Bocconia frutescens

Tree poppy
Papavaraceae

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OVERVIEW

Bocconia frutescens, native to tropical America, is a large shrub to small tree in the poppy family that is cultivated in warm regions of the world as an ornamental to create a tropical look in gardens (Bailey and Bailey 1976, Riffle 1998). *B. frutescens* was introduced to Hawai'i as an ornamental (Wester 1992) and was first collected in 1920 on the island of Maui (Wagner et al. 1999). Since then, *B. frutescens* has spread to areas nearby and has become a serious invader in leeward native dry and mesic forests of East Maui with dense infestations from Kula to Kahikinui at elevations concentrating near 1,600 ft (488 m) to 4,000 ft (1,219 m). Seeds are dispersed by fruit eating birds and seedlings readily germinate in disturbed areas along roads, pastures, and on lava substrates. *B. frutescens* is also known from the island of Hawai'i, where it is being considered as a potential target for control by the Big Island Invasive Species Committee (BIISC). In Hawai'i, *B. frutescens* is listed as a noxious weed (HDOA 1992). On Maui, there is no current effort to control *B. frutescens* on an island wide level and eradication at this time may not be feasible due to the current widespread distribution and limited resources. However, control work is done within several rare native plant exclosures located in dry forests of Auwahi. Both mechanical and chemical control techniques have been used, however, *B. frutescens* is not easily controlled due to its large waxy surfaces, ability to re-grow if not completely removed, large seed sources from existing parent trees outside exclosures, and bird dispersed fruits. According to habitat and climate conditions in its native range, the potential range of *B. frutescens* on Maui could be much larger than it is currently in both wet and dry conditions. Potential areas of invasion that are currently free of *B. frutescens* could include mid elevation shrubland, stream and gulch corridors, and forested areas on the windward side of Haleakala. During baseline surveys of *B. frutescens* in 2001, a small group of naturalized *B. frutescens* plants were found in Makawao. Perhaps it would be feasible to control outlier locations, such as this one, to help prevent new infestation sites.

TAXONOMY

Family: Papavaraceae (Poppy family) (Wagner et al. 1999).
Latin name: *Bocconia frutescens* L. (Wagner et al. 1999).
Synonyms: None found.
Common names: *Bocconia*, Parrotweed, Plume poppy, Sea oxeye daisy, Tree poppy (ITIS 2001) Tree Celandine (GRIN 2001).

Taxonomic notes: *Bocconia* is a genus from Central and South America and the West Indies comprised of 6-10 species (Wagner et al. 1999). Species of the genus *Bocconia* are large leaved, tropical looking shrubs or small trees (Riffle 1998).
Nomenclature: This genus is named in honor of Paola Boccone who lived from 1633-1704 and was an Italian botanist as well as the grand duke of Tuscany (Wagner et al. 1999).
Related species in Hawai'i: No other species of *Bocconia* are known from Hawai'i. A similar species, *Bocconia arborea*, is also used in landscaping in the United States (Riffle 1998).

DESCRIPTION

"Branched shrubs; stems 2-6 m long, pith white. Leaves often somewhat congested toward the tips of the branches, oblong-obovate to oblong-lanceolate, 10-45 cm long, 4-20 cm wide, pinnately cleft ca. 1/2 to midrib, upper surface sparsely strigillose, lower surface glaucous and puberulent, especially along veins. Panicles densely branched, 20-60 cm long, bracts lanceolate, 2-5 mm long, pedicels 3-10 mm long; sepals erect, elliptic, 8-10 mm long; stamens 8-10 filaments filiform; anthers linear, pendent by the filaments at anthesis. Capsules grayish at maturity, pulp pale yellow, ca. 12 mm long, stipe ca. 5 mm long. Seed 1, black, 6-7 mm long, the surface smooth and glossy, the lower 1/2 - 1/3 covered with a red, pulpy aril." (Wagner et al. 1999).

BIOLOGY & ECOLOGY

Cultivation: *B. frutescens* is cultivated in warm areas of the world to create a tropical look (Riffle 1998). The thick orange latex from species of *Bocconia* were used by natives of Mexico and Central America as a dye (Riffle 1998). In Hawai'i, *B. frutescens* was originally introduced as an ornamental (Wester 1992). It is now illegal to grow in Hawai'i and is listed as a state noxious weed (HDOA 1992). On Maui, *B. frutescens* is no longer used in landscaping, but rather, comes up on its own as a weed in and nearby infested areas.

