

Buddleia madagascariensis

Smoke bush
Buddleiaceae

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OVERVIEW

Buddleia madagascariensis, native to Madagascar, is a striking, fragrant ornamental shrub with a sprawling habit that is cultivated and naturalized in tropical areas of the world (Wagner et al. 1999). *B. madagascariensis* is an aggressive plant that is capable of spreading beyond the confines of the garden. *B. madagascariensis* invades disturbed areas and creates dense thickets capable of smothering other plants in the way. In Hawai'i, *B. madagascariensis* is reported from O'ahu, Maui, Hawai'i, and Kaua'i (Lorence and Flynn 1999, Wagner et al. 1999). On Maui, *B. madagascariensis* is not as widely planted as the popular related species, *B. davidii*. However, numerous naturalized populations of *B. madagascariensis* exist, whereas *B. davidii* is just sparingly naturalized. *B. madagascariensis* is readily observed in large, dense patches sprawling on other plants at mid-elevation sites, such as Kula, on the side of the road, in gulches, and waste areas. *B. madagascariensis* produces numerous seeds born in pulpy fruits on terminal clusters that are likely dispersed by birds. On Maui, control of this aggressive vine like shrub would require large amounts of resources. However, the potential range of this invader on Maui could be much more than the current distribution, and control will only become more expensive and less feasible with time. Areas likely threatened by invasion of *B. madagascariensis* include mid-elevation, cool, moist areas. The public could be discouraged from planting this aggressive plant. Plants that turn up in natural areas should be detected and controlled as early as possible to avoid large infestations.

TAXONOMY

Family: Buddleiaceae (Butterfly bush family) (Wagner et al. 1999). The genus has also been placed in Scrophulariaceae, Buddlejaceae, and Loganiaceae (GRIN 2002).

Latin name: *Buddleia madagascariensis* Lam. (Wagner et al. 1999).

Synonyms: *Adenoplea madagascariensis* (Lam.) Eastw., *Buddleja heterophylla* Lindl., *Buddleja madagascariensis* Lam., *Buddleja nicodemias*, *Nicodemias madagascariensis* (Lam.) R. Parker (Bailey and Bailey 1976, Brickell and Zuk 1997, Turner and Wasson 1997, Wunderlin and Hansen 2002).

Common names: Smoke bush, smokebush, butterfly bush, *Buddleia* bush, Madagascar butterflybush (Neal 1965, Wagner et al. 1999, Wunderlin and Hansen 2002, PLANTS 2002).

Taxonomy: *Buddleia* is a genus of about a 100 species of evergreen, semi-evergreen, and deciduous shrubs, trees, vines, and herbs from riversides, rocky, and scrub areas of tropical and subtropical Asia, Africa, and North and South America (Brickell and Zuk 1997, Wagner et al. 1999).

Nomenclature: The genus is named in honor of Reverend Adam Buddle (1660-1715), English botanist and vicar of Farmbridge in Essex (Wagner et al. 1999). The species name refers to the area of origin, Madagascar.

Related species in Hawai'i: Other *Buddleia* species cultivated in Hawai'i include: *B. asiatica* Lour., *B. japonica* Hemsl., and *B. davidii* Franch. (Neal 1965). *B. asiatica* is naturalized on O'ahu, Moloka'i, Lana'i, Maui, and Hawai'i (Wagner et al. 1999, Oppenheimer and Bartlett 2000) and is a fairly widespread weed in moist lowland areas. *B. davidii* is commonly cultivated and has occasionally escaped from gardens in cool, mid-elevation areas of Kaua'i and Maui (Shannon and Wagner 1996, Wagner et al. 1999, Starr et al. in press).

DESCRIPTION

"Sprawling shrubs 2-3(-8) m tall; stems densely tomentose. Leaves opposite, narrowly ovate, 7-12 cm long, 2-4.5 cm wide, upper surface glabrous, lower surface densely tomentose, margins entire, petioles 1.5-2.5 cm long. Flowers in terminal, thyrsoid cymes; calyx campanulate, ca. 3 mm long, densely tomentose, the lobes ca. 0.5 mm long; corolla orange, densely tomentose externally, glabrous within; ovary pubescent. Fruit white, becoming bluish purple at maturity, fleshy, globose, indehiscent, ca. 2.5 mm in diameter. Seeds ellipsoid, ca. 1 mm long." (Wagner et al. 1999).

BIOLOGY & ECOLOGY

Cultivation: *B. madagascariensis* is widely cultivated in tropical and subtropical areas of the world (Wagner et al. 1999). It is grown in California and other mild climates (Bailey and Bailey 1976). With a vigorously scrambling growth habit, this species makes a good wall shrub in cold but mild climates (Turner and Wasson 1997). On Maui, *B. madagascariensis* is not as commonly cultivated as the related *B. davidii*. However, it is more commonly naturalized than *B. davidii*, which is just beginning to show signs of spread in Kula.

Invasiveness: Turner and Wasson (1997) warn that, in warmer climates, *B. madagascariensis* is rampant and invasive. It has been recognized as a weedy plant in many places where it has been planted, including Florida, Australia, South Africa, and some Atlantic Islands (Binggeli 1999, Foxcroft 1999, The Environmental Conservation Section 1999, Randall 2002). In Hawai'i, Smith (1998) reports the following about *B. madagascariensis*. "It is an early invader of heavily disturbed areas. Its rapid growth enables it to overtop the slower growing native species. Eventually it can be overtopped by trees. It resprouts after fire and replaces the old stand within a year." On Maui, *B. madagascariensis* is a vigorous grower and can be observed spreading in large thickets and competing with other vegetation nearby in disturbed gulches, roadsides, waste areas, and on walls. In addition to aggressive growth, it produces numerous seeds that are likely dispersed by birds.

