



PLANT
INVADERS

in the District of Columbia

SECOND EDITION



UNIVERSITY OF THE
DISTRICT OF COLUMBIA
COLLEGE OF AGRICULTURE, URBAN SUSTAINABILITY
AND ENVIRONMENTAL SCIENCES

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Early in United States history, higher education was a privilege that only a select few could afford. In 1862, President Abraham Lincoln changed that when he signed the Morrill Act. Under the Morrill Act, each state was given land from the Federal Government, the proceeds of which were to be used to open the first public institutions of higher education. Today these colleges are collectively known as the Land-Grant University System and there is one in every state and territory in the United States. The University of the District of Columbia (UDC) is the District of Columbia's land-grant university; we are the only completely urban land-grant university in the system.



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All of the land-grant universities receive funding from the United States Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA). NIFA's mission is to advance knowledge for agriculture, the environment, human health and well-being, and communities. It fulfills this mission by supporting research, education, and extension programs in the Land-Grant University System.

INVASIVE PLANTS

At UDC, the College of Agriculture, Urban Sustainability, and Environmental Sciences (CAUSES) fulfills the university's land-grant function by integrating education, research, and outreach. Academic programs include Architecture and Community Planning; Health Education; Nursing; and Nutrition, Dietetics and Food Science. The Agricultural Experiment Station (AES), Architecture Research Institute (ARI), and Water Resources Research Institute (WRI) are the research components, while the Cooperative Extension Service (CES) and the Institute of Gerontology fulfill the outreach mission. The Cooperative Extension Service is comprised of four program areas that address key urban topics: the Center for Nutrition, Diet and Health; 4-H and the Center for Youth Development; the Center for Urban Agriculture & Gardening Education; and the Center for Sustainable Development. Our mission is to improve the quality of life for District residents by providing fee based and free, non-credit educational programs, workshops, demonstrations, and to provide technical assistance to District residents. To learn more please visit us online: <http://www.udc.edu/causes>

THE INVASIVE SPECIES PROBLEM

For as long as people have migrated around the world, we have intentionally and unintentionally brought other species with us. Many of these species are benign. Some, like wheat, have become societal mainstays and aren't even thought of as an exotic, non-native species. Unfortunately, many non-native species do have adverse effects within their new ecosystem, particularly in areas that are already stressed.

This publication is intended to familiarize the public with 15 specific non-native, invasive plant species that are problematic in the Washington area. See if you can spot them next time you are in one of our National Parks or strolling through your neighborhood. It's alarming to realize that so much of the lush green that surrounds us is not a thriving ecosystem, but a struggling one overcome with these non-native invasive plants.

There is hope. With increased awareness about the invasive plant problem people can take measures to halt their spread. Controlling invasive species in an area or region is possible. With the help of concerned citizens that take an active role, invasive plants

THE INVASIVE SPECIES PROBLEM

(and other species) have, and continue to be, managed or eradicated in particular areas. So whether you're removing invasive plants on your own property, participating in larger abatement events, replacing invasive plants with native or non-invasive plants in your own landscape, spotting and informing the correct authorities about new invasive plants, or simply spreading the word about this problem, you are making a difference in the effort to stop the spread of invasive species.

WHAT IS AN INVASIVE SPECIES?

The USDA defines invasive species as, "plants, animals, and other organisms that are alien to the ecosystem under consideration, and whose introduction can cause harm". The National Invasive Species Council determined that for a species to be qualified as invasive it must overcome five barriers. The species in question has to first overcome a geographical barrier, such as an ocean or mountain range, which previously confined the species to its native range. In the new environment the exotic species then has to be able to survive in the existing conditions. Is there sufficient heat, water, light, nutrients? Is the soil pH within a parameter in which the species can live? If the species prevails it has overcome the survival barrier, but it also must be able to successfully reproduce and establish a self-sustaining population in order to overcome the establishment barrier. Additionally, the species in question has to escape containment and spread to other sites, and at an accelerated rate, to breach the dispersal and spread barrier. Even then the species still isn't considered invasive unless it causes economic harm, environmental harm, or harm to human health.

Species that are considered invasive have competitive advantages over native and non-invasive species that allow them to monopolize limited natural resources like habitat, light, nutrients, and water. For example, an invasive species that is out of its native range won't have the natural controls, such as pathogens, predators, or soil microbes, that once helped keep its population in check. Invasive species can typically withstand a wide range of environmental conditions and are often extremely adaptable and competitive for limited natural resources. Frequently, the species reach maturation and begin to reproduce earlier, or are able to reproduce faster and in quick succession, making them highly prolific. When invasive plants displace native plants, the entire food web is affected as native species that rely on those species for food, habitat and breeding grounds are no longer able to survive in that locale.

Invasive species are able to spread with the aid of humans. We do this through importations, recreation, and transportation. The species, once here, can also spread naturally through flooding, by wind, and by animals. Roads and edges of natural areas can serve as conduits for invasive species to move into sites previously not infested. Areas that have been disturbed, such as construction sites or old agricultural sites, are particularly susceptible to infestations if they are not restored by re-planting with native plants. Our goal is to increase the public's awareness and knowledge about invasive species so that rather than accepting them as a part of our ecosystem, we can change our behavior and implement measures that will ensure the well being of the District of Columbia's natural areas.



Left: City Year volunteers remove invasive plants. Right: The DC Cooperative Weed Management Area's summer work crew clear invasives along Suitland Parkway.

MEET YOUR LOCAL COOPERATIVE WEED MANAGEMENT AREA

Since its establishment in 2007, the DC Cooperative Weed Management Area (DC-CWMA) has been dedicated to restoring the biodiversity of the District of Columbia by working cooperatively to minimize ecological damage wrought by non-native invasive plants. The District is unique in that it has more wildlife habitat than most US cities and most of its 10,500 acres of parkland is forested. The DC-CWMA coordinates invasive plant management and wildlife habitat restoration within the District by facilitating cooperation, management and outreach across administrative boundaries. Current partners in the DC-CWMA include local and federal land owners, local conservation organizations, and local universities. The DC-CWMA has been effective as a result of stakeholders working together, using common goals and strategies, while freely sharing data, methods, research, and invasive control plans. Management will focus on natural areas and developed areas surrounding parks.

To find out about our upcoming events or to learn more about the DC-CWMA and its members, please visit us at: <http://ddoe.dc.gov/DC-CWMA>

WHAT IS EARLY DETECTION RAPID RESPONSE?

Early Detection Rapid Response (EDRR) is management strategy in which populations of incoming invasive plants are eradicated early, thereby minimizing ecological damage and the long term cost associated with managing established invasive plant populations. How can you help?

- » Become familiar with EDRR species
- » Prevent the problem by using native or non-invasive exotic plants for landscaping
- » Eradicate EDRR and invasive plants on land that you own or manage
- » Monitor for EDRR species in natural areas
- » Volunteer to remove invasive plants from parks and other public land
- » Raise awareness by telling others about EDRR and invasive plants

Six EDRR species that have been identified as a potential or emerging threat in the Mid-Atlantic region are highlighted in the EDRR Incoming Invasive Plant Profiles section. For more information about these and many other EDRR plant species in the Washington, DC area please visit: www.nps.gov/cue/epmt/index.htm

EDDMAPS AND THE MID-ATLANTIC EARLY DETECTION NETWORK (MAEDN)

The Early Detection and Distribution Mapping System (EDDMapS) is a web-based mapping system for tracking and documenting invasive species distribution. In addition to tracking occurrences of invasive species, EDRR reporting tools, and identification and management information, this user-friendly internet tool has been providing a visual of the distribution of invasive species across the U.S. and Canada for the general public since 2005.

Locally, MAEDN is a vast network of land managers, field experts, citizen scientists, naturalists, gardeners and others interested in documenting invasive plant occurrences in the mid-Atlantic region for the purposes of early detection, improved management and better coordination. The region includes Delaware, Maryland, New Jersey, New York, Pennsylvania, Virginia, West Virginia and the District of Columbia. Free apps

EDRR: INCOMING INVASIVE PLANT PROFILES

are available for iPhones and Androids.

To learn more visit: www.eddmaps.org or www.eddmaps.org/midatlantic/ to get the app and access more regional information.

Butterfly Bush

Buddleja davidii

Originally from China, the butterfly bush is a popular landscaping plant that has been naturalizing in the Pacific Northwest, the North East, Hawaii, and Puerto Rico. This plant spreads by seed and invades natural areas, thereby displacing native plants. The butterfly bush thrives in disturbed sites, right of ways, and riparian areas bordering waterways. Locally, it has been sighted naturalizing at Monocacy National Battlefield in the floodplain of Bush Creek, and also at the headwaters of Fenwick Branch in Rock Creek Park.

Identification: The butterfly bush is a deciduous shrub that grows 4 to 16 feet tall and has long arching stems. The gray-green, lance shaped leaves grow opposite along the stem, are between 6 to 10 inches long, and their undersides have a velvety texture. Fragrant, conical clusters of small purple, white, or pinkish flowers (depending on the cultivar) start blooming in late spring and can last until the first frost.

Five Leaf Aralia

Eleutherococcus sieboldianus

Five leaf aralia, a native of Japan, is valued as an ornamental shrub for its ability to endure a wide range of site conditions. It can grow in full sun or shade, in moist or dry sites, in a variety of soil conditions, and can withstand environmental pollution. Five leaf aralia exhibits extensive suckering. This plant will naturalize in woodland settings and can displace desirable native plant species. This plant has been sited naturalizing at two locations in the District: Rock Creek Park at the headwaters of Broad Branch along 36th Street and Spring Valley Park.