Invasiveness: In Hawai'i, *B. frutescens* has escaped from gardens and has invaded disturbed areas of roadsides, pastures, and native dry to mesic shrub and forest communities. On Maui, *B. frutescens* invades both dry and moist conditions from lower elevations up to as high as 5,800 ft (1,768 m) on the leeward slopes of Haleakala. *B. frutescens* has numerous bird dispersed seeds and readily germinates in lava substrates. Plants are large and form dense stands that crowd out and aggressively compete with native vegetation. In addition, mechanical and chemical control of this species is difficult. Plants often resprout after control and require persistence to completely control.

Pollination: Phenology studies on Maui by Chimera (in press) revealed that several Hymenoptera frequently visited the flowers of *B. frutescens*, including syrphid flies and honeybees (*Apis melifera*). Flowers are also wind pollinated (Tanner 1982).

Propagation: *B. frutescens* can be propagated from seeds and cuttings (Riffle 1998). Plants will begin to set fruit when about 4-6 years old (Chimera in press).

Dispersal: C. Chimera (in press) reported the following birds feeding on *B. frutescens* fruit on Maui: large numbers of Japanese white-eyes (*Zosterops japonicas*), one mockingbird (*Mimus polyglottus*), and one northern cardinal (*Cardinalis cardinalis*). The following birds occurred in the area, but were not observed feeding on fruits: common mynahs (*Acridotheres tristis*), house finch (*Carpodacus mexicanus*), black francolin (*Francolinus francolinus*), gray francolin (*F. pondicerianus*), ring necked pheasant (*Phasianus colchicus*). Chimera also found *B. frutescens* seeds in several *Z. japonicas* fecal samples. He further adds that the pattern of seedling distribution demonstrates that *B. frutescens* is dispersed by birds. In addition, *B. frutescens* seeds may be moved in contaminated soil or cinders from infested areas.

Pests and Diseases: Cattle may occasionally push over or harass *B. frutescens* plants (Chimera in press).

DISTRIBUTION

Native range: *B. frutescens* is native to Central and South America and the West Indies (Wagner et al. 1999). These areas are typically warm and humid with average annual rainfall amounts ranging from 40-over 80 in (100-over 200 cm) and average temperatures ranging from 50-over 86 F (10-over 20 C) in January to 68-over 86 F (20-over 30 C) in July (Hammond 1986). In its native range, *B. frutescens* is often found in disturbed sites, such as along roads and in secondary forests (Liogier 1985, Gentry 1993). In Jamaica, *B. frutescens* is commonly found along rivers (Hutchinson 1920) and in disturbed areas of tropical montane forests (Tanner 1982).

The following *B. frutescens* elevation ranges and locations have been compiled from a listing of collections from the Missouri Botanical Garden (2002) specimen database. Mesoamerica: Belize, 250-609 m (820-2,000 ft), 16.29.44N-18.01N, 88.53.35W-89.04W; Costa Rica, 1-3,160 m (3-10,367 ft), 08.31.30N-10.52.50N, 82.46W-85.24.29W; El Salvador, 600-1,600 m (1,968-5,249 ft), 13.16N-13.50N, 87.50W-89.55W; Guatemala, 400-1,829 m (6,000 ft), 14.39N-16.50N, 90.00W-91.48W; Honduras, 200-2,000 m (656-6,562 ft), 14.07N-15.15N, 87.10W-89.00W; Mexico, 840-1,850 m (2,756-6,069 ft), 15.06N-22.30N, 92.05W-100.30W; Nicaragua, 400-1,700 m (1,312-5,577 ft), 11.27N-13.35N, 85.37W-86.00W; Panama, 300-3,048 m (984-10,000 ft), 8.30N-8.50N, 82.10W-82.15W. South America: Bolivia, 1,100-2,100 m (3,609-6,890 ft), 15.40S-22.05S, 64.13W-68.04W; Colombia, 1,300-3,000 m (4,265-9,842 ft), 1.10N-6.19N, 72.50W-77.58W; Ecuador, 780-3,100 m (2,559-10,170 ft), 00.20N-1.22S, 78.02W-79.04W; Peru, 670-3,000 m (2,198-9,842 ft), 10.40S, 75.55W; Venezuela, 1,300-1,500 m (4,265-4,921 ft), 09.28N, 069.55W. Caribbean: 300-1,450 m (984-4,757 ft), 18.14N-23.13N, 66.08W-82.15W.

Global distribution: *B. frutescens* is cultivated in other warm areas of the world. It is not known to be invasive elsewhere, other than Hawai'i. However, Chimera (in press) points out that in its native range, *B. frutescens* has an aggressive and opportunistic habit.

