**Appendix A – Treatment Protocol Examples**

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| Southeast Exotic Pest Plant Council Invasive Plant Manual |

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| **Common Name:** **Autumn Olive**  **Scientific Name:** Elaeagnus umbellata (Thunb.)  Autumn olive is an introduced, fast-growing woody shrub in the Elaeagnaceae (Oleaster) family. Used extensively for wildlife habitat, strip mine revegetation, and shelter belts, autumn olive thrives in disturbed areas open to full sun. It is adaptive, competitive, and vigorous, especially on open, sunny sites and it produces abundant fruit crops.  **Height:** Autumn olive grows to a height of 6 m (20 ft). Its growth habit is bushy with a spreading crown.   |  |  | | --- | --- | | **Leaves:** Deciduous leaves are alternate, short-petioled, elliptic to ovate, and oblong. They are glabrous, dark green above, conspicuously silvery beneath.  **Twigs:** The silvery or golden brown twigs often have prominent spines.  **Flowers:** Fragrant flowers are axillary, pedicellate, tube-shaped, and yellowish-white, with 4 sepals and 4 stamens. Blooms May-June.  **Fruit:** Fruits are abundant, juicy, round drupes up to 1 cm (0.4 in) in length. Silvery fruit turns to red as it matures and is speckled with brown to silvery scales. Matures September-October.  **Life History**  **Elaeagnus** spp. are among the few non-legumes that fix nitrogen in the soil by means of bacterial root nodes. Plants flower and develop fruits annually after reaching three years of age. An individual can produce up to 3.6 kg (8 lbs) of fruit that are consumed and spread by birds and small mammals.  **Origin and Distribution**  Autumn olive was introduced into the United States in 1830 from China and Japan. It has been actively promoted by state and federal agencies for shelter belts, erosion control, strip mine reclamation, wildlife habitat, and was widely marketed as an ornamental. The shrub has now become naturalized in suitable habitats scattered throughout the eastern and Midwestern U.S.  **Similar Species**  Several other Elaeagnus species have become naturalized in the U.S. A native species E. commutata (Bernh.) is found in the far northern states and Canada. Minnie bush (Menziesia pilosa [Michx. ex Lam] Jussieu ex Pers.), a high elevation, southern Appalachian endemic, is somewhat similar but has glands, not scales, on the midrib.  **Habitat**  Autumn olive grows well in disturbed areas, open fields, margins of forests, roadsides, and clearings. Being tolerant of drought, it does not grow well in wet sites. It is intolerant of shade and will not invade areas of dense forest. Because the fruits are eaten by a variety of wildlife, the seeds may be distributed into forest openings or open woodlands. | Photo by James R. Allison  Photo by James R. Allison  Photo by James H. Miller |   **Management Recommendations**  **Mechanical Controls**  **Cutting:** Cut trees at ground level with power or manual saws. Cutting is most effective when trees have begun to flower to prevent seed production. Because autumn olive spreads by suckering, resprouts are common after treatment. Cutting is an initial control measure, and success will require either an herbicidal control or repeated cutting of resprouts.  **Girdling:** Use this method on large trees where the use of herbicides is not practical. Using a hand-axe, make a cut through the bark encircling the base of the tree, approximately 15 cm (6 in) above the ground. Be sure that the cut goes well into or below the cambium layer. This method will kill the top of the tree but resprouts are common, and may require follow-up treatments for several years until roots are exhausted.  **Hand Pulling:** Autumn olive is effectively controlled by manual removal of young seedlings. 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. The entire root must be removed since broken fragments may resprout.  **Herbicidal Controls**  **Foliar Spray Method:** This method should be considered for large thickets of autumn olive seedlings where risk to non-target species is minimal. Air temperature should be above 65Â°F to ensure absorption of herbicides.  **Glyphosate:** Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target, partially-sprayed plants.  **Triclopyr:** Apply a 2% solution of triclopyr and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Triclopyr is a selective herbicide for broadleaf species. In areas where desirable grasses are growing under or around autumn olive, triclopyr can be used without non-target damage.  **Cut Stump Method:** This control method should be considered when treating individual trees or where the presence of desirable species preclude foliar application. Stump treatments can be used as long as the ground is not frozen.  **Glyphosate:** Horizontally cut stems at or near ground level. Immediately apply a 50% solution of glyphosate and water to the cut stump, covering the outer 20% of the stump.  **Triclopyr:** Horizontally cut stems at or near ground level. Immediately apply a 50% solution of triclopyr and water to the cut stump, covering the outer 20% of the stump.  **Basal Bark Method:** This method is effective throughout the year as long as the ground is not frozen. Apply a mixture of 25% triclopyr and 75% horticultural oil to the basal parts of the tree to a height of 30-38 cm (12-15 in) from the ground. Thorough wetting is necessary for good control; spray until run-off is noticeable at the ground line.  **Bibliography**  Eckardt, N. Autumn olive: element stewardship abstract. The Nature Conservancy, Minneapolis, MN; 1987.  Kuhns, L. J. Controlling autumn olive with herbicides. Proceedings 40th Annual Meeting. Northeast Weed Science Society. 289-294; 1986.  Rehder, A. Manual of cultivated trees and shrubs. Vol. 1, 2nd ed. Portland, OR: Dioscorides Press; 1990.  Symonds, G. The shrub identification book. New York, NY: William Morrow & Co., 262-263; 1963.  Szafoni, R. E. Vegetation management guideline: autumn olive, Elaeagnus umbellata Thunb., Natural Areas Journal 11(2):121-123; 1991.  [  [Home](http://www.invasive.org/eastern/index.html)  ]   [  [Contents](http://www.invasive.org/eastern/eppc/index.html)  ] |

