Coccinia grandis

Ivy gourd
Cucurbitaceae

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OVERVIEW

Ivy gourd (*Coccina grandis*) is an aggressive vine in the Cucurbitaceae (cucumber) family. It is widely cultivated and has escaped to become a vigorous pest in Hawai'i, Australia, Saipan, Texas, and Florida. In Hawai'i, ivy gourd has spread rapidly in Honolulu from Manoa Valley to Punchbowl and in Kailua, O'ahu, and also in Kailua-Kona, Hawai'i (Wagner et al. 1999). It is now also known from both east and west Maui (Starr et al. 1999; Oppenheimer and Bartlett 2000). On Midway Atoll in 1999, a single plant was found in cultivation and eradicated before it was able to spread (Starr and Martz 1999). On Kaua'i, *C. grandis* is currently restricted in distribution and it is a target for eradication by the Kaua'i Invasive Species Committee (KISC). On Maui, though numerous locations of ivy gourd have recently been found, the island wide distribution is still limited and it has been targeted for eradication by the Maui Invasive Species Committee (MISC).

TAXONOMY

Family: Cucurbitaceae (cucumber family) (Wagner et al. 1999).
Latin name: *Coccinia grandis* (L.) Voigt (Wagner et al. 1999).
Synonyms: *C. cordifolia* (L.) Cogn., *Bryonia grandis* L (PIER 2001).
Common names: Ivy gourd, scarlet fruited gourd (Wagner et al. 1999).
Taxonomic notes: The genus, *Coccinia*, is made up of about 30 species mostly from tropical Africa (Wagner et al. 1999).
Nomenclature: The name is derived from the Latin *coccineus*, meaning scarlet, in reference to the fruit color (Wagner et al. 1999).
Related species in Hawai'i: No other *Coccinia* are documented from Hawai'i.

DESCRIPTION

"Dioecious, climbing perennial herbs with a tuberous rootstock producing annual stems up to several m long, hispid. Leaves broadly ovate in outline with a basal sinus, blades 3-10 cm long, 4-10 cm wide, 5 angled to palmately 3-7 lobed, the lobes shallow to deep and lobulate, upper surface glabrate, lower surface hispid and bearing 3-8 glands near attachment of petiole and major vein branchings, margins denticulate, apex obtuse, mucronate, petioles 1-3 cm long, tendrils unbranched. Staminate flowers solitary, rarely in axillary clusters of 2-3, pedicels 15-50 mm long, calyx lobes subulate, recurved, 2-5 mm long, corolla lobes white, ovate, 15-20 mm long; pistillate flowers solitary on stalks 10-30 mm long, hypanthium 10-15 mm long. Fruit red, ovoid to ellipsoid, 25-60 mm

long, 15-35 mm in diameter, glabrous, on stalks 10-40 mm long, pulp red. Seeds tan, 6-7 mm long, margins thickened." (Wagner et al. 1999).

BIOLOGY & ECOLOGY

Cultivation: In Southeast Asia, ivy gourd is cultivated for its edible young shoots and edible fruits (Linney 1986). According to website Gardenbed.com (2001), "Young leaves and long slender stem tops are cooked and eaten as a potherb or added to soups. Young and tender green fruits are eaten raw in salads or cooked and added to curries. Ripe scarlet fruit is eaten raw." They also report on ivy gourds various medicinal qualities and say that, "The juice of the roots and leaves is used in the treatment of diabetes. The leaves are used as a poultice in treating skin eruptions. The plant is used as a laxative. It is used internally in the treatment of gonorrhea. Aqueous and ethanolic extracts of the plant have shown hypoglycaemic principles."

