

Ficus deltoidea

Mistletoe fig

Moraceae

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OVERVIEW

F. deltoidea is one of many species of *Ficus* cultivated in various parts of the world as a houseplant or as an ornamental shrub. In Hawai'i, this species is not as commonly cultivated as other more popular figs, such as *F. benjamina* or *F. elastica*, and is known from just a few plantings. This species is not yet reproducing sexually because each *Ficus* species needs a specific pollinator wasp (Agaonidae) in order to reproduce and spread (Ramirez 1970) and the pollinator wasp for *F. deltoidea* has not yet been introduced to Hawai'i. The potential for *Ficus* species to spread in Hawai'i once their pollinator wasps are introduced has been demonstrated already and future naturalization of *Ficus* species could be prevented by preventing the introduction of pollinator wasps by adding them to the list of injurious animal species. This would prohibit the wasps from introduction and help to minimize the chance for this *Ficus* species to spread. In addition, *F. deltoidea* is not widely planted and removal of this species and adding it to the noxious weed list would also assist in prevention of future spread.

TAXONOMY

Family: Moraceae (Mulberry family)

Latin name: *Ficus deltoidea* Jack (Bailey and Bailey 1976).

Synonyms: *Ficus diversifolia* Blume (Bailey and Bailey 1976).

Common names: Mistletoe fig, Mistletoe rubber plant (Bailey and Bailey 1976).

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 common name, mistletoe fig, comes from the habit of the plant as an epiphyte often growing on larger trees. The scientific name, *deltoidea*, *triangularis*, refers to the shape of the leaf.

Related species in Hawai'i: About 60 species of *Ficus* have been introduced to Hawai'i for cultivation and reforestation (Wagner et al. 1999).

DESCRIPTION

"Evergreen shrub or small tree, usually bushy, sometimes epiphytic in the wild. 15–22 ft (5–7 m) tall and 3–10 ft (1–3 m) wide. Leaves broadly spoon-shaped to obovate, leathery, 1 1/2–3 in (4–8 cm) long, bright green above and rust-red to olive brown beneath. Spherical to round figs, to 1/2 in (1.5 cm) across, ripening from dull yellow to orange and red, are freely produced in pairs." (Brickell and Zuk 1997). Seeds are minute.

"This large shrub or small tree with aerial roots often begins its life as an epiphyte but is not a banyan. It grows only 20 feet or so in height and is more often found as a shrub than a tree, even in nature. Indeed, it is usually seen as a large cascading epiphytic shrub on large trees, thus one of the common names of mistletoe fig. It is a spreading and somewhat sprawling shrub with slender zigzagging branches. The bark is gray and what trunk there is slender and usually leaning. The leaf shape is probably the most variable in the whole genus and ranges from elliptical or lanceolate to obovate or spatulate, the two latter shapes being more common than the two former. Only the spatulate-shaped leaf form is regularly sold and cultivated. The 3-inch-long leaves are dark green thick and leathery, almost succulent, and the ends of the spatulate-shaped leaves are usually provided with a shallow notch. The plant loves warmth and humidity, and produces picturesque aerial roots under such conditions." (Riffle 1998).

BIOLOGY & ECOLOGY

Cultivation: *F. deltoidea* is cultivated as a houseplant for its attractive foliage. It is said to be one of the only *Ficus* species that will produce fruits when cultivated indoors (McKenny and Lineberger 2002). It also makes a nice shrub or foreground subject for larger trees (Riffle 1998). On Maui, it is planted in a few locations as a small shrub. On Kaua'i, in the Sleeping Giant area, this species is planted along a road fronting a private property. The hedge is rather large, reaching about 3-4 m in height with long arching branches that appeared to reach into and climb up other adjacent small trees. This plant prefers warmth and humidity and produces aerial roots under such conditions (Riffle 1998).

Invasiveness: There was not much literature found about the invasiveness of *F. deltoidea*. It is listed in Western Australia's global compendium of weeds (Randall 2002) as *Ficus triangularis*, a possible synonym, as a quarantine weed. Currently, this species is not reproducing sexually in Hawai'i. If the associated pollinator wasp was introduced and successfully established, this species may begin to spread. Invasive attributes are likely to be similar to other invasive *Ficus* species that have had their associated wasps introduced and are reproducing on their own. These attributes include large seed production, small fruit and seed size, ample vectors such as fruit eating birds and other mammals to spread the seeds long distances, ability to germinate and grow as an epiphyte, sometimes on native host plants, ability to replace desirable vegetation, and difficulty in controlling epiphytic plants in steep terrain.