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[Taken from the Texas A&M University, Texas Horticulture Program website, February 11, 2000. It may be accessed on the web at [http://aggie-horticulture.tamu.edu/PLANTanswers/trees/bamboo.html](http://www.nps.gov/plants/alien/fact/lecu1.htm). Though a bit salty, it contains valuable information.]

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**BAMBOO**

In the proper setting, ornamental bamboo is useful as a specimen plant, screen or windbreak. Unfortunately, some bamboos SHOULD NEVER be planted [excised text]!!! But some species of bamboo are aggressive creepers and become a real nuisance when spreading to areas where they are not wanted. [excised text]. The aggressive bamboo can indiscriminately emerge through concrete walks, home foundations and even in darkened garages! There is more than one way to control bamboo. The choice of a method or the combination of methods depends on the circumstances under which it is growing.

A large clump of bamboo looks as though it would be hard to dig out -- but it really is not. Its many horizontal rootstocks are close to the surface. All pieces of the shoots and rootstocks should be removed or regrowth will occur.

Cutting bamboo shoots close to the ground, then removing the regrowth each time it reaches 20 to 24 inches in height will eventually kill established plants. Success with this method depends on exhausting the food reserves stored in the roots. The prompt removal of the shoots as they reach 20 to 24 inches is essential. It will have to be performed many times over a period of a year or more.

The length of time required for eradication can be considerably reduced by using the right chemical in the right way. There are several types from which to choose:

--Sprays that kill only the foliage they contact, such as cacodylic acid, should be applied each time the regrowth reaches 20 to 24 inches in height. These chemicals substitute for the cutting of the shoots; their application must be repeated to starve the root.

-- Sprays that are taken up by the leaves, such as dalapon, MSMA, DSMA and glyphosate, and carried down to kill roots. Dalapon is available as Dowpon and glyphosate is available as Roundup, Klean-up and Weed-and-Grass Killer. Spray the actively growing leaves to wet and allow a six hour drying period. Even with these herbicides and mixing a double strength solution, repeated treatments will be necessary to completely eradicate established plants. To prevent these chemicals from injuring roots of trees and shrubs in the area, irrigate thoroughly before treating. Then do not irrigate again for 7-10 days.

