

Ficus benjamina

Weeping fig

Moraceae

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OVERVIEW

F. benjamina is one of about 60 species of *Ficus* that has been introduced to Hawai'i (Wagner et al. 1999). Each *Ficus* species needs a specific pollinating wasp in order to reproduce and spread (Ramirez 1970). The pollinator wasp for *F. benjamina* has not yet been introduced to Hawai'i and, as a result, the tree has not yet begun to spread. Other *Ficus* species that have had their wasps introduced are spreading on Maui. These include *F. microcarpa*, *F. macrophylla*, and *F. cf. platypoda* (Wagner et al. 1999, Oppenheimer and Bartlett 2000). These three species are currently invading both disturbed and native ecosystems where they are capable of germinating in native host trees, such as koa (*Acacia koa*) and ohia (*Metrosideros polymorpha*), where they grow as epiphytes, eventually destroying their hosts. *F. benjamina* is a popular tree worldwide cultivated for ornamental purposes. On Maui, it is one of the most commonest trees planted in urban areas. With a large population of *F. benjamina* already present in Hawai'i along with small sized fruit which allows for easy dispersal over long distances, the potential for the pollinator wasp to become established, if ever introduced, is high. Should the pollinator wasp become established on Maui, *F. benjamina* will likely begin to spread and will likely display similar characteristics to the related pest species, *F. microcarpa*. The pollinator wasp for *F. benjamina* should be prohibited from introduction to Hawai'i by placing it on the injurious species list to minimize the chance for this species to spread.

TAXONOMY

Family: Moraceae (Mulberry family) (Wagner et al. 1999).

Latin name: *Ficus benjamina* L. (Bailey and Bailey 1976).

Synonyms: *Ficus nitida* Thunb., *Ficus waringiana* auct. (Bailey and Bailey 1976, GRIN 2002).

Common names: Benjamin tree, Waringin, Weeping fig, Java fig, Weeping laurel (GRIN 2002, Bailey and Bailey 1976, Neal 1965).

Taxonomic notes: The genus *Ficus* is made up of about 1,000 species from pantropical and subtropical origins (Wagner et al. 1999). Plants in the genus are all woody, ranging from trees and shrubs to climbers (Neal 1965).

Nomenclature: The name probably refers to the plant as a source of benzoin (resin) that was obtained from the Orient in times of antiquity (Flora of North America 2000).

Related species in Hawai'i: About 60 species of *Ficus* have been introduced to Hawai'i for cultivation and reforestation (Wagner et al. 1999). *F. benjamina* is a variable species with several cultivars and varieties in cultivation (Riffle 1998). The form *F. benjamina* var. *comosa* Kurz has yellow fruits .75 inch in diameter (Neal 1965).

DESCRIPTION

"Trees, evergreen, to 10 m. Roots adventitious, occasionally hanging. Bark gray, smooth. Branchlets brown, glabrous. Leaves: stipules .8-1.2 cm; petiole 0.5-2(-3) cm. Leaf blade oblong, elliptic, lanceolate, or ovate, 4-6(-11) x 1.5-6 cm, nearly leathery, base rounded or cuneate, margins entire, apex acuminate or cuspidate; surfaces abaxially and adaxially glabrous; basal veins 1(-2) pairs, short; lateral veins (6-) 12(-14) pairs, regularly spaced, uniform; secondary veins prominent. Syconia solitary or paired, sessile or subsessile, orange, yellow, or dark red, nearly globose, 8-12 x 7-10 mm, glabrous; subtending bracts 2-3, crescent-shaped, 0.5-1.5 mm, glabrous; ostiole closed by 3 small, flat, apical bracts 1.5-2 mm wide, umbonate." (Flora of North America 2000).

BIOLOGY & ECOLOGY

Cultivation: Neal (1965) describes *F. benjamina* as one of the most beautiful and graceful of figs. As the tree matures, its spread is generally broader than tall with a beautiful dense umbrella-like canopy of pendant branches that cascade down to the ground, hence the name, weeping fig (Riffle 1998). This weeping fig is widely cultivated in Hawai'i and has not had its associated wasp introduced and therefore has not yet spread from initial plantings. In temperate areas of the world it is grown as a houseplant. In warmer regions the tree is grown as a specimen, street tree, or as a hedge. On Maui, *F. benjamina* is one of the most common trees in urban areas. In some residential neighborhoods, almost every house contains at least one of these popular trees, either in a pot or in the ground. Some disadvantages to this tree in cultivation include adventitious roots both above and below ground which can break up concrete surfaces and numerous fruits, that are a spectacular red color, but become a nuisance when they shed onto streets, sidewalks, or driveways (Courtright 1988).

