

Lonicera japonica

Japanese honeysuckle

Caprifoliaceae

Forest Starr, Kim Starr, and Lloyd Loope
United States Geological Survey--Biological Resources Division
Haleakala Field Station, Maui, Hawai'i

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OVERVIEW

Lonicera japonica, native to Asia, is an ornamental groundcover that is commonly planted in many areas of the world for its sprawling habit, numerous sweetly fragrant white flowers, ability to quickly cover bare or steep ground, and attractive evergreen foliage. *L. japonica* has escaped from cultivation in several places, becoming a major nuisance, and is restricted in parts of North America and New Zealand (Auckland Regional Council 1997, Nuzzo 1997, GRIN 2002). Invasive attributes include the ability to invade forest edges, disturbed woods, and floodplains, a climbing and smothering habit, and rapid growth once established. Despite a notoriously invasive history, *L. japonica* is still widely sold and planted. In Hawai'i, spread by *L. japonica* into adjacent lands on Maui has been mainly through vegetative reproduction and it was originally thought that plants did not produce fruit. Viable seed producing plants were recently found on O'ahu and Maui (Wagner et al. 1999, Starr et al. 2002). On Maui, fruits were observed at various elevations from near sea level up to about 4,200 ft. elevation. Fruit producing plants allows for more rapid long distance dispersal by birds and other animals. *L. japonica* is already fairly widely planted on Maui and probably not feasible to control on an island wide level. However, it is not yet invading natural areas and publicity to discourage future plantings, monitoring spread of existing plants, and rapid control in newly invaded areas may help in avoiding costly large scale control efforts in natural areas in the future.

TAXONOMY

Family: Caprifoliaceae (honeysuckle) family (Wagner et al. 1999).

Latin name: *Lonicera japonica* Thunb. (Wagner et al. 1999).

Synonyms: *Nintooa japonica* (Thunb.) Sweet (Wisconsin State Herbarium 2002).

Common names: Japanese honeysuckle, *honekakala* (Wagner et al. 1999), Chinese honeysuckle (Williams and Timmins 1997).

Taxonomic notes: *Lonicera* is a genus of more than 150 species of shrubs and woody twining climbers, found in North America and Eurasia south to northern Africa, the Philippines, and southwestern Malesia (Wagner et al. 1999). Several varieties of *L. japonica* exist in cultivation. Apparently, the variety "Halliana" is the more commonly grown, invasive variety and is distinguished from other *L. japonica* varieties by its pure white flowers that turn yellow with age (Brickell and Zuk 1997).

Nomenclature: The genus name, *Lonicera*, refers to Adam Lonitzer, German naturalist, and the species name, *japonica*, refers to part of its native range, Japan (Nuzzo 1997).

Related species in Hawai'i: Other *Lonicera* species cultivated in Hawai'i include *L. hildebrandiana* Coll. and Hemsl. (large honeysuckle) with flowers up to 7 in long, *L. nitida* Wils. (bush honeysuckle) with shrubby habit, and *L. heckrottii* Rehd. (pink honeysuckle) with nearly stemless leaves and pink flowers born 6 together (Neal 1965). On Maui, *L. japonica* is the most widely planted species in the genus. *L. hildebrandiana* is known on Maui from a single planting in Makawao. The other species have not been observed.

DESCRIPTION

"Sprawling and twining lianas; young stems pubescent. Leaves ovate, elliptic, oblong, or broadly lanceolate, blades 3-8 cm long, 1-3.5 cm wide, pubescent, becoming glabrate above, entire or young lower leaves sometimes lobed. Flowers 2 in axillary cymes, bracts 1-2 cm long, bracteoles suborbicular, ca. 1 mm long; corolla white, turning yellowish or tinged pink, 2-lipped, 2-3 cm long. Berries bluish black, globose, 6-7 mm in diameter." (Wagner et al. 1999).

BIOLOGY & ECOLOGY

Cultivation: *L. japonica* has been widely cultivated as an ornamental plant, as a road bank stabilizer, and as food and shelter for wildlife (Handley 1945). Some varieties have been used in Chinese medicine since the Tang dynasty in 659 AD (Turner 1997).