Identification: Five leaf aralia is a deciduous, multi-stemmed, upright shrub with arching branches that can grow up to 10 feet tall and wide. Leaves are compound and are comprised of 5 to 7 smaller leaflets (each 1 to 2 inches) that originate from a central point. The leaves grow alternately along the stem and thorns are found at the stem nodes below each leaf. The bark has a warty appearance. From late spring to early summer small greenish-white flowers appear, and if pollinated black berries can develop on female plants.

Holly Osmanthus

Osmanthus heterophyllus

Holly Osmanthus, or false holly, was introduced from Japan and Taiwan as a landscaping plant. This evergreen shrub resembles true hollies, including our native American holly. It does best in acidic, moist, well drained soil, though it tolerates a range of pH, soil types, and exposures from full sun to partial shade. It has been found naturalizing in Rock Creek Park.



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BARRY RICE, SARRACENIA.COM, BUGWOOD.ORG

Identification: This dense, upright, evergreen shrub can grow up to 15 feet tall and 10 feet wide. Its dark green, leathery, holly-like leaves bear exaggerated spines, are opposite, and are 1 to 2.5 inches long. Clusters of small, white, fragrant flowers appear in early to mid fall, followed by blue-black fruit. If both male and female plants are present the seed produced is viable.

Italian Arum
Arum italicum

Italian arum, a native of Europe, is an herbaceous perennial that is evergreen in the mid Atlantic region. Installed in woodland settings, this plant prefers moist, humus-rich soil in full to partial shade conditions. Italian arum invades forests and riparian areas and reproduces by seed. It has been reported as invasive in Rock Creek Park along the Pinehurst tributary and in Soapstone Valley, at the National Arboretum, and in Alexandria, Virginia.



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Identification: This herbaceous perennial grows 12 to 18 inches tall and has large, arrow-shaped, glossy green leaves with distinctive white veins. A showy white flower, loosely resembling a calla lily or jack-in-the-pulpit, emerges in spring followed by green berries that turn bright orange from summer to fall. The native arum, *Peltandra Virginica*, do not have white veins in leaves, and the mature berries are blackish in color.

Leatherleaf Mahonia
Mahonia bealei

Leatherleaf mahonia, also called Beales barberry, is an evergreen shrub frequently used in ornamental landscape installations. Originally from China, leatherleaf mahonia prefers slightly moist, acidic soils with good drainage, but is prized for being a shade tolerant plant that can withstand droughts and a variety of soil conditions. Spread primarily by birds who eat its berries and disperse its seeds, it has been naturalizing in the forests of the Southeast and Mid-Atlantic region. Locally, leatherleaf mahonia has been naturalizing in low densities in a wide distribution throughout Rock Creek Park.

Identification: Leatherleaf mahonia is an evergreen, broadleaf, multi-stemmed, upright shrub that typically grows 4 to 6 feet tall and 3 to 4 feet wide. The compound leaves are 1 to 2 feet long, alternate, and have 9 to 13 stiff, paired, dark green, holly-like leaflets each with 5 to 7 spines. Fragrant yellow flowers emerge in winter followed by berries that ripen from green to blue.

Wavyleaf Basketgrass

Oplismenus hirtellus ssp. *undulatifolius*

Wavyleaf basketgrass is a perennial grass originating from Southeast Asia. It was discovered in Maryland in 1996. This highly shade-tolerant grass is believed to potentially be more invasive than Japanese stiltgrass, and they are often found growing together in forested areas. Once established, it spreads rapidly and forms a dense carpet layer in the forest understory, crowding out native plants and preventing regeneration of native hardwood tree species. It is most active in moist areas but actively spreads in upland areas and persists during dry periods. Maryland, Virginia, and one location in Georgia are the only states where it is known to exist in the contiguous U.S.

Identification: Wavyleaf basketgrass is a low-growing, shallow-rooted perennial grass. The leaves are flat, roughly ½ inch across and 1½ - 4 inches long, have ripples across their width, and taper to an elongated sharp point. The leaves stay green well into fall, and both leaf sheath and stem are covered with short hairs. Alternate spikes of flowers appear in fall, resulting in sticky seed that adheres to fur, skin, clothing, shoes, and tires—aiding in seed dispersal. This plant also spreads by underground rhizomes.

REFERENCES

Carolina Nature: www.carolinanature.com

Floridata: www.floridata.com/index.cfm

Invasive.org, Center for Invasive Species and Ecosystem Health: www.invasive.org

Maryland Department of Natural Resources: www.dnr.state.md.us/

Missouri Botanical Garden, Plant Finder: www.missouribotanicalgarden.org

National Park Service, National Capital Region, Center for Urban Ecology: www.nps.gov/cue/epmt/index.htm

North Carolina Cooperative Extension Service, Urban Horticulture: www.ces.ncsu.edu/depts/hort/consumer/index.html

Pennsylvania Department of Conservation and Natural Resources: www.dcnr.state.pa.us

University of Connecticut, Plant Database: www.hort.uconn.edu/plants/index.html

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GRASSES

COMMON BAMBOO

Bambusa vulgaris
Schrad. ex J.C. Wendl.

GOLDEN BAMBOO

Phyllostachys aurea
Carr. ex A. & C. Rivière

ARROW BAMBOO

Pseudosasa japonica
(Sieb. & Zucc. ex Steud.)
Makino ex Nakai

GRASS FAMILY (POACEAE)

ORIGIN
Asia

BACKGROUND

Bamboos are perennial, woody, reed-like grasses that have a shrubby growth habit. The three species featured here are popular ornamentals that were introduced and planted widely but other species and cultivars are also available in the nursery trade. These species have been reported by numerous sources as being invasive in natural areas. Giant or switch cane (*Arundinaria gigantea*) is the only species of bamboo native to the US. It is found throughout the Southeast just into southern Maryland and is about the size of *Pseudosasa*.

DISTRIBUTION AND HABITAT

These species of bamboo have been reported to be invasive in the Mid-Atlantic and Southeast as well as some sites in the Western and Southwestern U.S. Infestations are commonly associated with new and old residences from which they've escaped.

ECOLOGICAL THREAT

Bamboos form very dense single-species thickets that displace native plant species and create dense shade, making it difficult for seedlings of native species to survive. Once established they are very difficult to eradicate.

DESCRIPTION AND BIOLOGY

- » **Plant:** woody stems varying from about 1/4 in. (arrow) to 3-4 in. diameter (common and golden) with hollow centers and solid joints; grow to heights of 7-8 ft. (arrow) to 16-40 ft. (common and golden).
- » **Leaves:** strap-shaped and tapering with pointed tips, tough, somewhat papery or leathery, up to 10 in. long and 1-2 in. across.
- » **Flowers, fruits and seeds:** flowering is infrequent and unpredictable; flowers are grasslike and not especially showy.
- » **Spreads:** by vegetative means through vigorous rhizomatous growth.
- » **Look-alikes:** other bamboos, including native giant cane (*Arundinaria gigantea*) and some tall grasses.

PREVENTION

Do not plant exotic bamboos. Manual control of bamboo through cutting and digging out of rhizomes is extremely labor intensive and will need to be continued over a long time to ensure eradication. Control with herbicides is more practical and can be very effective. See Control Options.

NATIVE ALTERNATIVES

Within its native range in the eastern U.S., giant reed (*Arundinaria gigantea*) is a good alternative to consider.

www.nps.gov/plants/alien/pubs/midatlantic/bamboos.htm

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COMMON BAMBOO

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GOLDEN BAMBOO



COMMON BAMBOO

FOREST & KIM STARR, STARR ENVIRONMENTAL, BUGWOOD.ORG



ARROW BAMBOO

MARGARET CHATHAM, FAIRFAX COUNTY PARK AUTHORITY, WWW.EDDMAPS.ORG

HERBACEOUS FORBS

Perilla frutescens
(L.) Britt.

**MINT FAMILY
(LAMIACEAE)**

ORIGIN

Asia (China, India, Japan,
Korea, Thailand, and
other countries)

BACKGROUND

Also called perilla mint, beefsteak plant is an annual Asian ornamental plant. It readily escapes cultivation and has become a problematic invasive plant in natural areas across the Mid-Atlantic region and elsewhere. Contrary to popular belief, this plant is not edible.

DISTRIBUTION AND HABITAT

Beefsteak plant is reported to be invasive in Washington, DC, Illinois, Maryland, Missouri, Pennsylvania, Tennessee, Virginia, and West Virginia. It is well established along riparian areas of streams and rivers, gravel bars, forest edges, roadsides, railroad right-of-ways, pastures, fields and other disturbed areas in soils that are rich, alluvial, or dry.

ECOLOGICAL THREAT

Beefsteak plant has spread to natural areas, especially those experiencing some form of disturbance. Once established, it disrupts native ecosystems by pushing out native plants. It has toxic characteristics which may explain why very few herbivores feed on it. It is ordinarily avoided by cattle and has been implicated in cattle poisoning. Beefsteak plants are most toxic during seed production.

DESCRIPTION AND BIOLOGY

- » **Plant:** small, freely-branching annual herb that grows to 18-30 in. high; stems four-sided and covered with short hairs.
- » **Leaves:** opposite, ovate, green to purple with toothed margins; distinctive musky mint-like odor.
- » **Flowers, fruits and seeds:** flowers are small, bell-shaped, white and purple with a distinctive ring of fine hairs along the bottom in terminal spikes or emerging from leaf axils; July and October.
- » **Spreads:** by seed that either drops close to parent plant or may be transported by wind or water.
- » **Look-alikes:** beefsteak plant superficially resembles basil and coleus and can be confused with other members of the mint family.

PREVENTION

Do not purchase or plant beefsteak plant. Control is possible with long-term monitoring. See Control Options.