The bamboo should ONLY be planted in an enclosed, "containable" area from which this devil-plant can escape. The majority of "problem" bamboo originates from a neighbor's planting. So BE CAREFUL and BE CONSIDERATE when planting bamboo or better yet, NEVER plant [excised text]!

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| |  | | --- | |  |   *Lonicera fragrantissima* (fragrant honeysuckle)*, L. maackii* (Amur honeysuckle), *L. morrowii* (Morrow's honeysuckle)*, L. standishii* (Standish's honeysuckle), *L. tatarica* (Tartarian honeysuckle)*, L. xylosteum* (European fly honeysuckle), *L. X bella* (hybrid, pretty honeysuckle) and possibly others Honeysuckle family (Caprifoliaceae) [Download PDF version formatted for print](http://www.nps.gov/plants/alien/fact/pdf/loni1.pdf) (116 KB)  **NATIVE RANGE** Eurasia (Japan, China, Korea, Manchuria, Turkey and southern Russia)  **DESCRIPTION** Exotic bush honeysuckles are upright, generally deciduous shrubs that range from 6 to 15 feet in height. The 1-2 ½ inch, egg-shaped leaves are opposite along the stem and short-stalked. Older stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or crimson in some varieties of Tartarian honeysuckle. Flowering generally occurs from early to late spring, but varies for each species and cultivar. The fruits are red to orange, many-seeded berries. Native bush honeysuckles may be confused with these exotic species and cultivars, so proper identification is necessary. Unlike the exotics, most of our native bush honeysuckles have solid stems.  **ECOLOGICAL THREAT** Exotic bush honeysuckles can rapidly invade and overtake a site, forming a dense shrub layer that crowds and shades out native plant species. They alter habitats by decreasing light availability, by depleting soil moisture and nutrients, and possibly by releasing toxic chemicals that prevent other plant species from growing in the vicinity. Exotic bush honeysuckles may compete with native bush honeysuckles for pollinators, resulting in reduced seed set for native species. In addition, the fruits of exotic bush honeysuckles, while abundant and rich in carbohydrates, do not offer migrating birds the high-fat, nutrient-rich food sources needed for long flights, that are supplied by native plant species.  **DISTRIBUTION IN THE UNITED STATES** Amur, Tartarian, Morrow's, and pretty honeysuckle generally range from the central Great Plains to southern New England and south to Tennessee and North Carolina. The remaining species are sporadically distributed.  **HABITAT IN THE UNITED STATES** Exotic bush honeysuckles are relatively shade-intolerant and most often occur in forest edge, abandoned field, pasture, roadsides and other open, upland habitats. Woodlands, especially those that have been grazed or otherwise disturbed, may also be invaded by exotic bush honeysuckles. Morrow's honeysuckle and pretty honeysuckle have the greatest habitat breadth and are capable of invading bogs, fens, lakeshores, sandplains and other uncommon habitat types.  **BACKGROUND** Exotic bush honeysuckles have been introduced for use as ornamentals, for wildlife cover and for soil erosion control.  **BIOLOGY & SPREAD** Open-grown exotic bush honeysuckles fruit prolifically and are highly attractive to birds. In the eastern United States, over twenty species of birds feed on the persistent fruits and widely disseminate seeds across the landscape. In established populations, vegetative sprouting also aids in the persistence of these exotic shrubs.  **MANAGEMENT OPTIONS** Mechanical and chemical methods are the primary means of control of exotic bush honeysuckles. No biological control agents are currently available for these plants and any potential agents that might be considered would have to be specific to the exotic species, for obvious reasons. Hand removal of seedlings or small plants may be useful for light infestations, but care should be taken not to disturb the soil any more than necessary. In shaded forest habitats, where exotic bush honeysuckles tend to be less resilient, repeated clippings to ground level, during the growing season, may result in high mortality. Clipping must be repeated at least once yearly because bush honeysuckles that are cut once and left to grow will often form stands that are more dense and productive than they were prior to cutting.  