



AN EMERGING INVASIVE IN THE
NORTHEASTERN UNITED STATES

INVASIVE HARDY KIWI

BOWERBERRY, TARA VINE, CHINESE GOOSEBERRY
Actinidia arguta

Compiled by Berkshire Environmental Action Team (BEAT)
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WHAT IS HARDY KIWI?

The genus *Actinidia* is well known for producing the delicious green fruit common to fruit salads. There are approximately 80 species of *Actinidia* in the world, with some grown for their berries and others prized for their ornamental vines. The most popular varieties are commercial kiwi, *Actinidia deliciosa*, the green kiwi, and *Actinidia chinensis*, yellow kiwi (Hoover, 2015 and Tiyayon, 2001). While *Actinidia* originates in eastern Asia, the kiwifruit's common name comes from New Zealand's flightless bird. Farmers of that country commercialized the fruit in the 1950s trying to make it synonymous with the South Pacific. Today, Italy, New Zealand, China, and Chile are the main producers of green kiwi and yellow kiwi (Tiyayon, 2001). Recently, however, another species is gaining attention here in the United States: *Actinidia arguta*, hardy kiwi.



Hardy kiwi's native distribution sweeps a wide band across Japan and into western China. It came to the United States in 1877 as an ornamental vine. The young shoots that climbed and twined at over 20 feet a year and the fragrant white flowers made hardy kiwi a popular choice. It quickly gained favor among New England elites and by the early 1900s was sprawling over estates from Bar Harbor, ME to Long Island, NY. One notable fan of hardy kiwi was Edith Wharton's niece, Beatrix Farrand, a landscape gardener, who incorporated hardy kiwi into her design for Wharton's estate, The Mount, in Lenox, MA. Not until the mid 1900s did hardy kiwi become known for its tasty fruits.

NATURAL HISTORY



Unlike green kiwi, with its fuzzy brown skin, hardy kiwi fruit has smooth, green, edible skin (Micsky, 2013 and Debersaques and Mekers, 2010). Hardy kiwi fruit is also smaller, similar to table grapes (Debersaques and Mekers, 2010).

Most hardy kiwi plants are dioecious: female plants produce berries and male plants produce pollen (Hoover, 2015).

Typically, hardy kiwi vines have one main shoot or 'trunk' that seeks out large, stable trees and climbs to the canopy. The tree canopy acts as windblock for the fragile shoots below to form during the spring (Hoover, 2015). These vines favor rich, moist soils and prefer pockets of trees where they are protected from afternoon sun year round to avoid burning.

Root rot is a common problem for commercial hardy kiwi growers in poorly drained soils. However, no significant diseases seem to affect wild hardy kiwi. Frost may be a limiting factor but hardy kiwi tends to live up to its name, generally tolerating temperatures around and sometimes below -22°F (Micsky, 2013). Insects have not been shown to pose a threat to vines in the wild.



Hardy kiwi - both ground cover and climbing vines.



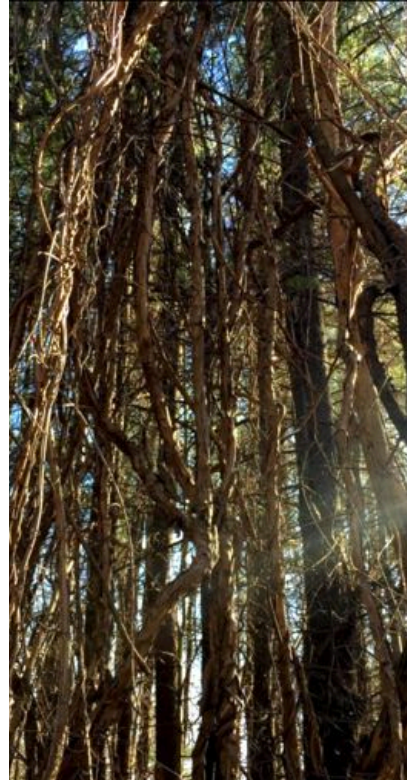
Surveying hardy kiwi amphitheater vines cut the previous winter, note the mat of hardy kiwi covering the forest floor.