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.

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. Because the pollinator wasp is not yet present, *F. deltoidea* 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 *Ficus* trees on Maui include mynah birds (*Acridotheres tristis tristis*), blue faced doves (*Geopelia striata*), lace necked doves (*Streptopelia chinensis*), Japanese white-eye (*Zosterops japonicus*), and house sparrows (*Passer domesticus*), though there are probably more. Other animals, such as pigs, rodents, parrots, and monkeys may be capable of spreading fruit.

Pests and diseases: Brickell and Zuk (1997) report that 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.

DISTRIBUTION

Native range: *F. deltoidea* is native to S.E. Asia to Borneo, and the Philippines (Brickell and Zuk 1997). Riffle (1998) describes this species as indigenous to the southern Philippines southward and westward to Southeast Asia, Malaysia, and Indonesia. These areas are islands located between the Pacific Ocean and the South China sea. The vegetation type includes tropical rainforest. Average temperature ranges from over 68 F (20 C) in January to over 86 F (30 C) in July. Average annual rainfall is over 80 in (200 cm) (Hammond 1986).

Global distribution: *F. deltoidea* is cultivated in various parts of the world and is grown as a house plant in cooler regions. The following two specimen records were listed in the Missouri Botanical Garden (2002) specimen database: USA, Florida, Dade, Fairchild Tropical Garden, 5.5 m (18 ft), 25.37.00N 080.32.00W; and Malaysia, Selangor, 880-900 m (2,887-2,953 ft), 03.58N 101.38E.

State of Hawai'i distribution: The state wide distribution is not certain. Plants are capable of growing as epiphytes (Brickell and Zuk 1997), however, in Hawai'i, it has only been observed as planted in the ground on the islands of Kaua'i and Maui. On Kaua'i, this plant was observed in a mixed planting in the Sleeping Giant residential area. The plants ran along the front of a private property in a scrubby border probably planted as a wind break or privacy screen. The plants had long arching branches that were climbing in surrounding allspice (*Pimenta dioica*) and Surinam cherry (*Eugenia uniflora*). Fruits were present and no seeds or wasps were observed, nor any reproduction of the plant. The plants were robust in appearance and reached heights of 3-4 m, much larger than previously observed plantings on Maui.

Island of Maui distribution: On Maui, few locations of cultivated *F. deltoidea* have been observed. One is located at the Makawao Elementary school as a small shrub grown in a hedge with other plants. The shrub is small (about 1 x 1 m) and sheared. Fruits have been observed, though no wasps or sexual reproduction have ever been observed. The other is located in Pukalani and is similar to the planting in Makawao. In

addition, *F. deltoidea* was recently observed for sale at the Kula Ace Hardware store, so more locations are likely.

CONTROL METHODS

Physical control: Current plantings on Maui are small and can probably be dug up by hand.

Chemical control: "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." (Hammer 1996).

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 (Agaonidae) should be prevented from entering Hawai'i by adding them to the Department of Agriculture's injurious animals list in order to prevent spread of *F. deltoidea*. *Ficus* species could be added to the Department of Agriculture's noxious weed list. Alternative native plants and non-invasive non-natives other than *Ficus* species can be used in landscaping.

Noxious weed acts: None.

MANAGEMENT RECOMMENDATIONS

F. deltoidea is currently not spreading in Hawai'i due to the fact that its pollinator wasp has not yet been introduced. It is sparingly cultivated in Hawai'i and only a few specimens have been observed on the islands of Kaua'i and Maui. Though this species is not widely known as invasive elsewhere and is not widely planted in Hawai'i, if the associated pollinator wasp was introduced, there would be the potential for it to become naturalized. *Ficus* wasps should be placed on the Department of Agriculture's injurious animals list to prevent further introduction of associated pollinator wasps to prevent the spread of this and other species of *Ficus* in Hawai'i.

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