Seedlings of exotic bush honeysuckles can also be controlled by application of a systemic herbicide, like glyphosate (e.g., Roundup®), at a 1 percent solution, sprayed onto the foliage or applied by sponge. Well established stands of exotic bush honeysuckles are probably best managed by cutting the stems to ground level and painting or spraying the stumps with a slightly higher rate of glyphosate (2-3%).  Prescribed burning has shown some promise for exotic bush honeysuckles growing in open habitats. In all instances, control should be initiated prior to the seed dispersal period (late summer to early autumn) to minimize reinvasion of treated habitats.  **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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.**  **NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.**  **CONTACTS** For more information on the management of exotic bush honeysuckles, please contact:   * Tennessee Exotic Pest Plant Council, <http://www.nps.gov/cgi-bin/intercept?http://www.se-eppc.org/states/tennessee.cfm> * The Nature Conservancy - Pest Plant Abstracts, <http://www.nps.gov/cgi-bin/intercept?http://tncweeds.ucdavis.edu/esadocs.html> * Virginia Natural Heritage Program - Bush honeysuckles, <http://www.nps.gov/cgi-bin/intercept?http://www.dcr.virginia.gov/dnh/fslobe.pdf>   **SUGGESTED ALTERNATIVE PLANTS** Many native plants make excellent substitutes for exotic bush honeysuckles for home landscaping and wildlife planting. In the eastern U.S., examples include spicebush (*Lindera benzoin*), ink-berry (*Ilex glabra*), gray dogwood (*Cornus racemosa*), northern bayberry (*Myrica pensylvanica*), red chokecherry (*Aronia arbutifolia*), and arrowwood (*Viburnum dentatum*). These species are readily available through commercial nurseries.  **OTHER LINKS**   * [Photos at invasive.org (fragrantissima)](http://www.nps.gov/cgi-bin/intercept?http://www.invasive.org/search/action.cfm?q=Lonicera%20fragrantissima) * [Photos at invasive.org (maackii](http://www.nps.gov/cgi-bin/intercept?http://www.invasive.org/search/action.cfm?q=Lonicera%20maackii) * [Invasive Plant Atlas of New England](http://www.nps.gov/cgi-bin/intercept?http://www.lib.uconn.edu/webapps/ipane/browsing.cfm?descriptionid=66) * [Photos at invasive.org (morrowii](http://www.nps.gov/cgi-bin/intercept?http://www.invasive.org/search/action.cfm?q=Lonicera%20morrowii) * [Invasive Plant Atlas of New England](http://www.nps.gov/cgi-bin/intercept?http://www.lib.uconn.edu/webapps/ipane/browsing.cfm?descriptionid=67) * [Photos at invasive.org (tatarica](http://www.nps.gov/cgi-bin/intercept?http://www.invasive.org/search/action.cfm?q=Lonicera%20tatarica) * [Invasive Plant Atlas of New England](http://www.nps.gov/cgi-bin/intercept?http://www.lib.uconn.edu/webapps/ipane/browsing.cfm?descriptionid=68) * [Invasive Plant Atlas of New England](http://www.nps.gov/cgi-bin/intercept?http://www.lib.uconn.edu/webapps/ipane/browsing.cfm?descriptionid=70) * [Invasive Plant Atlas of New England](http://www.nps.gov/cgi-bin/intercept?http://www.lib.uconn.edu/webapps/ipane/browsing.cfm?descriptionid=69)   **AUTHOR** Charles E. Williams, Clarion University of Pennsylvania, Clarion, PA  **PHOTOGRAPH** Jil M. Swearingen, National Park Service, Washington, DC  **REFERENCES** Luken, J.O. 1990. Forest and pasture communities respond differently to cutting of exotic Amur honeysuckle. Restoration and Management Notes 8:122-123.  Nyboer, R. 1992. Vegetation management guideline: bush honeysuckles. Natural Areas Journal 12:218-219.  The Nature Conservancy. Bush Honeysuckles: Element Stewardship Abstract. In: Wildland Weeds Management & Research Program, Weeds on the Web. <http://www.nps.gov/cgi-bin/intercept?http://tncweeds.ucdavis.edu/esadocs/loni_spp.html>  Williams, C.E. 1994. Bush honeysuckles (*Lonicera spp*.). Fact sheet - invasive alien plant species of Virginia. Virginia Native Plant Society and Virginia Department of Conservation and Recreation, Richmond, VA.  **Plant Conservation Alliance, Alien Plant Working Group.** |
| [**FACT SHEET LIST**](http://www.nps.gov/plants/alien/fact.htm) | [**APWG HOME PAGE**](http://www.nps.gov/plants/alien/index.htm)  **Comments, suggestions, and questions about the website should be directed to the** [**webmaster**](mailto:plant@plantconservation.org)**.**  http://www.nps.gov/plants/alien/fact/loni1.htm Last updated: 27-Jun-2006 |