NATIVE ALTERNATIVES

Members of the mint family, such as bee balm (*Monarda didyma*), bergamont (*Monarda fistulosa*), and mountain mint (*Pycnanthemum muticum*) are good alternatives to this invasive plant.

www.nps.gov/plants/alien/pubs/midatlantic/pEFR.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



BEEFSTEAK PLANT



BEEFSTEAK PLANT

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BEEFSTEAK PLANT

PHOTO-DALGIAL

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CHINESE LESPEDAZA

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HERBACEOUS FORBS

Lespedeza cuneata
(Dum.-Cours.) G. Don.

PEA FAMILY (FABACEAE)

ORIGIN
Eastern Asia

INVASIVE PLANTS

BACKGROUND

Chinese or Sericea lespedeza was introduced in the late 1800s by federal and state agencies for use in bank stabilization, erosion control, soil improvement, mine reclamation, forage, hay and other purposes. It has been escaping from plantings for many years and is a well established invasive plant.

DISTRIBUTION AND HABITAT

Chinese lespedeza occurs throughout much of the eastern U.S. from Minnesota to Texas east to New York and Florida. It is found in a variety of habitats including fields, prairies, floodplains, pond borders, stream banks, swamps, meadows, open woodlands, roadsides and other disturbed grounds, prefers full sun and is not tolerant of much shade.

ECOLOGICAL THREAT

Chinese lespedeza poses the greatest threat to open areas such as meadows, prairies, open woodlands, wetland borders, and fields. Once established, it out-competes and displaces native plants, forms extensive monocultures and develops an extensive seed bank in the soil, ensuring its long residence at a site. Its high tannin content makes it unpalatable to livestock and most native wildlife.

DESCRIPTION AND BIOLOGY

- » **Plant:** warm season, perennial herbaceous plant with an erect growth form, 3-5½ feet in height; mature stems are somewhat woody and fibrous with sharp, stiff, flattened bristles.
- » **Leaves:** each leaf is divided into three smaller leaflets which are narrowly oblong and pointed, with awl-shaped spines and wedge-shaped bases; leaflets are covered with densely flattened hairs, giving a grayish-green or silvery appearance.
- » **Flowers, fruits and seeds:** flowers small (about ¼ in.) creamy white to pale yellow with central purple spots, single or in clusters of 2-4 in axils of upper and median leaves, summer; fruits form in fall; seeds tiny, bean-shaped, yellow to light brown.
- » **Spreads:** by seed that is consumed by animals such as bobwhite quail and passed through digestive tract and deposited in new locations.
- » **Look-alikes:** other species of Lespedeza including native and non-native species.

PREVENTION AND CONTROL

Do not plant Chinese lespedeza. Hand pulling is impractical because of lespedeza's extensive perennial root system. Mowing plants in the flowering stage for two or three consecutive years may help control it. Plants should be cut as low as possible. Systemic herbicides can be effective when applied in early to mid summer. See Control Options.

NATIVE ALTERNATIVES

Blue indigo (*Baptisia australis*) or yellow wild indigo (*Baptisia tinctoria*), partridge pea (*Cassia fasciculata*), Virginia wild rye (*Elymus virginicus*), little bluestem (*Schizachyrium scoparium*), wild senna (*Senna hebecarpa* or *marilandica*).

www.nps.gov/plants/alien/pubs/midatlantic/lecu.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



CHINESE LESPEDEZA

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CHINESE LESPEDEZA



CHINESE LESPEDEZA

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CHINESE LESPEDEZA

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EXOTIC BUSH HONEYSUCKLE

SHRUBS

AMUR HONEYSUCKLE

Lonicera maackii (Rupr.)

Herder

MORROW'S HONEYSUCKLE

Lonicera morrowii A. Gray

HONEYSUCKLE FAMILY (CAPRIFOLIACEAE)

ORIGIN

China, Japan, Korea, and Russian Far East (Amur); Japan and South Korea (Morrow's)

BACKGROUND

Both Amur and Morrow's honeysuckles were imported in the 1800s and were used as ornamentals, for wildlife food and cover, and for soil erosion control. Both species are recognized as highly invasive. They have long since escaped from intended planting sites and have spread into natural areas, managed parks, and gardens. Other less common invasive exotic shrub honeysuckles include fragrant (*L. fragrantissima*), Standish's (*L. standishii*), Tartarian (*L. tatarica*), and Bell's (*L. x bella*), a hybrid between Tartarian and Morrow's.

DISTRIBUTION AND HABITAT

Amur honeysuckle is one of the most common and invasive bush honeysuckles found in the Mid-Atlantic region, occurring throughout the eastern US (except for Minnesota, Maine and Florida). Morrow's honeysuckle is fairly common in the Mid-Atlantic region. It is found from Wisconsin to Maine and Missouri to North Carolina. Both species are adaptable to a range of conditions from sun to deep shade and wet to dry. They occur in disturbed habitats including forest edges, forest interiors, floodplains, old fields, pastures, roadsides, and other disturbed areas. Disturbance increases likelihood of invasion.

ECOLOGICAL THREAT

Both species of exotic bush honeysuckle form dense thickets, outcompeting and displacing native shrubs, trees, and herbaceous plants. Amur is one of the first plants to leaf out in the spring. Amur and Morrow's dense growth impedes reforestation efforts. They invade open woodlands, old fields and other disturbed sites, spreading rapidly with help from birds and mammals who disperse their seeds. Research from the Midwest found the growth structure of exotic bush honeysuckles is easily accessible to predators such as snakes, resulting in increased nest predation of robins that nested in them. While the carbohydrate-rich fruits of exotic honeysuckles provide some nutrition for birds and rodents in winter, they do not compare to the lipid-rich fruits of native species that provide greater energy to sustain migrating birds.

DESCRIPTION AND BIOLOGY

- » **Plant:** both are multi-stemmed, upright, deciduous shrubs; Amur grows up to 15-20 ft. high and Morrow's grows 7 ft. tall; mature shrubs have tan and vertically striated bark; pith of mature stems is hollow (in contrast to solid white pith of native shrub honeysuckle species).
- » **Leaves:** both have opposite leaves; ovate with a tapered tip, lightly covered in downy hair, and up to 3½ in. long (Amur); elliptic to oblong, sparsely hairy above, permanently hairy underneath, 1-2 in. long (Morrow's).
- » **Flowers, fruits and seeds:** both have paired, tubular flowers borne from leaf axils; white to pinkish fading to yellow, less than 1 in. long, five petals, upper 4 fused (Amur); white, 5 separate unfused petals (Morrow's); the fruit of both species are red to orange-red berries produced in mid to late summer and persist through the winter.
- » **Spreads:** by fruits which are abundant and highly attractive to birds that consume them and defecate the seeds in new locations; vegetative sprouting aids in local spread.
- » **Look-alikes:** other exotic bush honeysuckles including Tartarian (*L. tatarica*) and Standish's honeysuckle (*L. standishii*); native species of *Lonicera* like hairy honeysuckle (*L. hirsuta*), American fly honeysuckle (*L. canadensis*), swamp fly-honeysuckle (*L. oblongifolia*), and mountain fly honeysuckle (*L. villosa*); northern bush-honeysuckle (*Diervilla lonicera*) which has leaves with toothed margins.



AMUR HONEYSUCKLE

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MORROW'S HONEYSUCKLE

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MORROW'S HONEYSUCKLE

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AMUR HONEYSUCKLE

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PREVENTION AND CONTROL

Young plants can be pulled by hand, larger plants either pulled using Weed Wrench® type tool or cut repeatedly. Systemic herbicides containing glyphosate or triclopyr can be applied to foliage, bark or cut stems. See Control Options.

NATIVE ALTERNATIVES

Other native honeysuckles including American fly honeysuckle (*L. canadensis*), swamp fly-honeysuckle (*L. oblongifolia*) and mountain fly honeysuckle (*L. villosa*) and the related northern bush-honeysuckle (*Diervilla lonicera*) can be alternatives for Morrow's honeysuckle.

www.nps.gov/plants/alien/pubs/midatlantic/loma.htm
www.nps.gov/plants/alien/pubs/midatlantic/lomo.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.

SHRUBS

Rosa multiflora
Thunb. ex Murr.

**ROSE FAMILY
(ROSACEAE)**

ORIGIN

Japan, Korea and
Eastern China

BACKGROUND

Multiflora rose was introduced to the eastern United States in 1866 as rootstock for ornamental roses. The US Soil Conservation Service began promoting it for use in erosion control and as “living fences” to confine livestock in the 1930s. State conservation departments recommended multiflora rose as cover for wildlife. It has been planted in highway median strips as crash barriers and to reduce automobile headlight glare. Its tenacious growth habit was eventually recognized as a problem on pastures and unplowed lands, where it disrupted cattle grazing, and, more recently, as a pest of natural ecosystems. It is designated a noxious weed in several states.

DISTRIBUTION AND HABITAT

Multiflora rose occurs throughout the eastern half of the US and in Washington and Oregon. It tolerates a wide range of soil, moisture, and light conditions and is able to invade fields, forests, prairies, some wetlands and many other habitats.

ECOLOGICAL THREAT

Multiflora rose grows aggressively and produces large numbers of fruits (hips) that are eaten and dispersed by a variety of birds. Dense thickets of multiflora rose exclude most native shrubs and herbs from establishing and may be detrimental to nesting of native birds.

DESCRIPTION AND BIOLOGY

- » **Plant:** multi-stemmed shrub, sometimes climbing vine, with arching stems and recurved thorns.
- » **Leaves:** divided into five to eleven sharply toothed leaflets; leaf stalks with fringed stipules (paired wing-like structures).
- » **Flowers, fruits and seeds:** clusters of showy, fragrant, white to pinkish, 1 in. wide flowers appear during May; small bright red fruits, or rose hips, develop during the summer and remain on the plant through the winter.
- » **Spreads:** reproduces by seed and by forming new plants from the tips of arching canes that can root where they contact the ground. An average plant produces an estimated one million seeds per year, which remain viable in the soil for up to 20 years.
- » **Look-alikes:** pasture rose (*Rosa carolina*); swamp rose (*Rosa palustris*); Allegheny blackberry (*Rubus allegheniensis*); flowering raspberry (*Rubus odoratus*). Only multiflora rose has the combination of upright arching stems and fringed stipules.

