

# *Anredera cordifolia*

Madeira vine

Bassellaceae

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## OVERVIEW

*Anredera cordifolia*, native from Paraguay to southern Brazil and northern Argentina, is widely cultivated as an ornamental vine in tropical regions of the world (Wagner et al. 1999). *A. cordifolia* has become a major pest in places where it is cultivated, such as Hawai'i, Australia, New Zealand, South Africa, and other Pacific Islands (HDOA 1992, Auckland Regional Council 1999, PIER 2000, Weeds Australia 2000). Invasive characteristics include an ability to readily escape cultivation via dispersal of tuberous roots, aggressive, smothering, and vining nature, and difficulty in control once established. Though listed as a Hawai'i state noxious weed, *A. cordifolia* is already fairly established in some areas and is naturalized on all of the main Hawaiian islands, but is not documented from Ni'ihau and Kaho'olawe (Nagata 1995, Wagner et al. 1999). On Maui, *A. cordifolia* is currently not sold or distributed as a landscape plant, but persists from previous plantings in older neighborhoods and estates, and is naturalized in disturbed areas, gulches, along old rock walls, and adjacent to initial plantings. There is no control work currently being done to remove existing plants. It has not been observed invading natural areas on Maui yet.

## TAXONOMY

**Family:** Basellaceae (Basella family) (Wagner et al. 1999).

**Latin name:** *Anredera cordifolia* (Ten.) Steenis (Wagner et al. 1999).

**Synonyms:** *Boussingaultia cordifolia* Ten.; *B. gracilis* Miers; *B. g. f. pseudo-basselloides* Haum. (Wagner et al. 1999).

**Common names:** Madeira vine, mignonette vine, lamb's tail, *Anredera* (Wagner et al. 1999, PIER 2000)

**Taxonomic notes:** The genus *Anredera* is comprised of 5-10 species from tropical America (Wagner et al. 1999). Plants in this genus typically have tuberous roots and are evergreen climbers found in dry scrub and thickets in South America (Brickell and Zuk 1997).

**Nomenclature:** The name is probably derived from a person's name, or from the Spanish word, *enredadera*, meaning creeping or climbing plant (Wagner et al. 1999).

**Related species in Hawai'i:** There are no other species of *Anredera* known from Hawai'i.

## DESCRIPTION

"Plants from thick rhizomes; stems usually 3-6 m long. Leaves ovate, or sometimes lanceolate, 1-11 cm long, 0.8-8 cm wide, producing small axillary tubercles at base.

Racemes simple or 2-4 branched, 4-30 cm long, pedicels 1.5-2 mm long, each flower subtended by a minute persistent bract; receptacle cup-shaped by 2 persistent hyaline bracteoles, the upper 2 greenish white, broadly elliptic to suborbicular, ca. 1-2 mm long; corolla white, the lobes ovate-oblong to elliptic, 1-3 mm long; stamens white; style white, 3-cleft nearly to base. Fruit unknown. Fruit has not been observed on plants in Hawai'i and plants are assumed to spread by the axillary tubers." (Wagner et al. 1999).

## **BIOLOGY & ECOLOGY**

**Cultivation:** *A. cordifolia* is widely cultivated in Hawai'i and in other tropical regions of the world (Wagner et al. 1999). *A. cordifolia* is a fast growing twiner with succulent leaves and fragrant white flowers. It can be trained to twine up trellises, fences, or rock walls for decoration or for screening.