[Text taken from the Native Plant Conservation Alliance website, Alien Plant Working Group, dated August 26, 1999. Accessed on the web at <http://www.nps.gov/plants/alien/fact/wist1.htm>.]

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| Exotic Wisterias **Chinese Wisteria** *Wisteria sinensis* (Sims) DC.  **Japanese Wisteria** *Wisteria floribunda* (Willd.) DC.  **NATIVE RANGE:** China and Japan  **DESCRIPTION:** Chinese and Japanese wisteria are exotic, showy, woody ornamental vines in the pea family, or Fabaceae.  These vigorous vines can climb trees, apparently limited only by the height of the tree, and have been observed to reach 65 feet.  Unlike American wisteria (*Wisteria frutescens*), native to the southeastern U.S., which flowers June through August, and produces a non-hairy seed pod 2-4 inches long, both exotic wisterias flower in the springtime (April-May) and produce a velvety seed pod.  The fuzzy brown seed pods are 4-6 inches long, narrowed toward the base, with constrictions between the seeds.  Stems of the exotic wisterias can grow to 15 inches in diameter in older plants. White-barked Japanese wisteria vines twine clockwise around the host plant and Chinese wisteria twines counter-clockwise. The compound leaves,  consisting of 7-13 (Chinese) or 13-19 (Japanese) smaller leaf units, called leaflets, are about 1 foot long and alternate along the stem.  Fragrant, violet to blue-violet flowers, 1/2 to 1 inch long, occur in showy, pendulous clusters that hang gracefully from the twining stems.  **ECOLOGICAL THREAT:** Exotic wisterias impair and overtake native shrubs and trees through strangling or shading.  Climbing wisteria vines can kill sizable trees, opening the forest canopy and increasing sunlight to the forest floor, which in turn favors its aggressive growth.  Chinese and Japanese wisterias are hardy and aggressive, capable of forming thickets so dense that little else grows.  **DISTRIBUTION IN THE UNITED STATES:** Japanese and Chinese wisteria are found extensively throughout the eastern states.  Click [here](file:///D:\map\wist1.htm) to see a distribution map.  **HABITAT IN THE UNITED STATES:** The ideal habitat for exotic wisterias is in full sun, but established vines will persist and reproduce in partial shade.  Vines often climb surrounding vegetation and structures toward sunlight.  Wisteria tolerates a variety of soil and moisture regimes but prefers loamy, deep, well drained soils.  Infestations are commonly found along forest edges, roadsides, ditches, and rights-of-way.  **BACKGROUND:** Chinese wisteria was brought to the U.S. from China in 1816 and Japanese wisteria was introduced from Japan around 1830.  Both were brought in as ornamentals.  They have been grown extensively in the southern U.S. as decorative additions to porches, gazebos, walls, and gardens.  Most infestations in natural areas are a result of escapes from landscape plantings.  **METHODS OF REPRODUCTION & DISPERSAL:** Exotic wisterias are long-lived, some vines surviving 50 years or more.  Vegetative reproduction is their primary means of expansion.  Numerous stolons, or above-ground stems, develop roots and shoots at short intervals.  Abundant seeds may also be produced if conditions are favorable, but flower buds are susceptible to winter kill.  In riparian habitats, seeds may be carried downstream in water for great distances.  **CURRENT MANAGEMENT APPROACHES:** The only practical methods currently available for control of exotic wisterias are mechanical and chemical.  Cut climbing or trailing vines as close to the root collar as possible.  This technique, while labor intensive, is feasible for small populations, as a pretreatment for large impenetrable infestations, or for areas where herbicide use is not desirable.  Wisteria will continue to resprout after cutting until its root stores are exhausted.  For this reason, cutting should begin early in the growing season and, if possible, sprouts cut every few weeks until autumn.  Cutting will stop the growth of existing vines and prevent seed production.  However, cut vines left coiled around trunks may eventually girdle trees and shrubs as they continue to grow and increase in girth.  