PREVENTION AND CONTROL

Do not plant multiflora rose. Effective control of multiflora is possible using chemical, manual, or mechanical means. Frequent, repeated cutting or mowing at the rate of three to six times per growing season, for two to four years, has been shown to be very effective. In high-quality natural communities, cutting of individual plants may be preferable to minimize habitat disturbance. Because of the long-lived stores of seed in the soil, follow-up treatments are necessary. Application of glyphosate to freshly cut stems, regrowth, or foliage is very effective, especially if done late in the growing season. Two naturally-occurring



MULTIFLORA ROSE

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



MULTIFLORA ROSE

ROB ROUTLEDGE, SAUIT COLLEGE, BUGWOOD.ORG



MULTIFLORA ROSE

NANCY FRALEY, USDI NATIONAL PARK SERVICE, BUGWOOD

controls affect multiflora rose: a native virus (rose-rosette disease) impedes stem growth, and a non-native seed-infesting wasp, the European rose chalcid, causes damage to the seeds.

www.nps.gov/plants/alien/pubs/midatlantic/romu.htm

Jil Swearingen, National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker,
U.S. Fish and Wildlife service.



MULTIFLORA ROSE

CHRIS EVANS, RIVER TO RIVER CWMA, BUGWOOD.ORG

SHRUBS

BORDER PRIVET

Ligustrum obtusifolium
Sieb. & Zucc.

CALIFORNIA PRIVET

L. ovalifolium Hassk.

CHINESE PRIVET

L. sinense Lour.

EUROPEAN PRIVET

L. vulgare L.

OLIVE FAMILY (OLEACEAE)

ORIGIN

Japan (Border); Japan and
South Korea (California);
China (Chinese); Europe,
Morocco, Western Asia and
Caucasus (European)

BACKGROUND

There are no species of *Ligustrum* native to the US. Privets have been introduced since the 1800s and earlier. They are commonly used as hedges in yards, gardens and other landscapes from which they have escaped and are now well established in the wild.

DISTRIBUTION AND HABITAT

All four privet species featured here have been reported to be invasive in the Mid-Atlantic region; some are recognized as invasive elsewhere in the Eastern U.S. and nationwide. They thrive in floodplains, fields, disturbed forests and forest edges.

ECOLOGICAL THREAT

Privets form dense thickets that shade out and take the place of native shrubs and herbaceous plants. The shady thickets make conditions unsuitable for native seedlings. Chemical compounds (Phenolic) in the leaves protect plants from leaf-feeding insects, including native herbivorous species.

DESCRIPTION AND BIOLOGY

- » **Plant:** deciduous or semi-evergreen shrubs that grow from 8-20 ft. tall; trunks with multiple stems with long leafy branches; the presence or absence of hairs and type of hairs on stems is helpful in distinguishing species.
- » **Leaves:** opposite, simple, entire, short-stalked, ranging in length from 1-3 in. and varying in shape from oval, elliptic, to oblong.
- » **Flowers, fruits and seeds:** flowers small, white and tubular with four petals and occur in clusters at branch tips; fragrant; late spring to early summer (May to July); length of corolla tube length ranges from 1/10 in. (Chinese) to 1/4 in. (border); anthers exceed the corolla lobes (Chinese and California); fruit is small black to blue-black oval to spherical drupe (i.e., a fleshy fruit with 1-several stony seeds inside), mature late summer to fall.
- » **Spreads:** by birds that consume fruits and excrete seeds undamaged in new locations; can spread locally through root sprouting.

PREVENTION AND CONTROL

Do not plant privets. Small plants can be dug out pulled out by hand or with the help of a mattock or heavy Weed Wrench® type tool. Larger plants can be cut repeatedly or treated with a systemic herbicide. Herbicide can be sprayed on foliage or applied to bark or cut stems and stumps. No biological controls are available for any of these species. Known pests that affect privets include a foliage-feeding insect native to Europe (*Macrophya punctumalbum*), a fungal leaf spot (*Pseudocercospora ligustri*) and a common root crown bacteria (*Agrobacterium tumefaciens*). See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/privets.htm

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EUROPEAN PRIVET

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BORDER PRIVET

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EUROPEAN PRIVET

ROBERT VIDÉKI, DOKONICUM KFT., BUGWOOD.ORG



CALIFORNIA PRIVET

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



CHUCK BARGERON, UNIVERSITY OF GEORGIA, BUGWOOD.ORG

CHINESE PRIVET

CHRIS EVANS, ILLINOIS WILDLIFE ACTION PLAN, BUGWOOD.ORG



CHINESE PRIVET

SHRUBS

Rubus phoenicolasius
Maxim.

**ROSE FAMILY
(ROSACEAE)**

ORIGIN
Japan, Korea and China

BACKGROUND

Wineberry, or wine raspberry, is a spiny shrub that was introduced into the United States in 1890 as breeding stock for new *Rubus* (raspberry genus) cultivars and still used today by berry breeders. It is prized for its delicious edible raspberry-like berries that are produced in abundance in summer.

DISTRIBUTION AND HABITAT

Wineberry is found from New England and eastern Canada to North Carolina and west to Michigan and Tennessee. It occurs along forest, field, stream and wetland edges and in open woods, preferring moist habitats.

ECOLOGICAL THREAT

Wineberry forms dense shady thickets that displace native plants and significantly alter habitat structure.

DESCRIPTION AND BIOLOGY

- » **Plant:** multi-stemmed shrub with spiny stems densely covered with reddish hairs, also on flowering stems and buds.
- » **Leaves:** alternate, divided into three leaflets with toothed margins, terminal leaflet largest; undersides are noticeably white.
- » **Flowers, fruits and seeds:** flowers with five white petals occur in springtime; bright red edible berries produced in early summer.
- » **Spreads:** by seed that is consumed and dispersed by birds and mammals (including humans), and by forming new plants from the tips of arching canes that can root where they contact the ground.

PREVENTION AND CONTROL

Do not plant wineberry. It can be controlled through mechanical means or by treating the canes with a systemic herbicide like glyphosate or triclopyr. See Control Options.

NATIVE ALTERNATIVES

Native blackberries and non-invading cultivated raspberries are good alternatives.

www.nps.gov/plants/alien/pubs/midatlantic/ruhp.htm

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Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



WINEBERRY

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WINEBERRY

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



WINEBERRY

MARY FARRAH, UNIVERSITY OF THE DISTRICT OF COLUMBIA



WINEBERRY

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



WINEBERRY

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WINGED BURNING BUSH

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SHRUBS

Euonymus alatus
(Thunb.) Sieb.

**BITTERSWEET FAMILY
(CELASTRACEAE)**

ORIGIN
Northeastern Asia, Japan
and Central China

INVASIVE PLANTS

BACKGROUND

Winged burning bush, also known as winged wahoo and winged euonymus, was introduced to the U.S. around 1860 as an ornamental plant for use in landscaping. Despite its invasive nature, it remains very popular and is widely sold for its hardiness and intense red foliage in the fall. It can be found planted along roadways, at commercial and industrial sites, and in park and residential landscapes.

DISTRIBUTION AND HABITAT

Winged burning bush is found from New England to northern Florida and the Gulf Coast, and also in Illinois.

ECOLOGICAL THREAT

A variety of habitats are threatened, including forests, coastal scrublands, and prairies where it forms dense thickets and displaces many native woody and herbaceous plant species. Hundreds of seedlings are often found below the parent plant in what is termed a “seed shadow.”

DESCRIPTION AND BIOLOGY

- » **Plant:** multiple stemmed, angular branching shrub with conspicuously winged stems, normally 5-10 ft. high but mature plants can grow to 20 ft.
- » **Leaves:** deciduous, dark green, in pairs along stem, turn brilliant red-purple in autumn.
- » **Flowers, fruits and seeds:** inconspicuous, greenish flowers occur in late spring and red-purple fruits mature during summer.
- » **Spreads:** expands locally through vegetative reproduction and to new areas through bird dispersal of seeds.
- » **Look-alikes:** may be confused with other species of euonymus including our native strawberry bush (*Euonymus americana*), also called ‘hearts-a-bustin,’ which has green non-winged stems. Saplings of native sweetgum (*Liquidambar styraciflua*) with winged stems may be mistaken for winged burning bush.

PREVENTION AND CONTROL

Do not plant winged burning bush. Manual, mechanical and chemical means are available to control established plantings. Seedlings can be pulled by hand. Shrubs can be repeatedly cut to the ground to control re-sprouts, or cut and treated with systemic herbicides like glyphosate and triclopyr. See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/eual.htm

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WINGED BURNING BUSH

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WINGED BURNING BUSH

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WINGED BURNING BUSH

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WINGED BURNING BUSH

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WINGED BURNING BUSH

DAMIEN OSSI, DISTRICT DEPARTMENT OF THE ENVIRONMENT

EXOTIC MULBERRY

24

TREES

PAPER MULBERRY

Broussonetia papyrifera
(L.) L'Her. ex Vent.

WHITE MULBERRY

Morus alba L.

MULBERRY FAMILY (MORACEAE)

ORIGIN

Japan and Taiwan (Paper);
China (White)

INVASIVE PLANTS

BACKGROUND

Paper mulberry was introduced for use as a fast-growing shade tree. Native Pacific cultures use it to make bark cloth. White mulberry was introduced during colonial times for the purpose of establishing a silkworm industry.