Pollination: *Buddleia* species are well known for their ability to attract butterflies, bees, other insects, and hummingbirds to their sweet smelling flowers (Brickell and Zuk 1997), which may play a role in pollination.

Propagation: Bailey and Bailey (1976) report that *Buddleia* species can be propagated by seeds and cuttings.

Dispersal: *Buddleia* species are commonly cultivated and sold as ornamental plants throughout the world. The amethyst purple colored fruits contain sticky pulp inside and numerous tiny seeds. The fruits are possibly attractive as food for birds or other animals and could presumably be dispersed after ingestion. Fruits could also be washed down ravines during heavy rains. Pieces of stems produce roots in the right conditions and plants may be dispersed in discarded garden debris.

Pests and diseases: Brickell and Zuk (1997) report that *Buddleia* species are susceptible to capsid bugs, caterpillars, weevils, spider mites, and fungal leaf spots and die backs may also occur.

DISTRIBUTION

Native range: *B. madagascariensis* is native to Madagascar (Wagner et al. 1999).

Global distribution: *B. madagascariensis* is widely cultivated and often becoming naturalized in tropical and subtropical regions (Wagner et al. 1999). It is cultivated in Fiji (PIER 2002). *B. madagascariensis* has been recognized as a weedy plant in many places where it has been planted, including Florida, Australia, South Africa, and some Atlantic Islands (Binggeli 1999, Foxcroft 1999, The Environmental Conservation Section 1999, Randall 2002).

State of Hawai'i distribution: *B. madagascariensis* is cultivated and recently becoming naturalized in mesic areas, 900-1,200 m (2,953-3,937 ft), at least near Volcano transfer dump, Hawai'i, Koke'e, Kaua'i, and East Maui (Lorence and Flynn 1999, Wagner et al. 1999, Oppenheimer and Bartlett 2000). Wagner et al. (1999) report the following collection information for *B. madagascariensis* in the state of Hawai'i. "First naturalized collection made on Hawai'i in 1984, but collected earlier from cultivated or escaped plants: in 1931 on O'ahu, in 1972, Hana Highway, Maui, and in 1975 at Volcano transfer dump." On Kaua'i, Lorence and Flynn (1999) documented *B. madagascariensis* as naturalized from Koke'e State Park, 3,760 ft (1,146 m) elevation. Oppenheimer and Bartlett (2000) confirmed it as naturalized on Maui from several collections, including Hana Hwy., 366 m (1,200 ft) elevation, and sites in Kula, 872 m (2,860 ft) and 1,067 m (3,500 ft) elevation. *B. madagascariensis* has been targeted for control by the Big Island Invasive Species Committee (BIISC).

Island of Maui distribution: *B. madagascariensis* is cultivated and naturalized in many areas on Maui, especially Kula, but also in Makawao, Ha'iku, Olinda, and on the way to Hana. Average annual rainfall amounts in these areas range from approximately 30 in (76 cm) in Kula to over 200 in (508 cm) on Hana Hwy. (Juvik and Juvik 1998). This plant has recently been collected as naturalized in the Copp Rd. area of Kula, where it appears to be well established (Oppenheimer and Bartlett 2000). Scattered naturalized individuals are also currently found in the core area of infestation from 2,000-4,000 ft (609-1,219 m) elevation, Kula, along Kula Hwy. and Kekaulike Hwy. Large dense

patches of *B. madagascariensis* can be seen in this area, sprawling in gulches, along roads, and in waste areas. Along the Hana Hwy., *B. madagascariensis* was observed growing up into a native koa tree (*Acacia koa*). Eventually, the koa gave way to the weight of the *B. madagascariensis*, fell over and died. *B. madagascariensis* has also been observed on the side of rock walls and sprawling down banks.

CONTROL METHODS

Physical control: No control methods have been tested for *B. madagascariensis* on Maui. It is likely that small seedlings and plants can be pulled out by hand. Though, patches are usually large with stems rooting at the nodes and this technique would likely be tough.

Chemical control: No herbicidal treatments have been tested on Maui. It is likely that a foliar spray may work. Or perhaps a cut stump treatment would be more effective and efficient. PIER (2002) reports the following from Kaua'i. "Katie Cassel of the Koke'e Natural History Museum reported good control of stems <3 in (7 cm) diameter with triclopyr ester at 20% in crop oil applied to basal bark and to larger stems that were frilled."

Biological control: There are no known biological control programs currently for *B. madagascariensis*. There are very few pest on Maui that affect *B. madagascariensis* and plants are typically healthy and undamaged.

Cultural control: It could be suggested to Maui residents that they not plant *B. madagascariensis* or other harmful plants that may spread and grow out of control.

Noxious weed acts: None known. However, it is a prohibited plant in personnel villages of Kruger National Park, South Africa (Foxcroft 1999).

MANAGEMENT RECOMMENDATIONS

B. madagascariensis is occasionally cultivated on Maui and displays aggressive behavior, especially in mid-elevation sites, such as Kula, and lowland moist to wet sites, such as near Puaa Kaa Wayside on the road to Hana. In these areas, it is observed in large dense patches, sprawling in gulches, along roadsides, and in waste areas. The aggressive behavior of *B. madagascariensis* and ability to spread vegetatively, smothering other plants in its path, coupled with prolific seed set of presumably bird dispersed berries, could lead to further spread of this plant. Island wide eradication would take large amounts of resources and may not be feasible at this time. However, it is likely that *B. madagascariensis* will continue to spread if left unchecked and that the full potential range on Maui is not yet occupied. Early detection in vulnerable natural areas and rapid control may help contain infestations in the future. The public could be educated not to plant *B. madagascariensis* and other invasive plants.

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