Invasiveness: Ivy gourd is an aggressive vine that quickly smothers nearby plants or structures like a blanket. It has the potential to invade dry forest areas on Maui and out compete rare native plants. According to Medeiros et al. (1993), "Its preference for dry, hot environments and its smothering habit make *Coccinia grandis* well suited to potentially establish and choke out native trees and seedlings in Kanaio NAR. If *Coccinia* does become established, it would not only trigger the decline of much of the remaining biota but also transform the visual landscape to even the most casual of observers." Ivy gourd can climb over trees and shrubs as well as on fences and power lines. It can cover archaeological sites such as heiaus. Ivy gourd is presumably spread by birds and perhaps rats and other small mammals. In addition to these invasive characteristics, it is not easily killed and will persist if even one rooted stem is missed by the herbicide application.

Pollination: Unknown. On Maui, various Hymenoptera have bee observed in flowers, including bees (*Apis melifera*) and ants.

Propagation: *C. grandis* is propagate from seeds or cuttings.

Dispersal: Ivy gourd is dispersed long distances by humans who grow the plant for food. Seeds of the plant or pieces of the vine can be dispersed to produce new plants. This can occur when organic debris or equipment containing *C. grandis* is moved. Once established, it is spread by birds and possibly other animals that eat the fruit. PIER (2001) suggests that the fruit may be dispersed by pigs. Pieces of ivy gourd can also be moved unintentionally on equipment or on wood and sprout where they land.

Pests and Diseases: Two weevils and a moth have been introduced to Hawai'i as biological control of ivy gourd.

DISTRIBUTION

Native range: Ivy gourd is native to Africa, India Asia, and Australia (PIER 2001; Wagner et al. 1999). Though, according to the Department of Agriculture of Western Australia (DOA-WA 2001), it is an introduced weed there.

Global distribution: Ivy gourd was first recorded in the Pacific Islands in Fiji in 1940 (Whistler 1994). In Micronesia, it is present in the commonwealth of the Northern Mariana Islands (Saipan), Guam, Federated States of Micronesia (introduced to Pohnpei), and the Republic of the Marshall Islands (Majuro) (PIER 2001). Apparently, it has been stopped from invading Rota and Tinian Islands in the Northern Marianas (NMC 2001). In Australia, there are references that say that ivy gourd is native (Wagner et al. 1999). Perhaps it is native to the northern regions, however, it is reported as a weed in western Australia. Small infestations have been reported from Broome, South Hedland, Arnhem Land and Queensland, Australia (DOA-WA 2001). In the United States of America, ivy gourd is present in Texas and Florida and is declared as a state noxious weed in Hawai'i (PLANTS 2001).

State of Hawai'i distribution: In the State of Hawai'i, ivy gourd has been found on Hawai'i, Maui, Lana'i, O'ahu, Kaua'i, and Midway Atoll.

Hawai'i: On the Big Island (Hawai'i), ivy gourd was first observed at Kamoa Point in Kona in 1986 (Linney 1986). Ivy gourd is now widespread in Kailua-Kona (Wagner et al. 1999) where it grows from sea level up to an elevation of 800 ft (Uchida and Beardsley 1990). Ivy gourd has been called, "the cucumber that ate Kailua" (Hannah Springer pers. comm). During a recent survey of Kealakekua, Starr and Martz (2000) reported the following. "*Coccinia grandis*, an aggressive alien vine that tends to out-compete all other plants, is currently germinating on Hikiau Heiau. If not removed, ivy gourd could work its way into the nooks and crannies of the structure, and potentially alter the structure."

O'ahu: On O'ahu, it appears that *Coccinia grandis* was originally grown in cultivation some time in the late 1960's and early 1970's at Lyon Arboretum and that wild populations were found by 1985. Uchida and Beardsley (1990) reviewed specimens of *Coccinia grandis* at Bishop Museum and the Harold Lyon Arboretum and found the earliest collection made by Nagata in 1968 in the Punchbowl area of O'ahu. Linney (1986) reports that *Coccinia grandis* seeds were received and grown by Lyon Arboretum in 1969. Uchida and Beardsley (1990) also report, "the first plants were planted on the grounds of the Lyon Arboretum in 1970 and the first specimen bearing flowers was collected by Herbst and Ishikawa in 1974. In the spring of 1985, feral *C. grandis* was collected by Smith in Keolu Hills in Kailua." Wagner et al. (1999) report 1986 as the date of first collection on O'ahu.