WHY IS IT A CONCERN?

Hardy kiwi's tenacious growth and resilience to low temperatures have allowed it to take over wooded areas and have a negative impact on habitat, biodiversity and resilience, and trail use. This woody vine has quickly gained momentum in Berkshire County, MA, and in and around Long Island, New York.

SPREAD BY WILDLIFE

According to MassAudubon, "Hardy kiwi fruits are eaten by raccoons. Other mammals, and possibly large birds such as wild turkey and ruffed grouse, are also expected to consume the fruits and disperse the seeds." The seeds from a different variety of *Actinidia* pass through the digestive tract of silvereyes (a bird native to New Zealand). This passage can accelerate and greatly increase germination rate (Logan and Xu, 2006). If both male and female plants are present, and seeds are animal dispersed, especially bird dispersed, fruits could easily jump large spatial gaps (MassAudubon 2015). It may also spread vegetatively (Weatherbee 1996). These methods of dispersal can allow both rapid and widespread distribution.



FIERCE COMPETITOR

Where hardy kiwi takes root it can easily become problematic. Beginning as what appears to be an innocuous ground cover, hardy kiwi later grows up and over itself and other plants into dense mats of vine several feet deep. These vines then spread vertically, forming heavy "curtains" that hang from the trees they climb to reach the canopy. Over time these curtains create "amphitheatres" of hardy kiwi. The amphitheatres smother native plants and shrubs, and pull down mature trees creating acres of unhealthy monoculture.

In 2012 MassAudubon published an alert on hardy kiwi. In 2015 the Massachusetts Invasive Plant Advisory Group (MIPAG) reviewed new data and voted to re-categorized *Actinidia arguta* as "likely invasive."

POPULATION ESTIMATES

Since the late 1990s hardy kiwi has been popping up as a small-production cash crop for farmers and as an experimental agricultural crop for many universities in the United States. It is also prized among some permaculture communities. Some of the top states known for their university's research on hardy kiwi are Oregon, New Hampshire, and Pennsylvania. In the eastern United States, many cultivars offered by nurseries can be traced back to University of New Hampshire botanist Edwin Meader. When Meader served in the US Military in Korea in the 1960s he collected the hardy kiwi and returned it to his farm in Rochester, NY. That plant is known today as the Meader Male (Cornell University 2016).

Representatives from these universities, and from the agricultural community, have claimed hardy kiwi is not harmful to the environment and unlikely to escape cultivation. However, several wild populations that could easily be described as infestations, have been identified in the northeast. At least twenty of these sites are in Berkshire County, Massachusetts alone. Others include Salisbury and Franklin in Connecticut; Brinton Brook Sanctuary, Coffin Woods Preserve, Sterling Forest State Park, and Pound Ridge in New York; and many locations in Morristown National Historical Park in New Jersey.



Hardy kiwi vines in autumn after leaf-fall in Burbank Park, Pittsfield, MA.

IN THE BERKSHIRES

Introduction of hardy kiwi to the Berkshires can be traced to the large estates in Lenox, Massachusetts. Multiple literature sources confirm that the vines sprawled over buildings and acres of land, "there is at Lenox, in the Berkshire Hills, a place with the musical name of Fernbrook Farm. It is high on one of the glorious hillsides between Pittsfield and Lenox and reached by a romantic drive through pretty by-roads. The house itself is of white stucco and dark wood and here the eye catches first of all, perhaps, the decorative use of fruit, especially of rich black grapes, as the vines are caught upward above windows of the second story... *Actinidia arguta*, the fine creeper from Japan, and our native bittersweet were in evidence here, very much thinned as to branches but full of fruit" (King, 1915).