Invasiveness: *L. japonica* is considered a major pest in the United States due to its ability to escape from cultivation and invade both disturbed and natural areas. It has a smothering habit and can engulf small shrubs and trees that it climbs (Nuzzo 1997). Through both above and below ground competition, this aggressive vine seriously alters or destroys the understory and herbaceous layers of the communities it invades, including prairies, barrens, glades, flatwoods, savannas, floodplain and upland forests. *L. japonica* also may alter understory bird populations in forest communities (Nyboer 1990). In deciduous forests, the semi-evergreen condition of *L. japonica* allows for growth both prior to and after dormancy of other deciduous plants. Vegetative runners are most prolific in the open sun and will resprout where touching the soil, forming mats of new plants. *L. japonica* will display little growth under moderate shade. In deep shade, runners develop but often die back. *L. japonica* flowering and seed development are heaviest in open-sun areas. Seedling establishment and growth is slow in the first 2 years of development of a new *L. japonica* colony (Nyboer 1990). In New Zealand, *L. japonica* infests forests and climbs over shrublands or low canopy trees, especially on forest margins (Williams and Timmins 1997). *L. japonica* may form a complete blanket over small trees and shrubs. *L. japonica* is becoming an increasingly troublesome species of shrubland, forest margins, and open roadsides (Arulambalam 1998). In addition, *L. japonica* is toxic if large quantities are eaten. Effects from eating large quantities of *L. japonica* fruit include vomiting, diarrhea, pupil dilation, cold sweat, rapid heartbeat, respiratory failure, convulsion, and coma (Russell 1997).

Pollination: In North America, indigenous hawk moths (Sphingidae), wax moths (Gelechiidae), syrphid flies (Diptera), and bees (Hymenoptera: *Apis mellifera*, *Bombus*

spp., and hornets) have been observed extracting pollen from flowers (Williams and Timmins 1997).

Propagation: *L. japonica* can be grown from cuttings and seeds (Dehgan 1998). Fruits are dark black berries containing several seeds surrounded by pulp. Examination of 33 fruits collected from sites in Kula on December 1998 on Maui showed that each fruit contained anywhere from 1 - 10 seeds and that fruit diameter varied from 3-8 mm. Germination of two sets of seeds (50 seeds each) collected from two sites in Kula resulted in a germination rate of 2% for one set of seeds and 54% for the other set of seeds. It is uncertain what caused the differing rates of germination, but the seeds did prove to be viable.

Dispersal: In Hawai'i, *L. japonica* was previously thought to not bear fruit (Wagner et al. 1999). Recently, fruit has been observed on both Oahu (Wagner et al. 1999) and on Maui (Starr et al. 2002). Viable fruit bearing plants allows dispersal by birds and other animals into areas far from parent plants. A wide range of birds are known to feed on fruit in North America from turkeys to small passerines (Williams and Timmins 1997). Because of the high water content in the fruit, the seeds pass quickly through birds (Handley 1945).

Pests and Diseases: *L. japonica* is described as "pest free" by Dehgan (1998). Brickell and Zuk (1997) report the following pests: aphids, leaf roller, scale insects, dieback, powdery mildew, leaf spots, and blights. *L. japonica* responds rapidly to browsing by several mammals, such as goats, deer, and possums (Williams and Timmins 1997).

DISTRIBUTION

Native range: *L. japonica* is native to Asia (Wagner et al. 1999).

Global distribution: *L. japonica* is becoming a serious weed in areas such as eastern North America and New Zealand. Other areas where *L. japonica* has invaded and is now widespread include Hawai'i, southern parts of Australia through New South Wales and Victoria, where it is regarded as a very serious threat to native vegetation (Carr et al. 1992), and wastelands in parts of Southern Chile (Williams and Timmins 1997).

In North America, *L. japonica* was introduced in 1806 to Long Island, New York, and, the similar, more aggressive, and now more widespread variety "Halliana" was first introduced in 1862 to Flushing, New York (Leatherman 1955). The first documentation of its spread was in 1904 (Andrews 1919; Leatherman 1955). It has been widely cultivated since then as an ornamental and roadside bank stabilizer. Today, *L. japonica* is widespread throughout the United States. *L. japonica* has been documented from at least 42 states (PLANTS 2001), where it has been found to grow up to 5,905 ft (1,800 m) in both open and shaded areas, with annual precipitation in invaded areas averaging 100-120 cm (39-47 in), and temperatures as low as -8 to -15 degrees C (17 to 5 degrees F (Sasek and Strain 1990). Naturalized plants have been documented from as far west as California at elevations between 0 and 3,281 ft (0-1,000 m) (CalFlora 2002). To the south, *L. japonica* is found in Florida and Texas (PLANTS 2001). The only states

currently free of *L. japonica* include those in the central northwest. *L. japonica* readily invades open natural communities, often by seeds spread by birds. An aggressive colonizer of successional fields, this vine also will invade mature forest and open woodlands. Forests with either natural or unnatural openings are often invaded by *L. japonica* when birds drop seeds into these light gap areas. Deep shading reduces the amount of invasion (Nyboer 1990).