DISTRIBUTION AND HABITAT

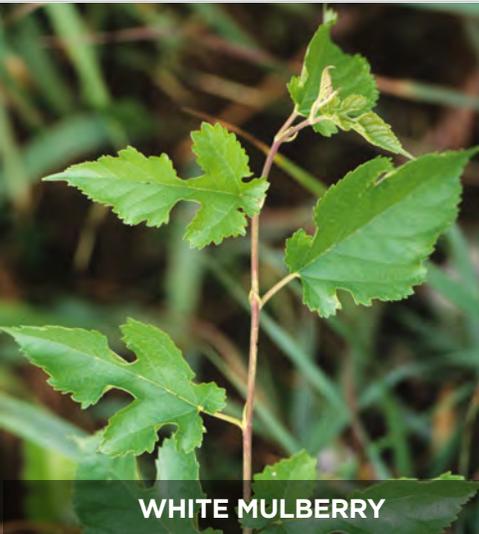
Paper mulberry is found from Illinois to Massachusetts, south to Florida and west to Texas, invading open habitats such as forest and field edges. Internationally, it is identified as an invasive weed in over a dozen countries. White mulberry occurs in every state of the lower 48 except for Nevada. It invades old fields, urban lots, roadsides, forest edges, and other disturbed areas.

ECOLOGICAL THREAT

Once established, paper mulberry grows vigorously and displaces native plants through competition and shading. It can dominate a site if left unmanaged. Its shallow root system makes it susceptible to blowing over during high winds, posing a hazard to people, causing slope erosion and further degradation of an area. White mulberry displaces native species in forest edges, disturbed forests, and open areas. It is slowly outcompeting and replacing native red mulberry (*Morus rubra*) through hybridization and possibly through transmission of a harmful root disease.

DESCRIPTION AND BIOLOGY

- » **Plant:** both are deciduous trees. Paper mulberry has milky sap and grows to about 45 ft., twigs are hairy reddish brown, the bark is tan and smooth to moderately furrowed, the wood is soft and brittle, stems and leaves are covered with stiff hairs, and buds are conical.
- » White mulberry grows 30-50 ft. tall, young bark, inner bark, and the bark of roots is bright orange, older bark is gray with narrow irregular fissures and splits easily; stems range from being covered in downy hair to being hairless.
- » **Leaves:** paper mulberry leaves can be alternate, opposite, and whorled; are covered in dense gray downy hairs, have 3-15 lobes (the lobes are sometimes deep) with a heart-shaped to rounded leaf base, and sharply toothed leaf margins. The upper leaf surface is somewhat rough feeling.
- » White mulberry leaves are alternate, the upper surface is glossy, they range from being unlobed to lobed (with one or more sometimes deep lobes), and have a toothed leaf margin. The leaf surface is hairless and sometimes slightly rough, but the leaf veins and vein axils can range from hairless to slightly downy.
- » **Flowers, fruits and seeds:** both species flower in spring. Paper mulberry has male and female flowers; male flower clusters are elongate, pendulous, 2½-3 in. long, and composed of many individual flowers; female flowers are globular and about 1 in. in diameter; fruits are reddish purple to orange, ¾-1 in. across, and mature in summer.
- » White mulberry has male and female flowers on separate plants; male flowers are small, green and occur in 1-2 in. long catkins (slim, cylindrical flower clusters); female flowers are inconspicuous and crowded in short spikes; fruits form from female flowers and are multiple-seeded berries ranging in color from black to pink to white when ripe; contain abundant seed—a single tree is estimated to produce twenty million seeds!
- » **Spreads:** both species are spread by seed, which is consumed by wildlife and deposited in new locations; paper mulberry is also spread by vegetative growth through sprouting.



WHITE MULBERRY

JOHN CARDINA, THE OHIO STATE UNIVERSITY, BUGWOOD.ORG



WHITE MULBERRY

VLADIMIR SHIOSHVILI



WHITE MULBERRY

ROBERT VIDEKI, DORONICUM KFT., BUGWOOD.ORG



PAPER MULBERRY

KARAN A. RAWLINS, UNIVERSITY OF GEORGIA, BUGWOOD.ORG



PAPER MULBERRY

AMY RICHARD, UNIVERSITY OF FLORIDA, BUGWOOD.ORG

- » **Look-alikes:** exotic invasive white mulberry (*Morus alba*) and native trees including red mulberry (*Morus rubra*), American basswood (*Tilia americana*) and sassafras (*Sassafras albidum*), due to a shared leaf form.

PREVENTION AND CONTROL

White mulberry seedlings can be pulled by hand. Otherwise, cut the tree and grind the stump or paint the cut surface with a systemic herbicide like glyphosate or girdle the tree. See Control Options.

NATIVE ALTERNATIVES

Basswood (*Tilia heterophylla*) and sassafras (*Sassafras albidum*) have similar foliage and form and grow in similar places as paper mulberry. White mulberry alternatives also include sassafras, red maple (*Acer rubrum*), hackberry (*Celtis occidentalis*), and black gum (*Nyssa sylvatica*).

www.nps.gov/plants/alien/pubs/midatlantic/brpa.htm

www.nps.gov/plants/alien/pubs/midatlantic/meal.htm

Jil Swearingen. National Park Service

Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.

TREES

Paulownia tomentosa
(Thunb.) Sieb. & Zucc.
ex Steud.

**FIGWORT FAMILY
(SCROPHULARIACEAE)**

ORIGIN
Central and Western China

BACKGROUND

Also known as empress tree or royal paulownia, it was imported to Europe by the Dutch East India Company in the 1830s and to North America soon after. Historical records describe important medicinal, ornamental, and timber uses of Princess tree as early as the 3rd century B.C. Its ability to sprout prolifically from adventitious buds on stems and roots allows it to survive fire, cutting and even bulldozing in construction areas. It is highly prized for carving.

DISTRIBUTION AND HABITAT

Princess tree occurs throughout much of the eastern United States from Texas to New England where it can be found growing along roadsides, stream banks and forest edges. It tolerates infertile and acidic soils, drought conditions, and adapts to a wide variety of habitats.

ECOLOGICAL THREAT

Princess tree invades forests, stream banks and some rocky habitats, displacing native plant species.

DESCRIPTION AND BIOLOGY

- » **Plant:** medium-sized deciduous tree that grows to 30-60 ft. in height; twigs are stout, green to brown, and have many lenticels (pores); bark is thin, gray-brown with shallow features.
- » **Leaves:** paired, large, hairy on upper surfaces, broadly oval to heart-shaped and sometimes shallowly three-lobed.
- » **Flowers, fruits and seeds:** flowers are showy, pale violet and fragrant and produced in conspicuous upright clusters in spring before the leaves appear; fruit is a four-compartmented oval capsule containing thousands of small winged seeds; capsules are green, becoming brown and dry as they mature and persist through the winter.
- » **Spreads:** by seed which is abundant and easily transported long distances by wind and water; seeds germinate easily in suitable soil; seedlings grow and mature quickly, producing flowers within 8-10 years; a single tree is estimated to produce twenty million seeds!

PREVENTION AND CONTROL

Do not plant princess tree. Young plants can be pulled by hand; cut larger trees at ground level with power or manual saw, preferably prior to seed formation to prevent further spread. Systemic herbicides containing glyphosate or triclopyr are effective and can be applied to cut stumps or to bark. See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/pato.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



PRINCESS TREE

MARY FARRAH, UNIVERSITY OF THE DISTRICT OF COLUMBIA



PRINCESS TREE

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG



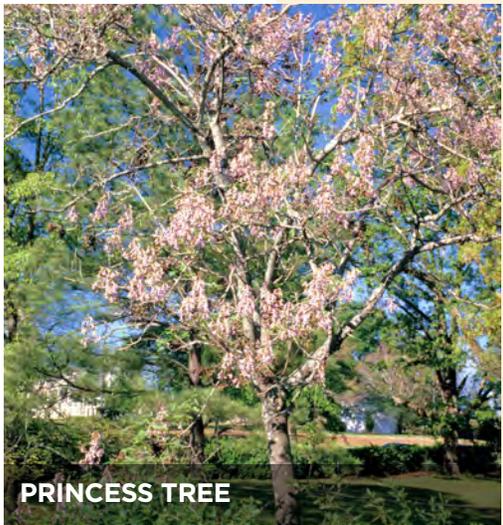
PRINCESS TREE

ROBERT VIDÉKI, DORONICUM KFT., BUGWOOD.ORG



PRINCESS TREE

JAMES H. MILLER, USDA FOREST SERVICE, BUGWOOD.ORG



PRINCESS TREE

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TREES

Albizia julibrissin
Durazz.

**PEA FAMILY
(FABACEAE)**

ORIGIN
Asia

BACKGROUND

Silk tree, also called silky acacia or mimosa tree, was introduced to the United States in 1745 for use as an ornamental plant.

DISTRIBUTION AND HABITAT

Silk tree occurs from California across the southern United States to New York. It grows in disturbed areas such as roadsides, forest edges and various open habitats. It is a hardy plant that tolerates a variety of soil and moisture conditions, enhanced by the ability of its roots to produce nitrogen.

ECOLOGICAL THREAT

Silk tree grows vigorously and displaces native trees and shrubs, spreading by seed and vegetative means. Once established, silk tree is difficult to remove due to its long-lived seeds and its ability to re-sprout vigorously.

DESCRIPTION AND BIOLOGY

- » **Plant:** small deciduous tree that grows 10-50 ft. in height and often has multiple trunks; the bark is light brown, nearly smooth, thin and has lens-shaped spots along the stem.
- » **Leaves:** alternate, twice-pinnately compound, fern-like.
- » **Flowers, fruits and seeds:** flowers are pink, fragrant and look like pom-poms; flowering occurs in early summer; fruits are flat 6 in. long seedpods that develop in the late summer.
- » **Spreads:** by seed and vegetative growth.
- » **Look-alikes:** honey locust (*Gleditsia triacanthos*) and black locust (*Robinia pseudoacacia*) with leaves that are once-pinnately compound.