Hotel Aspinwall in Lenox, MA - note the vine climbing up the trellis in front of the white pillars on the porch and around the foundation. Built in 1902, the hotel burned to the ground in 1931. The property is now home to Kennedy Park, a 500 acre town park.

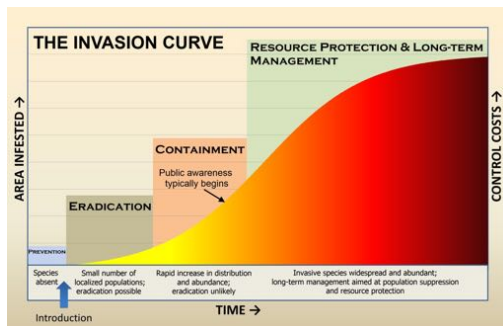
Within the last ten years, Kennedy Park in Lenox, has attracted attention for it's especially dramatic hardy kiwi infestation. The population likely came from landscape plantings at the Hotel Aspinwall that previously occupied the site.

TAKING ACTION



BEAT staff and volunteers removing hardy kiwi vines in Burbank Park in Pittsfield, MA

Since 2012, the Berkshire Environmental Action Team (BEAT) has been focusing our eradication effort on Burbank Park, 188 acres of conserved land in Pittsfield, MA. We are spreading the word about the emerging threat of hardy kiwi and removing vines by hand in the park. While data is still being collected on this species, we hope that it falls low on the Invasion Curve, a tool for describing the status of and informing the management strategies for invasive species. We believe that with swift action a complete eradication at Burbank Park is possible. BEAT encourages property owners and land stewards to use this guide to inspect and monitor their land to identify hardy kiwi populations, report them, and take steps to remove them.



The invasion curve. From the University of Florida Institute of Food and Agricultural Science. Adapted from Invasive Plants and Animals Policy Framework, State of Victoria, Department of Primary Industries, 2010.

BARK

Bark on young hardy kiwi vines is a smooth light brown-red to grey-white with white vertical lenticles. Young vines have a distinctive chambered pith, the soft spongy tissue at the center of the vine.



As the *A. arguta* vine matures, the bark begins to peel off and the color tends more toward brown-grey.

Large flaky plates of bark develop as the vine grows. Mature specimens may resemble wild grape vine, but will typically have bark lighter in color with a white to brown-grey appearance.



LEAVES



A single leaf per node sprouts in the spring in an alternate growth pattern.



Blades are simple with sharply toothed margins, typically 3-5" long.

Petioles, stalks that attach the leaf blade to the vine, can appear red.



Leaves often stay green into late autumn, but can turn yellow before dropping to the ground.

FLOWERS

Hardy kiwi flower buds are round and grow at the joints of the stem and the leaf.



Flowers are white and approximately 1" in diameter with five petals (female flowers) or six petals (male flowers) and five sepals. Male flowers have abundant stamens covered in yellow pollen. Female flowers have white pistils to receive pollen. Kiwi flowers bloom June - July.



FRUITS

Hardy kiwi vines have fleshy fruits with a smooth skin. The skin is often green, but may also appear brown. Fruits are approximately 1" long.

The inside of the fruit is green with many seeds, closely resembling the more familiar green kiwi fruit (*Actinidia deliciosa*), but in miniature.