**Invasiveness:** *A. cordifolia* has several characteristics that contribute to its invasiveness, including a history of weediness in warm, moist climates, aggressive vegetative growth which competes with and replaces other vegetation, and difficulty of control once established. *A. cordifolia* has escaped from cultivation to become a serious pest in many places where it has been planted, including Hawai'i, Australia, New Zealand, South Africa, and other Pacific Islands (HDOA 1992, Auckland Regional Council 1999, PIER 2000, Weeds Australia 2000). Its aggressive vining nature gives it the potential to smother other desirable plants. Growth rates of stems in warmer and moister regions can exceed 1 m (3 ft) per week (LCC 2001) and up to 6 m (20 ft) in a growing season (Neal 1965). According to the Lismore County Council in Australia (LCC 2001) "With fleshy leaves and aerial tubers, *A. cordifolia* is one of the heaviest of problem vines. Its sheer weight is capable of breaking branches off trees, thereby reducing them to poles, potentially causing collapse of the rainforest canopy." Control of this species is difficult because both underground and aboveground tubers must all be destroyed or removed. In Australia, aerial tubers were reported to live for 5 years in the canopy after the vine was cut and were still able to sprout after this time. Densities of up to 1,500 tubers per square meter have been reported (LCC 2001). In South Africa, *A. cordifolia* is spreading quickly and is competing for light, space, and water, smothering and replacing native vegetation, and is very difficult to control once established due to numerous aerial tubers that drop off and generate new plants (Wildy 2002).

**Pollination:** The flowers of *A. cordifolia* plants near Hamakuapoko, Maui appeared to have both male and female parts and were readily visited by various Hymenoptera, including many bees, wasps, and ants. Plants at this site did not appear to set fruit.

**Propagation:** *A. cordifolia* can be propagated from root divisions and softwood cuttings (Brickell and Zuk 1997). There have been recent sitings of seedlings in Australia, where seed was previously thought to not be viable (Bushcare 2001).

**Dispersal:** *A. cordifolia* is spread by people in landscaping efforts, both intentionally and unintentionally. The vine escapes from cultivation spreading vegetatively and through pieces of rhizome and stem tubers that separate from the parent plant. Plants can

also spread in green waste. The tubers may also spread by washing down stream or possibly along the coast in the ocean (Haley 1997).

**Pests and Diseases:** Plants in greenhouses may be susceptible to aphids and spider mites (Brickell and Zuk 1997).

## **DISTRIBUTION**

**Native range:** Native from Paraguay to southern Brazil and northern Argentina (Wagner et al. 1999). This region of South America is located roughly at 20-30 degrees in the southern hemisphere and is mostly made up of forest, grassland, cropland, woodland, and scrub (Hammond 1986). Average temperatures in this area range from 68-over 86 F (20-over 30 C) in January and from 50-86 F (10-30 C) in July. Average annual rainfall in this area varies from 20-80 in (50-200 cm) (Hammond 1986).

**Global distribution:** *A. cordifolia* is widely cultivated in tropical regions. It is known as a pest plant in Hawai'i, Australia, New Zealand, South Africa and other Pacific Islands (HDOA 1992, Auckland Regional Council 1999, PIER 2000, Weeds Australia 2000). In New Zealand, Haley (1997) reports that, "Madeira vine is a pest in coastal localities, wastelands, especially shrub covered areas such as coastal gullies where it smothers other vegetation and has become a nuisance in Auckland when it spreads away from roadside dumps and neglected gardens." In Queensland and New South Wales, Australia, it is a weed in riparian areas and edges of rainforest where it has been implicated as one of the most destructive weeds of rainforest and coastal remnants (LCC 2001). In South Africa, *A. cordifolia* is also a garden escape that is spreading quickly and is now found both at the coast and inland invading woodland and open space (Wildy 2002). *A. cordifolia* is also known from several other Pacific Islands including the Cook Islands, Kermadec Islands (Raoul) where it is a serious weed, Niue, and Norfolk (PIER 2001).

**State of Hawai'i distribution:** *A. cordifolia* was first collected in 1940 on the island of O'ahu, but is believed to have been introduced during the early part of the 20th century (Wagner et al. 1999). *A. cordifolia* is naturalized probably on all of the main Hawaiian islands, but with no documentation from Ni'ihau and Kaho'olawe (Nagata 1995, Wagner et al. 1999).