In New Zealand, *L. japonica* was being sold for horticulture use in 1872 (Esler 1988), and was first collected from the wild in 1926. Habitats invaded in New Zealand include shrublands, forest margins, disturbed or secondary forest, wetland margins, coastal areas and inshore islands, roadsides, farm hedges, wasteland, rough pasture, modified lowland forest. *L. japonica* is more vigorous in deeper valley soils (Arulambalam 1998). Today, *L. japonica* is widespread in North Island and northern South Island but is uncommon in the south part of South island (Williams and Timmins 1997). *L. japonica* grows from sea level to 743 m (2,438 ft) on North Island (Williams and Timmins 1997). Typical areas invaded in New Zealand include the hilly landscapes where there are untrimmed roadsides and unattended land and associated areas of shrubbery, scrub, and forest remnants (Williams and Timmins 1997). In these areas, *L. japonica* is described as "patchy" and displays a distribution pattern similar to other weedy plants whose primary dispersal agent is humans, with secondary spread occurring by birds and other animals. After a gradual secondary spread, plants become established then spread vegetatively, and so on (Williams and Timmins 1997). Once established, plants are difficult to remove.

In addition, the following specimens were listed in the specimen database of the Missouri Botanical Garden (2002). USA: California, Alameda: 37.36.00N 121.53.00W, 25 Oct 1999; Missouri, Barton: 37.30.22N 094.31.33W, 31 Aug 2001; and Washington, King: 47.28.00N 121.49.00 W, 14 Jul 1999. MESOAMERICA: El Salvador, San Salvador: 800 m (2,625 ft), 13.40N 089.15W, 12 Jan 1989; Guatemala, Baja Verapaz: 15.05N 90.20W, 28 Jul 1971; Honduras, Francisco Morazan: 1,500 m (4,921 ft), 14.15N 87.10W, 11 Mar 1978; Mexico, Chiapas: 16.30N 92.30W, 7 Apr 1988, Nicaragua, Managua: 220 m (722 ft), 12.07 N 086.16W, 6 Dec 1979; and Panama, Chiriqui: 2000-2300 m (6,562-7,546 ft), 8.30N 82.15W, 22 Apr 1975. SOUTH AMERICA: Colombia, Antioquia: 1700-1980 m (5,577-6,496 ft), 07.05N 075.32W, 11 Jul 1992; and Ecuador, Pichincha: 2600 m (8,531 ft), 00.11S 78.21W, 3 Nov 1991.

State of Hawai'i distribution: In Hawai'i, the first naturalized collection of *L. japonica* was made in 1951 (Wagner et al. 1999). Today, *L. japonica* is widely cultivated. It is escaping cultivation in cool, mesic to wet areas in Koke'e State Park, Kaua'i, on O'ahu, East Maui, and near Volcano and slopes of Hualalai, Hawai'i (Wagner et al. 1999, Starr et al. 2002).

Island of Maui distribution: On Maui, *L. japonica* has been planted widely in a variety of conditions from sea level up to 4,200 ft (1,280 m), in dry and wet areas, in shade and full sun, and in a variety of soils. *L. japonica* is densely planted in residential and urban areas of "Upcountry" including Makawao, Pukalani, and Kula as well as in a few lower

elevation urban areas including Kahului and Wailuku. It is less densely planted in lower elevation areas of Lahaina, Kihei, and Hana. Plantings vary from small individual residential ornamentals to large scale mass planting projects such as on steep banks bordering schools, houses, and other buildings, or as a bedding plants in parking lots. Fruit was observed at various elevations in the winter months (December and January) of 1998. Few naturalized or wild populations can be found to date on Maui, most of which are spreading vegetatively from initial plantings. Several naturalized locations were observed from 3,000-4,200 ft (914-1,280 m) in the cool arid climate of Kula. Two naturalized populations are located below Haleakala National Park, on Crater Road, Kula at 4,000 ft (1,219 m) and 4,200 ft (1,280 m) elevation. The average annual rainfall in this area is about 40 in (Juvik and Juvik 1998). One naturalized population is in full sun, possibly spread vegetatively from a nearby planting. The other is in the full shade growing in a grove of *Eucalyptus* spp., possibly spread by bird dispersal, though this may be an old house site or abandoned water tank, suggesting the plants could have been planted and are persistent. Recently, naturalized plants were also observed at low elevations on a stream bank in the wet area near Wahinepe'e upslope of the Hana Hwy. Average annual rainfall in this area is about 100 in (254 cm) (Juvik and Juvik 1998). On West Maui, *L. japonica* was planted near the Hilau cabin and are spreading vegetatively into the adjacent gulch at an elevation of 3,000 ft (914 m). Average annual rainfall is about 120 in (304 cm) (Juvik and Juvik 1998). This site is in close proximity to pristine wet forests of West Maui. Another semi-wild population is at the Waikapu golf course on West Maui, located at about 800 ft (244 m) elevation, spreading vegetatively into the unmaintained surrounding disturbed forest. Average annual rainfall at this site is about 30 in (76 cm) (Juvik and Juvik 1998).