Invasiveness: *F. benjamina* is not invasive in Hawai'i yet due to the absence of its associated pollinator wasp. The only reference found of this species becoming invasive elsewhere in the world is in Western Australia, where the tree is reported as invading cliffs in a few areas around the lower Swan River in Perth (Randall 1998). In Hawai'i, this species has several attributes that could make it invasive should the pollinator wasp be introduced, including large presence of host trees for the successful establishment of pollinator wasps, small fruit size allowing dispersal by many different vectors, and ability to begin life as an epiphyte. This species resembles *F. microcarpa* and the potential spread and damage caused would probably be similar to that of *Ficus* species that are currently spreading on Maui. *Ficus* species that are known to naturalize in Hawai'i include *F. microcarpa*, *F. macrophylla*, and *F. cf. platypoda* (Wagner et al. 1999, Oppenheimer and Bartlett 2000). These species commonly germinate in other trees, fenceposts, rocks, bridges, buildings, and other unwanted structures, eventually engulfing their hosts. *Ficus* species threaten many natural areas on Maui, including both wet and dry habitat, by germinating on many native host trees such as koa (*Acacia koa*), ohia (*Metrosideros polymorpha*), wiliwili (*Erythrina sandwicensis*), and others, and eventually killing them as they spread. Invasive characteristics include a widespread distribution due to popularity among the public who use the plant for an ornamental, large seed set, the presence of non-native fruit eating birds that spread the seeds, and

difficulty in controlling epiphytic plants on native hosts. In addition, *F. benjamina* is said to be drought tolerant once established (Riffle 1998).

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. For successful pollination and reproduction of *Ficus* species to occur, its associated pollinator wasp must be present. Conversely, for successful reproduction of agaonid wasps to occur, their associated *Ficus* species must be present (Janzen 1979).

Propagation: *Ficus* species propagate from seed and many can be propagated from cuttings. Trees can begin life as epiphytes on other trees.

Dispersal: Plants are initially spread by humans who grow the plant for ornament and use the trees in reforestation. Because the pollinator wasp is not yet present, *F. benjamina* seeds are not viable. Other species of *Ficus* that do have wasps present are spread by fruit eating birds. Various birds observed by the authors foraging and roosting in other species of *Ficus* trees on Maui include mynah birds (*Acridotheres tristis tristis*), blue faced doves (*Geopelia striata*), lace necked doves (*Streptopelia chinensis*), house sparrows (*Passer domesticus*).

Pests and diseases: Brickell and Zuk (1997) report that many *F. benjamina* that are grown indoors have been lost due to *Phomopsis* dieback. Other pests and diseases of *Ficus* species include: mealybugs, scale insects, spider mites, root knot nematodes, and thrips occur under most environmental conditions, fungal and bacterial leaf spots, crown gall, twig dieback, and Southern blight (Brickell and Zuk 1997). Cuban laurel thrips, which commonly affect *Ficus microcarpa* in Hawai'i and elsewhere, have been documented from *F. benjamina* trees in Florida (Wolfenbarger 1946).

DISTRIBUTION

Native range: *F. benjamina* is native to a large area including India, southern China, Southeast Asia, Malaysia, the Philippines, northern Australia, and the islands of the South Pacific (Riffle 1998).

Global distribution: *F. benjamina* is cultivated in many parts of the world. In Australia, it is reported as a native to the northern region. It is also reported as a weed to Western Australia (Randall 1998). PIER (2001) lists the following areas where *F. benjamina* is present: American Samoa (Tutuila), French Polynesia (cult.), Marshall Islands (Kwajalein (cult.), Majuro (cult.)), Tonga (Tongatapu, 'Eua, Vava'u, Lifuka/Foa, Ha'ano, 'Uiha and probably on most islands), as well as Florida, in the United States.

State of Hawai'i distribution: *F. benjamina* is cultivated in Hawai'i (Neal 1965).

Island of Maui distribution: There are numerous sites in mostly urban areas on Maui where *F. benjamina* is cultivated. The tree is densely distributed in places like Lahaina,

Kahului, Kihei, Ha'iku, Makawao, Kula, Hana, and anywhere else people live. All sites on Maui recently mapped by the authors were considered cultivated, none were naturalized, though there were three locations that were noted as unknown status in the Kipahulu area. These were noted as unknown because they were growing on steep rocky terrain and though these are probably cultivated plants their wild appearance led to the unknown status.

CONTROL METHODS

Physical control: Control of *Ficus* species seems daunting and is just beginning to be explored in Hawai'i. It is uncertain if small seedlings on the ground or as epiphytes can be pulled. Often, trees will germinate on and grow as epiphytes on other desirable trees, concrete structures, and fenceposts. These are sometimes out of reach or on steep dangerous terrain. Care will need to be taken in order to successfully kill the unwanted *Ficus* while preserving the host. Without control, the host tree or structure is in danger of destruction through strangulation.

Chemical control: Hammer (1996) reports the following. "Fig trees are particularly sensitive to triclopyr herbicides as a basal or cut-stump treatment. Trees found growing on concrete or rock structures should be treated with herbicide while young to avoid costly structural damage. Use extreme caution when applying herbicide to figs growing as epiphytes to ensure that the poison does not contact the host tree. When exotic figs germinate high in the branches of large trees in natural forest communities, it may be extraordinarily difficult to get close enough to the fig to treat it."

Biological control: Nadel et al. (1991) report several pests that could be looked at for biological control potential 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.

Cultural control: The pollinator wasps should be prevented from entering Hawai'i in order to prevent spread of *F. benjamina*.

Noxious weed acts: None.

MANAGEMENT RECOMMENDATIONS

F. benjamina is widely planted in dense concentrations on Maui in most urban areas and is currently not spreading in Hawai'i due to the fact that its pollinator wasp has not yet been introduced. Should the wasp arrive and successfully establish on Maui, the small size of fruit, large population size, and epiphytic nature may lead to an aggressive invasive nature similar to that of the pest, *Ficus microcarpa*, though this is not certain. For now, *F. benjamina* is a widely planted tree that is not spreading and the best way to keep it that way is to prevent the arrival of its associated pollinator wasp.

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