For this reason, the vines should be removed entirely or at least cut periodically along their length.  Grubbing, removal of entire plants from the roots up, is appropriate for small initial populations or environmentally sensitive areas where herbicides cannot be used.  Using a pulaski, weed wrench or similar digging tool, remove the entire plant, including all roots and runners.  Juvenile plants can be hand pulled depending on soil conditions and root development.  Any portions of the root system not removed may resprout.  All plant parts (including mature fruit) should be bagged and disposed of in a trash dumpster to prevent reestablishment.  Cut stump treatment, using a systemic herbicide, is effective in areas where vines are established within or around desirable native plants or where they have grown into the canopy.  This treatment is effective as long as the ground is not frozen.  Cut the stem as close to ground level as possible.  Immediately apply a 25% solution of glyphosate (e.g., Roundup) or triclopyr (e.g., Garlon) and water to the cross section of the stem.  Retreatment with a foliar application of glyphosate may be necessary for any sprouts.  Use foliar spray herbicide treatments to control large infestations of exotic wisterias.  It may be necessary to precede foliar applications with stump treatments to reduce the risk of damaging non-target species.  Apply a 2% concentration of glyphosate (e.g. Round Up) or triclopyr (e.g. Garlon) and water, plus a 0.5% non-ionic surfactant to thoroughly wet all foliage.  Chlorpyralid (e.g. Transline) is effective at a concentration of 0.5% and is selective to plants in the aster, buckwheat, and pea families.  Caution should be taken with chlorpyralid as groundwater pollution through leaching can be a problem with certain soil types.  Do not apply spray so heavily that herbicide drips off the leaves.  Glyphosate is a non-selective systemic herbicide that may kill non-target plants that are only partially contacted by spray.  Triclopyr is selective to broadleaved species and is a better choice if native grasses are present.  Ambient air temperature should be above 65[degrees]F for all foliar treatments.  **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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.**  **NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.**  ***For more information on the management of exotic wisterias, please contact:***  Kris Johnson, Great Smoky Mountains National Park, Gatlinburg, TN ([kris\_johnson@nps.gov](mailto:kris_johnson@nps.gov))  **SUGGESTED ALTERNATIVE PLANTS:** There are a variety of creeping or climbing vines native to the eastern U.S. that are good alternatives to the invasive exotic wisterias.  Some examples include American wisteria (*Wisteria frutescens*), trumpet creeper (*Campsis radicans*), trumpet honeysuckle (*Lonicera sempervirens*), Dutchman’s pipe (*Aristolochia macrophylla*), and crossvine (*Bignonia capreolata*).  Contact your local native plant society for information on sources of these and other native plants.    **AUTHOR:**  Tom Remaley, Great Smoky Mountains National Park, Gatlinburg, TN.  **EDITOR:**  Jil M. Swearingen, U.S. National Park Service, Washington, DC.  **PHOTOGRAPHS:**  Susan Ross, Great Smoky Mountains National Park, Gatlinburg, TN.  **REFERENCES:**  Dirr, Michael A.  1990.  Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses.  Stipes Publishing Co., Champaign, IL. Pp. 926-929.  Gleason, H.A., A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. 2nd ed. The New York Botanical Garden, 910.  Isely, D. 1990. Vascular flora of the southeastern United States. Volume 3, Part 2 Leguminosae. Chapel Hill, NC: The University of North Carolina Press, 96.  Radford, A.E., H.E. Ahles, C.R. Bell. 1968. Manual of vascular flora of the Carolinas. Chapel Hill, NC: The University of North Carolina Press, p. 1183.  Rehder, A. 1993. Manual of cultivated trees and shrubs. Vol. 1. Dioscorides Press, Portland OR. p.507.  Thomas, L.K. Jr. 1993. Chemical grubbing for control of exotic wisteria. Castanea, 58(3):209-213.  **Plant Conservation Alliance, Alien Plant Working Group. July 2, 1998 (Updated August 26, 1999).** |