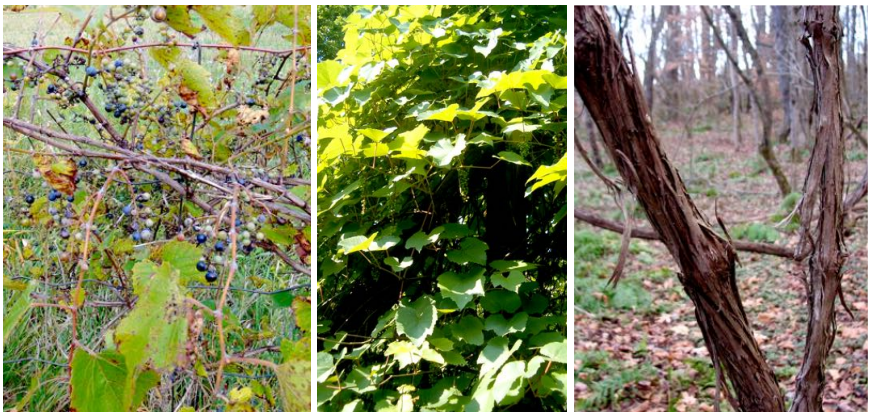


HARDY KIWI LOOK ALIKES

Wild Grape

Wild grape (*Vitis* spp.) is another liana, a woody plant that grows in the form of a vine. Mature hardy kiwi bark can appear similar to wild grape, however grape bark is overall a darker brown with thinner, easily peeling strips (resembling pulled pork).

Wild grape also has large leaves and spiralling tendrils, differing from hardy kiwi. Many species of native wild grape are common in New England and are an important source of food for wildlife. It is extremely important to distinguish hardy kiwi from wild grape. If you are unable to make a positive identification, we recommend consulting an expert before removing any vines.



HARDY KIWI LOOK ALIKES

Asiatic Bittersweet

Asiatic Bittersweet (*Celastrus orbiculatus*) generally resembles hardy kiwi in growth habit more than appearance. Also an invasive vine, *C. orbiculatus* grows quickly, taking over large areas, strangling and toppling mature trees. From a distance, a serious infestation of *C. orbiculatus* and *A. arguta* may be almost indistinguishable, but a closer look should easily clarify identity. Mature Asiatic bittersweet bark is distinctly furrowed rather than the peeling plates of hardy kiwi. In summer and fall, the round leaves and red fruits of *C. orbiculatus* make it easy to differentiate.



American Bittersweet

American bittersweet (*Celastrus scandens*) is a native relative of the invasive *C. orbiculatus*. The leaves of American bittersweet are more similar in shape to hardy kiwi leaves, compared to those of Asiatic bittersweet, but are consistently smaller with shorter, green petioles. Like *C. orbiculatus*, the bark, flowers, and fruit of American bittersweet, will set it apart from hardy kiwi.



REPORTING AN INFESTATION

Reporting new infestations is an essential step to manage and remove invasive species. Early detection and rapid response is one of the most effective control measures because it allows us to track the movement of and/or predict the location of current and future infestations.

We recommend reporting new infestations of hardy kiwi to the Invasive Pest Atlas of New England (IPANE) through the Early Detection and Distribution Mapping System (EDDMapS).

1. Gather the following information:

- Who made the identification
- When and where was it located (latitude and longitude can be acquired with a GPS unit or the EDDMapS mapping tools)
- A description of the infestation (stage of growth, acreage, etc)
- Images of the infestation that support positive ID and show the extent to which the plant is growing (ie. clear images of leaves, fruits or flowers, and any vines climbing trees, matting, etc.)

2. Visit the EDDMapS website at www.eddmaps.org

*If you are a first time user, click the 'Register' button in the menu to create an account - you will need to provide your name and contact information. Once you have registered, return to the main page, and select the 'Login' button on the menu bar.