CONTROL METHODS

Physical control:

Cutting: Vines may be chopped just above ground level. Cutting is repeated every two weeks to deplete nutrient reserves in the roots and prevent resumption of photosynthesis. Cutting does not affect roots, which will continue to grow until their energy and nutrient supplies are depleted (Cacek 1998). Mowing limits the length of *L. japonica* vines, but will increase the number of stems produced (Nyboer 1990).

Flaming: By placing a kerosene torch over leaves on the same schedule as cutting, foliage is wilted and nutrient supplies in the roots are depleted. As with cutting, flaming will not affect roots.

Burning: Although few quantitative studies occur in the literature, Barden and Matthews (1980) recommend controlled burning. Two annual burns in an experimental plot reduced honeysuckle crown volume by 80%. Ground cover was reduced by 35%. Fires killed most aboveground vines, but ground cover was maintained by re-sprouting roots. Burning may be combined with previous flaming, which wilts and dries leaves, providing fuel for the burn (Cacek 1998).

Grubbing: Consists of mechanical removal and destruction of the entire plant, including the root. If all root tissue is removed, no regrowth can occur, and repetition is not

necessary. Grubbing is labor intensive and may be locally destructive. Grubbing is most effective from fruiting to winter and early spring when plant reserves are lowest.

Grazing: Controlled grazing by goats may serve to reduce honeysuckle crown and ground cover densities, but as with controlled burning, re-sprouting roots will regenerate unless nutrient reserves are depleted by continuous grazing pressure.

Regardless of the control method used, care must be taken to prevent reinvasion from nearby areas, or by seeds transported by birds or other wildlife. Planting the area with fast-growing native vegetation or grasses may prevent recolonization (Cacek 1998).

Chemical control:

Results on control efficacy differed. Some reported best results with foliar applications of glyphosate. There were both positive and negative results with the herbicide triclopyr. Method of application and type of herbicide will most likely need to be tailored to the specific site and conditions. Timely follow up is always important to control any plants missed during initial control.

Foliar spray: The foliar spray method works well and has minimum non-target effects for plants growing on the ground. Mclemore (1981) reports that an acceptable level of control (70%) was reached during a two-year experimental program which used 2 lb/acre of glyphosate in the first year and 6 lb/acre in the second year. A 1.5-2% solution (2-2.6 oz Roundup/gallon water) applied as a spray to the foliage will effectively control *L. japonica*. Follow up treatments are recommended. *L. japonica* is an evergreen, so in deciduous forests it can be treated in the dormant season with less damage to non-target species (Nuzzo, 1997, Cacek 1998). During the growing season, the foliar method is not recommended in natural areas because of the potential harm to non-target plants (Arulambalam 1998).

Cut spray: In situations where trees are growing under or through *L. japonica*, cut the vines first, then spray the regrowth with an herbicide (Auckland Regional Council 1997). This will help minimize non-target kill.

Cut stump: Another method to avoid non-target kill of trees which are growing under or through *L. japonica*, cut and paint stems with an herbicide (Arulambalam 1998).

Biological control: There has been no formal biological control program for *L. japonica*.

Cultural control: The public could be discouraged from planting *L. japonica*, especially in moist habitat and higher elevation areas. If you must grow *L. japonica*, keep plants trimmed and contained. Clippings could be disposed in the trash rather than in the wild to prevent further spread.

Noxious weed acts: *L. japonica* is not listed on the United States Federal Noxious Weed or Seed Lists. *L. japonica* is not on the Hawai'i Noxious Weed List. *L. japonica* is

categorized as an exotic weed under the Illinois Exotic Weed Control Act of 1987. As such, commercial sale in Illinois is prohibited (Nyboer 1990). In New Zealand, in 1995, *L. japonica* was included on the Forest Friendly list of plants unsuited for planting because of its known weediness (Craw 1994). It is no longer permitted to be sold, propagated, distributed or commercially displayed on the basis that it is now a Regional Surveillance Plant Pest within the Auckland Region (Auckland Regional Council 1997).

MANAGEMENT RECOMMENDATIONS

L. japonica has an extensive history as an invasive species, yet is widely planted on Maui in schools, parks, and housing complexes and can be bought in most garden shops. It has been seen slowly spreading from plantings into wild lands through vegetative means and recently, plants producing viable fruits have been found, which could lead to more rapid spread in new areas currently free of *L. japonica*. Though *L. japonica* may be too widespread for an island wide eradication on Maui, perhaps the best strategy would be to stop selling it and control infestations adjacent to natural areas. Raising public awareness may help to prevent future plantings.

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