State of Hawai'i distribution: *B. frutescens* is reported from disturbed sites, especially along roadsides, 550-920 m (1,804-3,018 ft) elevation, in dry forests on Maui and mesic

forests on Hawai'i (Wagner et al. 1999). A large infestation of *B. frutescens* occurs the island of Hawai'i, in Wood Valley. The area is a disturbed mesic to moist forest with residential areas nearby. In this area, *B. frutescens* forms the shrub layer in a *Falcataria moluccanna* canopy and *Panicum maximum* (guinea grass) understory. Wood Valley is located south of Hawai'i Volcanoes National Park at about 2,400 ft (732 m) elevation. This area receives approximately 80 in (203 cm) average annual rainfall (Juvik and Juvik 1998). A smaller population of *B. frutescens* is also known from Manuka Natural Area Reserve on the island of Hawai'i (Chimera report ??). This area is located south of Kona at an elevation of about 1,000 ft (305 m). The climate is slightly drier, receiving about 40 in (102 cm) rainfall (Juvik and Juvik 1998). Control of *B. frutescens* on Hawai'i island is being considered by BIISC.

Island of Maui distribution: *B. frutescens* was first found on Maui in 1920 by C.N. Forbes, who reported seeing a single 8 ft (2 m) tall tree on the old government trail in Kanaio (Medeiros et al. 1993, Wagner et al. 1999). By 1961, Fosberg reported that the *B. frutescens* infestation just south of Ulupalakua was very sparingly and locally naturalized, and by 1974, single plants were beginning to be found in Auwahi and Kula, but it was still considered to be eradicable (Fosberg and Sachet 1975). Today, *B. frutescens* is widely naturalized on leeward East Maui from Kula to Kahikinui from as low as 500 ft (152 m) to as high as 5,800 ft (1,768 m) elevation, with dense infestations occurring at elevations of 1,600-4,000 ft (487-1,219 m) (Chimera in press). *B. frutescens* is ubiquitous in areas it invades, scattered throughout the landscape in residential areas, pastures, natural areas, along roads, and on lava flows. Average annual rainfall in these areas is about 30-40 in (76-102 cm) (Juvik and Juvik 1998). During island wide surveys in 2001, a few naturalized plants were also observed in Makawao, and recently, a plant was observed in a potted plant in Ha'iku. These locations are separate from the larger continuous infestation located on the leeward side. It is also closer to mesic and wet forests on the windward side of the island that are currently free of *B. frutescens*, but could eventually become invaded in the future.

CONTROL METHODS

Physical control: Small *B. frutescens* seedlings can sometimes be pulled up by hand. However, once plants are larger than just a few inches, they tend to break off at the base when pulled and will re-sprout. Plants are harder to pull when firmly rooted in lava substrates.

Chemical control: No large scale control work has been done to date on Maui. Trials need to be done to find the most effective methods that fit the situation.

Foliar: Because *B. frutescens* plants are so large with large waxy leaf surfaces, foliar spray methods may be costly and inefficient. To kill large plants in a large area, spraying from helicopters may be effective.

Cut stump: The cut stump method using an herbicide such as Garlon 3A (triclopyr) is be an effective way to treat *B. frutescens* plants. This method allows minimal non-target effects and is effective with large plants or plants with numerous stems.

Basal bark application: Some trials have been done using a thin line basal bark method with Garlon 4 (triclopyr and surfactant). This method was not as effective as cut stump and resulted in re-growth. This method could be useful in smaller sized stands on trees with single trunks.

Biological control: There are no known biological control organisms currently used employed to control *B. frutescens*.

Cultural control: It could be suggested to the public that they not use this plant in landscaping and remove it if it grows in their yard, that they not move cinder or soil from infested areas to new areas, and that equipment and cars that move through infested areas be washed before moving on to uninfected sites.

Noxious weed acts: *B. frutescens* is listed as a Hawai'i state noxious weed (HDOA 1992), making it illegal to posses, propagate, or sell in Hawai'i.

MANAGEMENT RECOMMENDATIONS

In Hawai'i, *B. frutescens* has escaped from cultivation and is known to be naturalized on Maui and Hawai'i. *B. frutescens* forms a dense shrub layer in disturbed areas, along roads, and forested areas, crowding out and competing with native vegetation. On Maui, the infestation is large and island wide eradication may not be possible without large amounts of resources. Taking a more site led approach, this species is controlled in areas of biological richness, such as the protected dry forests of Kanaio and Auwahi. In its native range, *B. frutescens*, grows mainly in moist areas of upper elevations. On Maui, while *B. frutescens* seems so widespread, it is currently restricted to the somewhat dry leeward slope. The potential for this species to spread to new areas, especially disturbed edges of moist to wet forests is high. It may be prudent to control outliers, such as the Makawao and Ha'iku locations, to help slow the invasion to rain forests on the windward side of the island.

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