Maui: On Maui, ivy gourd was first found in Kahului's industrial district (Robert Hobdy pers comm.) in 1992 growing on a fence of a lumber yard. It may have been introduced on lumber (Rezents 1998). Within a few years, two more sites were found, one near the Youth Center in Kihei and one on a fence at a chicken farm in Makawao. In 1997, one of the largest infestations was found near the mouth of Iao stream. Multiple ivy gourd infestations have now been found in Kapalua, Lahaina, Kihei, Kahului, Waikapu, Makawao, Paia, and Haiku. A more detailed description of the history and distribution on ivy gourd on Maui is found below.

Lana'i: Ivy gourd was purposefully introduced to Lana'i for its edible shoots (Rezents 1998). It is uncertain whether this plant still exists.

Kaua'i: On Kaua'i, a small infestation was found in 1997 in Anahola Valley and eradication efforts were launched. It is now known from Anahola, Moloa, Kapaa, and Nawiliwili, covering an estimated 20 plus acres, and is a KISC target species.

Northwestern Hawaiian Islands (NWHI): On Midway Atoll, a single ivy gourd plant was found and eradicated in 1999 (Starr and Martz 1999). It had been brought in as seeds from Thailand and grown on Midway. The plant was in cultivation and was sprawling along a fence in the yard. Through early detection and rapid response, this noxious weed has been eradicated from Midway Atoll. Ivy gourd was not found on any other atolls in the NWHI (Starr and Martz 1999b).

Island of Maui distribution: Ivy gourd was first observed on Maui in 1992 in Kahului and Kihei. Today, several infestations have been documented in Kahului, Iao, Waikapu, Kihei, Lahaina, Kapalua, Makawao, Paia, and Ha'iku. Ivy gourd is currently being controlled by the Department of Agriculture (DOA) and MISC. New locations are still being found, though mostly nearby known infestations. The following is a brief summary of ivy gourd on Maui.

Kahului: Ivy gourd was first reported in Kahului's industrial district in 1992 (Robert Hobdy pers. comm. 1993). Plants were controlled then by hand pulling. Follow up chemical treatments using a basal bark application of Garlon 4 were done in 1998 and new growth has not been seen there since. Other locations have been found nearby in the industrial district. Ivy gourd is usually found in this area growing along fences in a sprawling habit.

Makawao: Ivy gourd was first found on Makani Rd. in Makawao in 1994 growing on a fence at a chicken farm. Several attempts at control by hand pulling as well as chemical treatment have been done, though the plant still persists today.

Iao: Ivy gourd was first found at a residence at the mouth of Iao Stream in 1997 by Starr and Martz. At the time, only a few (about 3) other sites were known and this one was by far the largest infestation. The Department of Agriculture began control and today, the site still persists, but there is much less now.

Waikapu/*Wailuku*: Ivy gourd was first found in Waikapu in 1998 by Starr and Martz during a survey of a nursery. The infestation is on a mulch pile behind the Kihei Landscape and Foliage Company. A few other sites have also been found more recently in nearby areas.

Kihei: Ivy gourd was first found in Kihei in 1992 by Robert Hobdy at the Kihei Youth Center. Ivy gourd has since spread from the initial location into nearby residential areas. There are currently about 2-3 dozen locations in north Kihei from the Youth Center to the

Maui Lu. Most homeowners say they did not plant the vine and that it came on its own. Some of the sites were completely eradicated while others still persist. New plants are continually being found in the area. There is also now a single infestation in the Maui Meadows area in south Kihei. This is the first location above the Pi'ilani Hwy. and quite a significant outlier to the south.