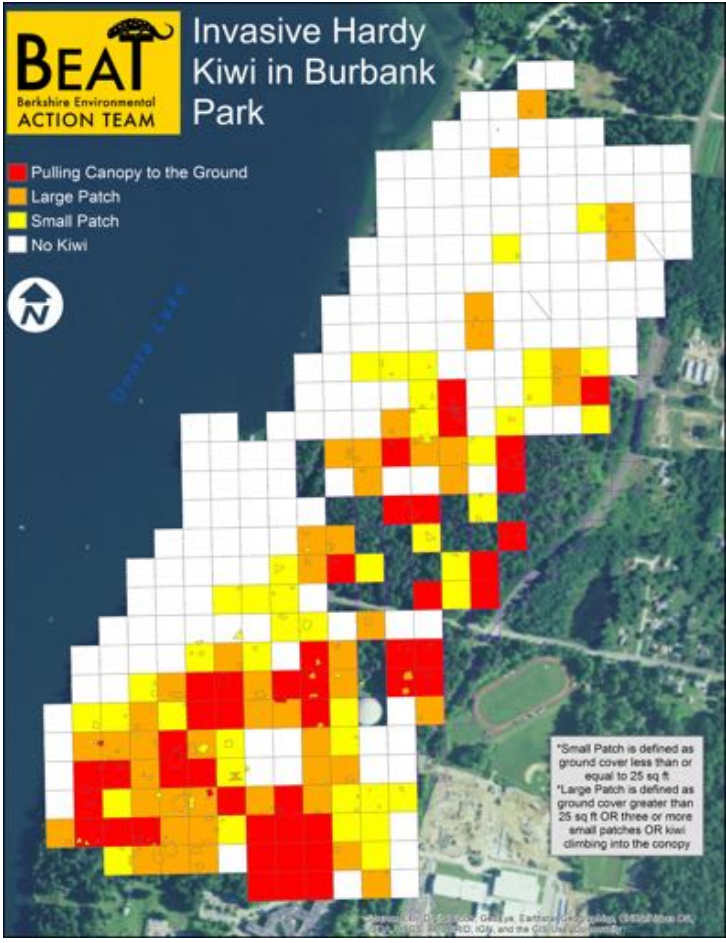
3. Click 'Report Sighting' and follow the instructions to submit a report for your infestation.

Important note: Hardy kiwi is listed in the EDDMapS program under the common name Tara Vine and the latin name *Actinidia arguta*.

If you are interested in more detailed information on recording information or reporting infestations, please explore the 'Tools and Training' tab on the EDDMapS website.

OUTSMART INVASIVE SPECIES APP

Produced by MassWoods and Umass Amherst, the Outsmart Invasive Species application is available for iPhone and Android. This app allows you to record information and photographs on a given infestation and save it to your "queue" for upload or into the EDDsMapS website at a later time.



MAPPING

Mapping and later re-mapping an infestation is an important part of long term management of hardy kiwi. Keeping robust records of where the plant is growing and how the population changes over time after your selected treatment will help inform future management or removal strategies by you, or other land stewards who seek you out as an experienced resource. Maps of the Burbank Park infestation in Pittsfield, MA are modeled after those done in Kennedy Park (50x50 meter square sections). White indicates where no kiwi was found. Yellow indicates a small patch, considered kiwi ground cover that is less than or equal to 25 square feet in size. Orange indicates large patches, defined as the ground cover greater than 25 square feet, or three or more small patches, or kiwi that is climbing into the canopy. Red indicates where kiwi is pulling trees to the ground.

REMOVAL & MANAGEMENT

Seedlings and smaller vines can be controlled easily by hand pulling. Larger vines can be cut with loppers or saws. BEAT does not recommend using herbicides in any situation. At Burbank Park in Pittsfield, MA we work with our volunteer force to remove and manage hardy kiwi populations solely by cutting and hand pulling. We continue to survey the property for additional kiwi infestations with the help of volunteers and Koda, the kiwi detecting German Shepherd.



BEAT volunteers and staff tackle a particularly dense infestation at Burbank Park in Pittsfield, MA.

MONITORING

We strongly encourage closely monitoring hardy kiwi populations. In May of 2016, Jane Winn and Elia Del Molino of BEAT hand cut the trunk of a large vine. When they returned to the area in March of 2017, the same stump had multiple new sprouts - two of which measured 16.5 and 18 feet in length. This example of aggressive regrowth over the course of ten months, just a single growing season, should serve as a reminder of just how important monitoring and re-monitoring invasive species is.

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