PREVENTION AND CONTROL

Do not plant silk tree. Trees can be cut at ground level with power or manual saws. Cutting is an initial control measure, best done prior to seed set, and usually requires follow-up cuttings in combination with herbicide treatments due to re-sprouts. Systemic herbicides like glyphosate and triclopyr are effective. See Control Options.

NATIVE ALTERNATIVES

Serviceberry (*Amelanchier arborea*), river birch (*Betula nigra*), redbud (*Cercis canadensis*), fringetree (*Chionanthus virginicus*), and flowering dogwood (*Cornus florida*).

www.nps.gov/plants/alien/pubs/midatlantic/alju.htm

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Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



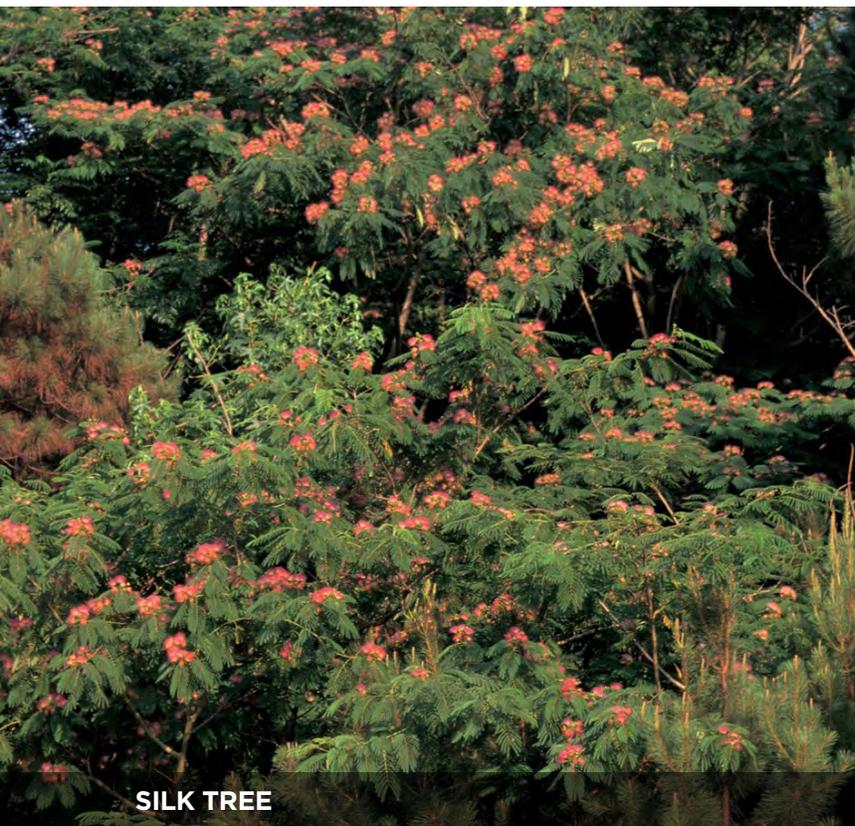
SILK TREE

FRANKLIN BONNER, USFS (RET.), BUGWOOD.ORG

MARY PARRAH, UNIVERSITY OF THE DISTRICT OF COLUMBIA



SILK TREE



SILK TREE

JAMES H. MILLER, USDA FOREST SERVICE, BUGWOOD.ORG



SILK TREE

JAMES H. MILLER, USDA FOREST SERVICE, BUGWOOD.ORG

VINES

Akebia quinata
(Houtt.) Decne.

**LARDIZABALA FAMILY
(LARDIZABALACEAE)**

ORIGIN

Central China, Japan
and Korea

BACKGROUND

Also known as five-leaf akebia, this is an unusual and attractive exotic vine that was imported around 1845 for ornamental purposes.

DISTRIBUTION AND HABITAT

It has been reported to be invasive throughout the Mid-Atlantic to Kentucky with scattered occurrences elsewhere.

ECOLOGICAL THREAT

Akebia can form an impenetrable groundcover, and when climbing shrubs and trees forms a dense tangle that creates deep shade for the vegetation it covers.

DESCRIPTION AND BIOLOGY

- » **Plant:** woody deciduous, perennial plant that grows either as a twining vine or a groundcover; slender stems are green when young becoming brown when mature.
- » **Leaves:** alternate, dull blue-green, palmately compound with five stalked leaflets that meet at a central juncture; leaflets are 1½-3 in. long, entire (non-toothed), oval shaped and notched at the tip.
- » **Flowers, fruits and seeds:** flowers are reddish to purple-brown, about 1 in. across, and have a sweet fragrance likened to chocolate; female flowers are chocolate-purple, male flowers are lighter rosy purple; spring flowering; fruits, if produced at all, are large, soft, edible sausage-shaped pods 2¼-4 in. in length, that ripen in late summer to fall.
- » **Spreads:** primarily by vegetative means; infrequently by seed.
- » **Look-alikes:** Virginia creeper (*Parthenocissus quinquefolia*), native to the eastern U.S., has palmate leaves with five leaflets that are toothed.

PREVENTION AND CONTROL

Young plants can be pulled by hand. Cutting can be done any time of year and vines should be cut to the ground. Vines may be dug up, removing as much of the roots as possible. For large infestations, a systemic herbicide containing glyphosate or triclopyr is effective. See Control Options.

NATIVE ALTERNATIVES

Pipevine (*Aristolochia macrophylla*), cross-vine (*Bignonia capreolata*), trumpet creeper (*Campsis radicans*) and trumpet honeysuckle (*Lonicera sempervirens*).

www.nps.gov/plants/alien/pubs/midatlantic/akqu.htm

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Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



CHOCOLATE VINE

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CHOCOLATE VINE



CHOCOLATE VINE

LESLIE J. MEHRHOFF, UNIVERSITY OF CONNECTICUT, BUGWOOD.ORG

COMMON PERIWINKLE

32

VINES

Vinca minor L.

DOGBANE FAMILY (APOCYNACEAE)

ORIGIN
Europe

BACKGROUND

Common periwinkle was first introduced into North America in the 1700s as an ornamental. It is still commonly sold and used as an ornamental ground cover.

DISTRIBUTION AND HABITAT

Periwinkle has escaped cultivation and is invading natural areas throughout the Eastern US. It inhabits open to shady sites including forests and often escapes from old home-sites.

ECOLOGICAL THREAT

Periwinkle grows vigorously and forms dense and extensive mats along the forest floor, displacing native herbaceous and woody plant species.

DESCRIPTION AND BIOLOGY

- » **Plant:** vine-like erect or trailing groundcover; mostly evergreen; stems slender.
- » **Leaves:** opposite, dark green, glossy, oval to lance-shaped, thick-textured; may be variegated.
- » **Flowers, fruits and seeds:** flowers are blue, lavender, or white, about 1 in. across, with five petals, arranged in spirals; springtime; no fruits or seeds typically.
- » **Spreads:** vegetatively through rhizomes.
- » **Look-alikes:** may be confused with several close relatives of this plant, including bigleaf periwinkle (*Vinca major*), imported from Europe, and Madagascar periwinkle (*Catharanthus roseus*), native only to Madagascar, both also invasive in natural areas in the Mid-Atlantic and other parts of the United States; and winter creeper (*Euonymus fortunei*).

PREVENTION AND CONTROL

Periwinkle can be pulled by hand, dug up or raked up, being sure to remove underground portions. Where appropriate, mowing can be used to cut plants back but will likely have to be repeated regularly. Mowing followed soon after by application of a systemic herbicide would improve control greatly. See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/vimi.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



COMMON PERIWINKLE

ROBERT VIDÉKI, DORONICUM KFT., BUGWOOD.ORG



COMMON PERIWINKLE

ROBERT VIDÉKI, DORONICUM KFT., BUGWOOD.ORG



COMMON PERIWINKLE

DAMIEN OSSÉ, DISTRICT DEPARTMENT OF THE ENVIRONMENT

DEENA CHADI, UNIVERSITY OF NEW HAVEN, BUGWOOD.ORG



COMMON PERIWINKLE

SWEET AUTUMN VIRGINSBOWER

34

VINES

Clematis terniflora DC

BUTTERCUP FAMILY (RANUNCULACEAE)

ORIGIN

Japan and China

BACKGROUND

Sweet autumn virginsbower was introduced into the United States as an ornamental vine and is still widely sold in the nursery trade.

DISTRIBUTION AND HABITAT

Sweet autumn virginsbower is documented to occur in much of the Eastern US from Minnesota to Vermont, south to Texas and Florida. It has been reported to be invasive in Alabama, Delaware, Florida, Georgia, Illinois, Maryland, New Jersey, North Carolina, South Carolina, Tennessee and Virginia, although it is probably invasive in additional states where it occurs. It prefers full sun but can tolerate partial shade.

ECOLOGICAL THREAT

This species is found invading forest edges, right-of-ways and urban areas along streams and roads. It grows vigorously over other vegetation, forming dense blankets that block sunlight to the plants underneath. In late summer infestations are conspicuous as a result of its abundant showy white flowers.