Lahaina: Ivy gourd was first found in Lahaina by Robert Hobdy around 1997 on Waine'e St. This large infestation has been controlled, however, re-growth is present. Several other sites nearby have recently been found along the Honoapi'ilani Hwy. from Puamana to Ka'anapali.

Kapalua: Ivy gourd was first found in Kapalua in 1998 by Starr and Martz at the Honolua store. Since then it has been found in several other sites nearby. The biological control agents have been released at the Kapalua infestations.

Ha'iku: A single location found in 1998 by Starr and Martz on West Kuiaha Rd. This site has been controlled by MISC.

Paia: A single location found in 2000 by Starr and Martz in Paia town. Recently, a second population was located by MISC at the Paia post office, growing on a fence.

CONTROL METHODS

The most effective method of control to completely kill ivy gourd with minimal follow-up is thin line basal bark treatment with 100% Garlon 4.

Physical control: Except for bagging fruits, physical control is not recommended. Grubbing or hand-pulling generally does not kill the plant. Rather, it breaks up into multiple plantlets which can grow back from roots or stems that touch the ground. This method can convey a false sense of success and often makes future control efforts more difficult. Picking fruits off the plants and placing them in a plastic trash bag helps decrease the seed bank under the plant. Double bag and dispose of fruits properly. It may be best to leave vines in place to allow translocation of herbicide.

Chemical control:

Thin-line basal bark: Ivy gourd plants have responded well to a thin-line basal bark application of 100% Garlon 4 (triclopyr). If there are multiple stems, apply multiple times. Make sure to get each section that touches the ground. Leave plants in place. Try not to pull plants out of trees or off of walls or fences, as this multiplies the number of plants and prevents translocation of the herbicide. On Kaua'i, KISC plans to use Spike or Garlon to treat the vines.

Cut stump: This method is not recommended as it will lead to multiplying plants and prevents translocation of herbicide to the rest of the vine.

Biological control: Several species have been introduced to Hawai'i for biological control of ivy gourd. Two weevils, *Acythopeus burkhartorum* and *A. coccinae* were

introduced by the DOA on O'ahu and Hawai'i. *A. coccinae* has also been released on Maui. African vine moths, also called the ivy gourd vine borer (*Melittia oedipus*), were also released on O'ahu and Maui. On Maui, *A. coccinae* is established in Kapalua and seems to be damaging leaves of *C. grandis* plants in the area. The larva of the beetle feed in a leaf mining manner and the adults chew holes in the leaves. *A. coccinae* seems capable of finding other *C. grandis* plants, as beetles were found in areas where they were not released. The moth, *Melittia oedipus*, has also been released at Kapalua. Deformed vines where moth larva had bored were sparingly observed, though it is not yet as well established as the beetle, *A. coccinae*.

Cultural control: Ivy gourd is a noxious weed in Hawai'i, making it illegal to possess, propagate, or grow. Infestations should be reported to the DOA or to MISC (on Maui).

Noxious weed acts: In the United States, ivy gourd is a state noxious weed in the state of Hawai'i (PLANTS 2001). In Australia, ivy gourd is a declared plant in the Kimberley region of Western Australia (DOA-WA 2001).

MANAGEMENT RECOMMENDATIONS

There are numerous infestations in lowland areas of Maui, though it is still relatively limited in distribution and not nearly as widespread as on O'ahu and Hawai'i. Control is most efficient using a basal bark application of 100% Garlon 4. Other methods such as hand pulling or cut stump have proved less effective at killing the entire infestation. Follow up control is necessary in a timely manner to effectively kill any parts of plants missed during the original application. Surveys of all the roads on Maui proved effective at locating new populations of ivy gourd. Foot surveys are also recommended especially near and adjacent to existing infestations. The DOA, MISC, and people of Maui will have to act swiftly if they wish to eradicate ivy gourd. The eradication of *C. grandis* on Midway Atoll proves that it is possible to prevent the establishment of a weedy invader if it is found and controlled early.

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