

# *Ficus religiosa*

Bo Tree

Moraceae

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## OVERVIEW

*F. religiosa* is a sacred tree native to India where it grows up to elevations of 5,000 ft (1,524 m) (Neal 1948). It is said to be the tree that Buddha was born under and also where he sat for six years of meditation and enlightenment. Elsewhere in the world and in Hawai'i, trees are occasionally cultivated and are most often seen planted near temples. This large tree with attractive heart shaped glossy leaves is also occasionally planted as a specimen tree in landscaping for it's aesthetic shape and form. In Hawai'i, *F. religiosa* does not reproduce sexually do to the lack of it's associated pollinator wasp and must be propagated from cuttings. In Israel, where *F. religiosa* is also cultivated, the pollinator wasp, *Blastophaga quadraticeps*, has successfully invaded and established (Galil and Eisikowitch 1968) and is now producing seedlings near irrigated areas and in exceptionally moist microhabitats. The pollinator wasp should be prohibited from Hawai'i to avoid reproduction and spread of this species.

## TAXONOMY

**Family:** Moraceae (mulberry family) (Neal 1965).

**Latin name:** *Ficus religiosa* L. (Neal 1965).

**Synonyms:** None known.

**Common names:** Bo tree, beepul tree, sacred tree (Neal 1965).

**Taxonomic notes:** Neal (1965) reports that one tree was brought from India in 288 B.C. to Ceylon, is the oldest tree known historical tree, and is said to be the parent of all beepul trees there.

**Nomenclature:** This sacred tree is associated with Buddha and is planted beside temples, hence the species name, *religiosa*.

**Related species in Hawai'i:** Over 60 species of *Ficus* have been introduced to Hawai'i (Wagner et al. 1999).

## DESCRIPTION

"Small tree, or taller strangling climber, with wide-spreading branches, semi- or fully deciduous in monsoon climates, and broadly ovate, glossy, leathery, dark green leaves, 5-7 in (12-18 cm) long, with unusual tail-like tips. Bears pairs of rounded, flat-topped green figs, to 1/2 in (1.5 cm) across, ripening to purple with red dots" (Brickell and Zuk 1997).

## BIOLOGY & ECOLOGY

**Cultivation:** *F. religiosa* is widely planted in the tropics (Bailey and Bailey 1976). The tree is very long lived and one tree near Bombay is reported to be over 3,000 years old (Neal 1965). *F. religiosa* are mostly planted near Buddhist temples. They are steeped in legends associated with Buddha and are also sacred to Vishnu who is also said to have been born beneath a bo tree. Hindus associate the bo tree with fertility in women. It is also cultivated as an ornamental, for medicinal uses, such as toothaches, and in the making of shellac.

**Invasiveness:** This species reported to be able to set viable seeds in two places, Israel and Florida. In Israel, the pollinator wasp successfully invaded and established allowing the tree to begin to spread. In Florida, sporadic seeding events have been documented, though have not persisted, perhaps due to an unsuccessful colonization of the associated pollinator wasp or an intrusion from a pollinator wasp of the native *Ficus aurea* (Nadel et al. 1992).

**Pollination:** The fruit (syconium or fig) and reproduction systems of species in the genus *Ficus* are unique. Each species of *Ficus* has an associated species of agaonid wasp (Hymenoptera: Chalcidoidea: Agaonidae). *Ficus* species can only be pollinated by their associated agaonid wasps and in turn, the wasps can only lay eggs within their associated *Ficus* fruit. The pollinator wasp for *F. religiosa* is *Blastophaga quadraticeps*.

**Propagation:** In places where the pollinator wasp is not present, trees are propagated from cuttings.

**Dispersal:** In Hawai'i, plants are spread mainly through horticulture trade. Various birds observed foraging and roosting in *Ficus* spp. trees on Maui that could be potential dispersal agents of *F. religiosa* seeds should they become viable include mynah birds (*Acridotheres tristis tristis*), blue faced doves (*Geopelia striata*), lace necked doves (*Streptopelia chinensis*), Japanese white-eye (*Zosterops japonicus*), Northern cardinals (*Cardinalis cardinalis*), and house sparrows (*Passer domesticus*), though there are probably more. Other animals, such as bats, pigs, rodents, parrots, and monkeys may be capable of spreading fruit.

**Pests and Diseases:** Nadel et al. (1992) report several pests including various ants which were seen carrying off pollinator wasps from *Ficus* fruits, Hymenoptera and mites that may be parasites of the pollinator wasps, and staphylinids which were seen entering *Ficus* fruits and eating the pollinator wasps.

## **DISTRIBUTION**

**Native range:** *F. religiosa* is native from India to southeast Asia (Bailey and Bailey 1976). In India, it occurs both wild and cultivated up to 5,000 ft (1,524 m) (Neal 1948).

**Global distribution:** *F. religiosa* is cultivated in various tropical areas of the world. In the United States, it is grown in southern California, Florida, and Hawai'i. In Florida, seedlings were found in Homestead in 1975 and in Miami in 1988, though these were isolated events and did not persist (Nadel et al. 1992). The wasps for these sporadic

events were never recovered so it is uncertain whether the pollinator wasps simply did not survive or if other pollinator wasps were responsible. The pollinator wasp for the native *F. aurea*, *Pegoscapus jimenezi* (Grandi), has been found intruding into syconia of two non-native figs, *F. septica* and *F. religiosa*. In Israel, *F. religiosa* and its associated pollinator wasp, *Blastophaga quadraticeps* are now both established and producing seedlings near irrigated areas and in exceptionally moist microhabitats.

**State of Hawai'i distribution:** *F. religiosa* is cultivated in Hawai'i. Exact distribution for islands other than Maui is uncertain.

**Island of Maui distribution:** On Maui, only a few (about 9) cultivated locations of *F. religiosa* were found during island wide surveys. A few temples near the coast in Lahaina and Baldwin Beach, Paia have one large tree each located near the temple. It is also cultivated as an ornamental or specimen tree in the Flemming Arboretum on West Maui, along the Mokulele Hwy. near Kihei, by buildings in Kahului at the Maui Community College, and in yards in Wailuku Heights, Ha'iku and Kula.

### **CONTROL METHODS**

Currently *F. religiosa* does not spread in Hawai'i. One might argue that removal of the trees now while they are in limited distribution and not yet a problem would be the easiest, least costly strategy, and most definite way to prevent invasiveness in the future. However, because of the sacredness and charisma of this tree, control would probably be met by public opposition. Perhaps a middle of the road tactic would be to prevent the introduction of its associated pollinator wasp to avoid unwanted spread.

**Physical control:** *F. religiosa* can most likely be cut down but will probably re-grow without chemical treatment.

**Chemical control:** A cut stump treatment with a chemical such as Garlon (triclopyr) would probably be effective in control.

**Biological control:** Currently there are no known biological controls for *F. religiosa*.

**Cultural control:** See above.

**Noxious weed acts:** None.

### **MANAGEMENT RECOMMENDATIONS**

*F. religiosa* currently does not spread in Hawai'i and is only occasionally cultivated on Maui. It is an attractive tree and has been associated with legends of Buddha. This species may become invasive if the pollinator were introduced. Efforts should be made to prevent the unintentional introduction of wasps, by not bringing in live materials from other places where wasps are present, as well as the intentional introduction of wasps by prohibiting their introduction.

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