DESCRIPTION AND BIOLOGY

- » **Plant:** climbing, deciduous to semi-evergreen, perennial vine.
- » **Leaves:** opposite, compound 3 leaflets; leaflets are 2-3 in. long and usually have entire (non-toothed) margins.
- » **Flowers, fruits and seeds:** flowers are produced late summer through fall; flowers are white with four petals; seeds are produced in profusion and are showy due to long, silvery-gray, feather-like hairs attached.
- » **Spreads:** by wind-dispersed seed.
- » **Look-alikes:** There are dozens of native species of *Clematis* in the U.S. including several that are quite rare. Devil's darning needles (*Clematis virginiana*), the species most likely to be confused with sweet autumn virginsbower due to its similar looking white flowers, and it has leaves that are compound and toothed. The much cultivated and highly popular ornamental *Clematis* vines with large, showy flowers in a wide variety of colors from white to rose to purple, typically with eight or more petals, have not been reported to be invasive.

PREVENTION AND CONTROL

See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/clte.htm

Jil Swearingen. National Park Service
Britt Slattery, Kathryn Reshetiloff, and Susan Zwicker, U.S. Fish and Wildlife service.



SWEET AUTUMN VIRGINSBOWER

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SWEET AUTUMN VIRGINSBOWER

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SWEET AUTUMN VIRGINSBOWER

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EXOTIC WISTERIA

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VINES

CHINESE WISTERIA

Wisteria sinensis (Sims)
A.P. de Cand.

JAPANESE WISTERIA

Wisteria floribunda (Willd.)
DC. Pea family (Fabaceae)

PEA FAMILY (FABACEAE)

ORIGIN

China; Japan

INVASIVE PLANTS

BACKGROUND

Chinese wisteria was introduced in 1916 as an ornamental plant. Japanese wisteria was introduced to the U.S. in 1830. Both have been widely planted and cultivated and are still very popular in the nursery trade despite their weedy and destructive habits.

DISTRIBUTION AND HABITAT

Found extensively throughout the Eastern US, Chinese wisteria has been reported to be invasive in at least 19 states from Massachusetts to Illinois south to Texas. Japanese wisteria is found invasive in the Mid-Atlantic and Southeastern US, from New York to Florida and west to Texas. Both wisteria species prefers full sun, but established vines will persist and reproduce in partial shade. Vines climb trees, shrubs and manmade structures. They are tolerant of a variety of soil and moisture regimes but prefers deep, loamy, well drained soils. Infestations are commonly found along forest edges, roadsides, ditches, and rights-of-way.

ECOLOGICAL THREAT

The hard woody vines twine tightly around host tree trunks and branches and cut through bark, causing death by girdling. On the ground, new vines germinating from seed or sprouting from rootstocks form dense thickets that smother and shade out native vegetation and impede natural plant community development. As girdled trees die, canopy gaps are created which increase the amount of sunlight reaching the forest floor. While this may temporarily favor some native species, it also stimulates vigorous growth and spread of wisteria.

DESCRIPTION AND BIOLOGY

- » **Plant:** both species are perennial deciduous, woody twining vines that climb up tree trunks, older plants can grow to 15 in. or more in diameter. Chinese wisteria twines in a clockwise direction, stems are stout, smooth gray-brown and covered with fine white hairs; Japanese wisteria twines in a counter-clockwise direction, stems are slender, brown and densely hairy when young, becoming hairless with age.
- » **Leaves:** alternate, compound, leaflets egg-shaped with wavy-margins and strongly tapering tips for both species; Chinese wisteria leaves grow 6-10 in. long with 9-11 (7-13) leaflets; Japanese wisteria grows 8-12 in. long, with 13-17 (11-19) leaflets.
- » **Flowers, fruits and seeds:** flowering occurs in April before leaf expansion for both species. Chinese wisteria flowers are lavender to purple, occur in pendulous racemes or clusters 6-12 in. long, and open mostly all at once; individual flowers are 0.8-0.9 in. long. Japanese wisteria flowers are violet to violet blue, occur in pendulous racemes 1-3 ft. in length, and open sequentially from the base to the tip; flowers are 0.6-0.7 in. long. Fruits for both species are green to brown velvety seedpods (4-6 in. long for Chinese; 4½-7½ in. for Japanese) containing flattened, round seeds (1-3 seeds for Chinese; 3-6 seeds for Japanese); they begin to appear midsummer and persist for a long time on the vine.
- » **Spreads:** by seed which, in riparian areas, can be transported by water; vegetatively by producing stolons (above-ground stems) that produce shoots and roots at short intervals.
- » **Look-alikes:** Chinese wisteria and Japanese wisteria are frequently confused for one another. The native American wisteria (*Wisteria frutescens*) has smooth, bright green compound leaves with slightly milky undersides that are 7-12 in. long with 9-15 uniform-sized leaflets; pale lilac-purple flowers with a yellow spot are about ¾ in. long and occur in clusters 4-6 in. long in May after leaf expansion; fruit is green and glabrous (not hairy) and seeds are swollen bean to kidney-shaped. Another look-alike is



CHINESE WISTERIA

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CHINESE WISTERIA

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JAPANESE WISTERIA

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trumpet creeper (*Campsis radicans*) with opposite, compound leaves, leaflet margins are toothed, flowers are red-orange, tubular, and bloom late spring through summer.

PREVENTION AND CONTROL

For small infestations, cut vines to relieve trees of the weight and girdling. Treat lower cut stem portions with a systemic herbicide containing glyphosate or triclopyr. New plants may grow from seed. Long term management is needed. See Control Options.

www.nps.gov/plants/alien/pubs/midatlantic/wisi.htm
www.nps.gov/plants/alien/pubs/midatlantic/wifl.htm

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CHINESE WISTERIA

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Non-native, invasive plants can be controlled through a number of techniques, including manual, mechanical, biological, and chemical control methods.

Use pesticides wisely: always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing.

Notice: mention of a trade name does not constitute the endorsement of the product by authors, agencies or organizations involved in the production of this publication.

Two of the more widely used herbicides are glyphosate and triclopyr. Both are systemic herbicides and are absorbed by plant tissues and carried to the roots causing the entire plant to die within about one week.

Glyphosate is a non-selective herbicide that can kill or harm any plants that come in contact with the spray. It carries a Caution signal word and requires long-sleeved shirt, long pants, shoes and socks during application. Glyphosate products referred to in this publication are sold under a variety of brand names (Accord®, Rodeo®, etc.) and in three concentrations (41.0, 50.2 and 53.8% active ingredient). Other glyphosate products sold at home improvement stores may be too dilute to obtain effective control.

Triclopyr is a selective herbicide that affects only broadleaf plants (e.g., forbs, shrubs and trees) and can be used in grasslands or areas where desirable grasses are growing under or around targeted woody or broad-leaved invasives. Use of triclopyr in areas where soils are permeable, particularly where the water table is shallow, can result in groundwater contamination. Triclopyr comes in two forms – triclopyr amine (e.g., Garlon® 3A, Brush-B-Gone®, Brush Killer®) and triclopyr ester (e.g., Garlon® 4, Pathfinder®, and Vinex®). They are very different products with very different specific uses, hazards and precautions. Triclopyr amine mixes with water and can be used near water without posing a threat to aquatic organisms. It can be used as a cut stem treatment at a 50% rate, or as a foliar treatment at 5% rate. It is not effective for basal bark treatments. However, the amine form of triclopyr carries a Danger signal word due to its corrosive properties which, in concentrated form, **can cause irreversible eye damage**. For this reason, it should only be used by trained and certified applicators who are familiar with this hazard and know the precautions that need to be taken when using it.

The ester form of triclopyr (e.g., Garlon® 4) carries a Warning signal word for the potential to cause skin and eye irritation but is not known to cause irreparable eye damage. Because it is toxic to aquatic invertebrates, it cannot be used near water or in wet soils. Garlon® 4 can be used for foliar, cut stem and basal bark applications. Due to the high potential for volatilization and offsite drift, *triclopyr should not be used when the temperature is above 85°F*. Drift can result in kill of non-target trees and other woody vegetation. It is imperative that protective eyewear and chemical resistant gloves be worn in addition to long-sleeve shirt, long pants, shoes and socks, during mixing and application. Always read the entire label before using any pesticide.

GENERAL GUIDANCE FOR GRASSES AND GRASSLIKE PLANTS

A variety of methods are available for control of grasses, depending on the extent of the infestation, the type of habitat, and the availability of labor and other resources. Preventing the introduction of invasive grasses from infested to non-infested areas should always be a priority. Early control of new infestations will also reduce the likelihood of establishment and expansion. When deciding between physical and chemical methods, keep in mind that manual removal of plants can result in disturbance to the soil, which can further encourage invasive species and open the site up to new introductions. Using an herbicide leaves the plants and soil in place, thus minimizing that likelihood. The use of grass-specific herbicides will reduce impacts to non-target broadleaf plants.

BAMBOOS

Chemical

The following method is effective for control of most exotic invasive bamboos such as common bamboo (*Bambusa vulgaris*), golden bamboo (*Phyllostachys aurea*), arrow bamboo (*Pseudosasa japonica*) and others. It was developed by Dr. Francis Gouin, formerly a University of Maryland Agronomist, and is presented here with slight modification.

Cut the bamboo down to the ground in spring. Depending on the type of bamboo you are working with, you will need a chain saw, weed whacker, Swedish brush axe, pruners or other tool that will cut through the bamboo stems. Leave the bamboo alone for the summer, allowing it to regrow. In October or early November, on a sunny, non-breezy day, spray the leaves of regrown plants with a 2% rate of glyphosate (e.g., Accord®) mixed with water, according to the label directions. Apply thoroughly just to the point of drip. Wait 10-14 days and reapply the glyphosate at the same rate. After the second treatment, leave the bamboo alone. Do not cut, mow, or remove plant material. The following spring, the bamboo will be browned out and should not grow back. At this point, you can cut and remove the dead vegetation. If any bamboo remains or does reappear, repeat the procedure.