**Island of Maui distribution:** Baseline surveys of *A. cordifolia* done by the authors on Maui during 2000-2001 revealed over 20 sites of mostly naturalized populations. Location elevations range from sea level up to 3,500 ft (1,067 m). Average annual rainfall in these areas is approximately 30-80 in (76-203 cm) (Juvik and Juvik 1998). The sites were typically in urban and residential areas, mostly in Ha'iku, Makawao, Ulupalakua, and Kaupo, but also in Wailuku, Waihe'e, Honokawai, and Kipahulu where *A. cordifolia* sprawls down gulches, on steep banks, along roads, up trees, and along old rock walls. At most of these sites, *A. cordifolia* covered large areas, spreading vegetatively from initial plantings, sometimes up to 30 ft (9 m) tall in trees, forming thick blankets in vegetation and on walls.

## **CONTROL METHODS**

**Physical control:** Physical control of *A. cordifolia* is very difficult. Wildy (2002) suggests placing a plastic sheet below the plant before any manual control is done so that all parts of the plant, especially aerial tubers, can be removed. All parts of the vine must be removed, including underground tubers and vines climbing up trees to prevent them from resprouting.

**Chemical control:** The vine is hard to kill with chemicals due to its numerous tubers, succulent waxy leaves, and numerous roots (Haley 1997).

*Foliar spray:* Haley (1997) recommends that after all tubers are removed, use a foliar spray of Escort, Roundup, and Pulse on plants and tubers as soon as green sprouts have two or four leaves on each sprout. Timing of follow spraying is important because if left too long, new underground tubers will form, prolonging successful control. Wildy (2002) suggests trying a foliar spray of Garlon 4 (triclopyr) mixed with water 50 ml/10 l.

*Cut stump:* Australians (LCC 2001) report that scraping stems at staggered intervals then applying 100% Roundup (glyphosate) is the only recommended control method. Aerial stems should be cut at both ends and dipped in Roundup (Bushcare 2001).

**Biological control:** None noted.

**Cultural control:** It could be suggested that the public not plant or spread plants to new areas. Tubers and parts of the plant could be double bagged and thrown away in the trash or piled in one location on site. Precaution could be taken to not spread green waste to uninfected areas.

**Noxious weed acts:** In Hawai'i, *A. cordifolia* is listed on the 1992 Hawai'i state noxious weed list (HDOA 1992). In New Zealand, *A. cordifolia* is prohibited from propagation, sale, distribution, and commercial display (Haley 1997). It is declared a "Total Control Plant Pest" within the Waitakere Ranges and Great Barrier Island area, meaning that land occupiers within this area are required to control infestations growing on their land. Throughout the rest of the Auckland region, it is declared a "National Surveillance Plant Pest", meaning that land occupiers are encouraged to remove or control the plant growing on their land, but without legal obligation (Auckland Regional Council 1999). In Australia, *A. cordifolia* is listed as an environmental weed, category W4c, of North Coast NSW, meaning it must not be sold, propagated or knowingly distributed, and the weed must be prevented from spreading to an adjoining property (Greening Australia 1997, Weeds Australia 2000). In South Africa, *A. cordifolia* is a category 1 declared alien invader, the strictest category of weeds, meaning that it may not occur on any land or inland water surface other than in a biological control reserve, it may not be planted, maintained, multiplied, propagated, imported, or sold (Wildy 2002).

## MANAGEMENT RECOMMENDATIONS

*A. cordifolia* readily escapes the garden and is a pest plant in many places where it has been cultivated. *A. cordifolia* is a Hawai'i state noxious weed, which should help to slow current and future dispersal of this plant to new areas through the horticulture trade.

Current spread in Hawai'i is mostly vegetative from initial plantings and when parts of existing plants are moved to new areas. There are currently no control efforts being done on existing plants. This species is very difficult to control and has invaded mainly in disturbed areas. Landowners could be educated not to spread the plant in green waste and not to share the plant with their neighbors. Landowners could also help by controlling or containing infestations on their property to limit spread to adjacent lands. *A. cordifolia* should be monitored for new locations, especially in natural areas, which should be controlled as soon as possible to avoid establishment.

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