4-5 winters is desirable in some cultivars. If a tree tends to overbear and shows signs of decline, it should be drastically cut back to give it a fresh start. After flowering, the trees should be irrigated every 3 weeks on light soil, every month on heavier soil, until time for harvest. The annual yield of a young tree ranges from 22.6-40.8 kg; of a full-grown tree, 150-250 kg.

**GERMPLASM MANAGEMENT**

Stratification is recommended for all persimmon seeds.

**PESTS AND DISEASES**

In Brazil, premature fall is partly linked to heavy infestation by the mite, *Aceria diospyri*. *Retithrips syriacus* feeds on and blemishes the leaves and fruit skin. The greenhouse thrips (*Heliethrips haemorrhoidalis*) blemishes fruits in Queensland. San José scale is combated by a dormant application of Bordeaux in diesel emulsion in India. In Florida, white peach scale, *Pseudaulacaspis pentagona*, has required control and a twig girdler, *Onsideres cingulatus*, has been troublesome. A flat-headed borer drills into bark and wood causing oozing of gum and decline in vigor. Mealy bugs distort young shoots and kill all new growth unless controlled. Fruit flies attack fruits especially in dry years. Tree-ripe persimmons are sought by all kinds of birds and small mammals.

**FURTHER READNG**

CSIR. 1952. The Wealth of India: A dictionary of Indian raw materials and industrial products, Vol. III. CSIR.

[http://www.hort.purdue.edu/newcrop/nexus/Diospyros\\_kaki\\_nex.html](http://www.hort.purdue.edu/newcrop/nexus/Diospyros_kaki_nex.html)

IBPGR. 1986. Genetic resources of tropical and subtropical fruits and nuts (excluding Musa). International Board for Plant Genetic Resources, Rome.

**SUGGESTED CITATION**

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