GENERAL GUIDANCE FOR HERBACEOUS FORBS

Chemical

Foliar. This method is effective on infestations where mechanical control is not practical or desired. It is important to avoid contact of spray with desirable plants. Treatments should be done either in early spring when most other non-target vegetation is dormant or mid to late summer and fall when plant growth slows and resources are being sent to the roots. In general, a 1-2% solution of glyphosate mixed with water and a non-ionic surfactant (seek manufacturer's recommendations) is used. Spray should be applied such that it thoroughly covers most of the leaves but not to the point that it is dripping off the leaves. Refer to manufacturer's label for specific information and restrictions regarding use.

Manual

Generally speaking, most herbaceous plants can be pulled by hand as long as the entire plant, including the roots, is removed to prevent regrowth. This is almost always recommended for individual plants

Mechanical

While repeated mowing can be effective for control of some herbaceous forbs, it may not be practical for others. Mowing often needs to be conducted repeatedly and for many years to eradicate plants with significant root systems. It may be more practical and effective to use chemical methods or a combination of mowing and herbicides for difficult species.

CHINESE LESPEDEZA

Mechanical and chemical methods are the most effective options currently available for Chinese lespedeza. Hand pulling is not recommended due to lespedeza's extensive perennial root system that will resprout from the root crown. Mowing plants in the flower bud stage for two or three consecutive years may reduce the vigor of lespedeza stands and control further spread. Plants should be cut as low to the ground as possible. Impacts to adjacent native plants should be minimized as much as possible during any treatments. Since root reserves increase up to the flower bud stage, all herbicide treatments should be completed in early to mid summer. The addition of a non-ionic surfactant at a concentration of 0.5% will improve the effectiveness of foliar treatments. A 2% solution of glyphosate (Accord® for upland and wet areas or Rodeo® for wet sites only) mixed with water is effective during the vegetative stage prior to branching or during flowering. Treatments should cover the leaves and stems of plants just to the point of runoff but should not be dripping off the leaves.

GENERAL GUIDANCE FOR MOST SHRUBS

Chemical

Basal Bark Method. This method is effective throughout the year as long as the ground is not frozen. While reducing the total amount of herbicide mixture applied to the environment, it requires a much more concentrated mix than that used for foliar applications. Prepare a mixture of 25% triclopyr plus 75% horticultural oil and apply to the basal parts of the shrub to a height of about a foot from the ground. Thorough wetting is necessary for good control; spray until run-off is noticeable at the ground line. A dye added to the mixture will help keep track of treated plants.

Cut Stem Method. This method and basal bark should be considered when treating individual plants or when target plants are mixed in with desirable species which would preclude foliar treatment. It is usually effective as long as the ground is not frozen. As with basal bark treatment, it reduces the total amount of herbicide mixture applied to the environment but requires use of a much more concentrated mix than that used for foliar applications. Cut stems at or near ground level and immediately apply a 25% solution of glyphosate or triclopyr mixed in water to the cut stump surface, making sure to cover the entire surface. As with basal bark, a dye added to the mix will help keep track of treated plants.

Foliar. Because this method involves applying herbicide mix to foliage (leaves), it should be considered mostly for large infestations where the risk to non-target species is minimal. The best time to treat is late fall or early spring when targeted plants are shifting resources toward the roots and many native species are dormant. Foliar application can be done almost anytime but air temperature should be above 65°F to ensure absorption of the herbicide mix. To allow ample drying time applications should be made when rain is unlikely for about 12 hours after application and leaves should be dry prior to treatment. Apply a 2% solution

of glyphosate or triclopyr and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Mix should not be dripping off leaves. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species. To avoid drift, triclopyr and glyphosate should be applied when winds are below about 8 mph. If desirable trees are nearby, a no-spray buffer area should be established to protect non-target plants.

Manual

Hand pulling is an effective method for many shrubs when in the young seedling stage, after which a tool or other method is often needed to remove strong roots. Plants should be pulled as soon as they are large enough to grasp but before they produce seeds. Seedlings are best pulled after a rain when the soil is loose. Larger stems, up to 6 cm (2½ in), can be removed using a Weed Wrench® or similar uprooting tool. For most species, the entire root should be removed to avoid resprouting.

Mechanical

Cutting or mowing is appropriate for small infestations or environmentally sensitive areas where herbicides cannot be used. It is not generally recommended for plants that resprout heavily unless cutting can be repeated and plants monitored until the targeted invasive has been eliminated. Ideally, cutting is most effective when combined with an application of herbicide to cut surfaces. Stems should be cut at least once and preferably multiple times per growing season and as close to ground level as possible.

MULTIFLORA ROSE

Biological control is not yet available for management of multiflora rose. However, researchers are investigating several options, including a native viral pathogen (rose-rosette disease), which is spread by a tiny native mite, and a seed-infesting wasp, the European rose chalcid. Rose-rosette disease, native to the Western U.S., has been spreading easterwardly at a slow pace. It may hold some potential for eliminating multiflora rose in areas where it grows in dense patches.

GENERAL GUIDANCE FOR TREES

Chemical

Basal Bark Method. This is one of the easier methods available, does not require any cutting, uses a small amount of herbicide mix and is effective throughout the year as long as the ground is not frozen. It works best during late winter/early spring and in summer. The base of the tree must be free of snow, ice, or water on the bark from recent rainfall, though precipitation following application is inconsequential. Late winter/early spring (February 15 -April 15, Mid-Atlantic) is generally the most productive time, since vegetation near the base of the trees is usually absent or leafless. Late spring and early summer applications (April 15-June 1 in the Mid-Atlantic), when plant fluids are moving upwards to support new growth, are usually not as effective. Application during the summer (June 1-September 15) works very well as long as vegetation is not a hindrance, and allows lower concentrations of herbicide to be used. Fall to mid-winter applications (October-January) may be less effective and temperatures below 45°F will restrict the use of triclopyr.

Mix up a solution of 20% (as low as 10% in summer depending on objectives) concentration of oil-soluble triclopyr product (e.g., Garlon® 4) in 80% oil (mineral oil, or special vegetable oils). A dye added to the mixture will help keep track of treated plants. Some applicators add a pine oil-based additive (e.g., Cide-Kick® II) at the rate of 10%, which helps penetrate the bark and eliminate unpleasant odor. Some companies market diluents based on mineral or vegetable oils specifically designed for basal bark application, which should be considered for use in sensitive areas. Another option is to use a pre-mixed, ready-to-use triclopyr product designed for basal bark (and cut stump) application (e.g., Pathfinder® II). Using a handheld or backpack sprayer, apply the mixture in a 12-inch wide band around the entire circumference of the tree base with no “skips.” The basal bark method is generally used for trees that are less than 6 inches in diameter, though slightly larger stems may also be treated effectively by thoroughly treating bark up to 24 inches in height. Follow-up foliar application (see above) to basal sprouts and root suckers may be necessary, depending on the species.

Cut Stem Method. This method is useful in areas where the trees need to be removed from the site and will be cut as part of the process. While situations exist that dictate this method over the others given above, felling trees is usually less effective in killing the root system, slower, more labor intensive, and more hazardous to personnel than other methods. This method is likely to be most successful during the growing season, with diminishing success through the early fall. Dormant season applications may prevent resprouting from the stump itself, but will do little to inhibit root suckering. However, at any time of year, if the tree must be cut it is better to treat the stump than not.

Cut trees near ground level and immediately apply a 25% solution of glyphosate mixed with water or 20% Garlon® 4 plus 80% oil dilutant, to the whole cut stump surface and the sides to the ground line. As with basal bark, a dye added to the mix will help keep track of treated plants. The mixture may be painted on with a paint brush or sprayed on using a spray bottle or backpack sprayer. Application of herbicide to the cut stumps must be conducted immediately after cutting, within 5-15 minutes of the cut with water soluble formulations, longer with oil mixtures, to ensure uptake of the chemical before the plant seals the cut area off.

Foliar. Because this method involves applying herbicide mix to foliage (leaves), it should be considered for small dense infestations or for large infestations where the risk to non-target species is minimal. Foliar treatment can be very effective but requires use of larger volumes of herbicide mixture and increases the risk of non-target impacts. Limitations of the method are the seasonal time frame and the need to transport a larger, more dilute mixture. It is typically more effective in summer and late season when plants are shifting resources downward to roots.

For most plants, use a 2% rate of glyphosate mixed with water and a small amount (0.5%, or as per label) of a non-ionic surfactant (except for Roundup®, which contains a surfactant) to help the spray spread over and penetrate the leaves. A 1.5% rate (4 lb./gal.) triclopyr (Garlon® 4) can also be used in this way. The mixture should be applied to leaves and green stems, including sprouts and suckers, until

thoroughly wet but not to the point of runoff. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species. To avoid drift, applications should be made when winds are below about 8 mph. If desirable trees are nearby, a no-spray buffer area should be established to protect non-target plants.

Foliar application can be done almost anytime as long as air temperature is above about 65°F (and no higher than 85°F for triclopyr) to ensure absorption of the herbicide. To allow ample drying, applications should be made when rain is unlikely for about 12 hours after application and leaves should be dry prior to treatment. Wind speed should be below 8-10 mph to avoid off-site drift.

Hack-and-squirt or injection. This method can be very effective and is useful when target trees are mixed in with desirable trees. It requires using a hand axe to make downward-angled cuts into the sapwood around the tree trunk and squirting about a teaspoon of concentrated herbicide into the cut.

Manual

Young seedlings may be pulled or dug up, preferably when soil is moist. Care should be taken to remove the entire plant including the roots whenever possible to avoid the possibility of regrowth through sprouting.

Mechanical

Cutting can work for many trees unless they are likely to resprout. It will need to be done continuously until the plants are no longer found.



INVASIVE PLANTS

PLANT INVADERS

in the District of Columbia

SECOND EDITION



TO LEARN MORE ABOUT THE INVASIVE
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