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| [Taken from the Plant Conservation Alliance's Alien Plant Working Group, December 4, 2000. Accessed on the website located at [http://www.nps.gov/plants/alien/fact/hehe1.htm](http://www.redw-evc.htm/).]  **------------------------------------------------------------------------------------------------------------**  English Ivy  Hedera helix L.    NATIVE RANGE: Europe, western Asia, and northern Africa  DESCRIPTION: English ivy is an evergreen climbing vine in the ginseng family (Araliaceae). Vines attach to the bark of trees, brickwork, and other surfaces by way of numerous, small rootlike structures, which exude a gluelike substance. Older vines are known to reach a foot in diameter. Leaves are dark green, waxy, somewhat leathery, and are arranged alternately along the stem. English ivy has many recognized leaf forms, the most common being a 3-lobed leaf with a heart-shaped base. Leaves in full sun are often unlobed, oval and have wedge-shaped bases. Umbrella-like clusters of small, greenish-white flowers appear in the fall if sufficient sunlight is available. Fruits mature in Spring and are black with a fleshy outer covering enclosing one to a few hard, stone-like seeds.  NOTE: Compounds in English ivy are somewhat toxic and include glycosides that cause vomiting, diarrhea, nervous conditions and dermatitis in sensitive individuals. This characteristic helps ensure spread of the seeds by many native songbirds that are attracted to the black berries in Spring when other food sources are limited.  ECOLOGICAL THREAT: English ivy is an aggressive invader that threatens all vegetation levels of forested and open areas, growing along the ground as well as into the forest canopy. The dense growth and abundant leaves, which spring from the stems like small umbrellas, form a thick canopy just above the ground, and prevent sunlight from reaching other plants. Similarly, vines climbing up tree trunks spread out and surround branches and twigs, preventing most of the sunlight from reaching the leaves of the host tree. Loss of host tree vigor, evident within a few years, is followed by death a few years later. The added weight of vines makes infested trees susceptible to blow-over during storms. English ivy also serves as a reservoir for bacterial leaf scorch (Xylella fastidiosa), a plant pathogen that is harmful to native trees such as elms, oaks, and maples. English ivy is a popular plant, recommended by Cooperative Extension offices for use as a low maintenance alternative to lawns. It is widely used by homeowners, horticulturists, landscape contractors, parks departments and others desiring a fast-growing, low maintenance, evergreen groundcover. Once established at a site, English ivy can be expected to move beyond its intended borders into neighboring yards, parks and other lands, either by vegetative means or by seed.  DISTRIBUTION IN THE UNITED STATES: English ivy occurs in at least 26 states and the District of Columbia, where it is one of the most abundant and widespread invasive plants.  Click [here](file:///D:\map\hehe1.htm) to see a distribution map.  HABITAT IN THE UNITED STATES: English ivy infests woodlands, forest edges, fields, hedgerows, coastal areas, salt marsh edges, and other upland areas, especially where some soil moisture is present. It does not grow well in extremely wet conditions and is often associated with some form of land disturbance, either human-caused or natural.  BACKGROUND: English ivy was probably first introduced to the US by European immigrants and is widely sold as an ornamental plant for landscapes throughout the US.  METHODS OF REPRODUCTION & DISPERSAL: English ivy reproduces vegetatively and by seed, which is dispersed to new areas primarily by birds, including English house sparrows, European starlings, robins, Stellar jays, and cedar waxwings. New plants grow easily from cuttings or from stems making contact with the soil.  CURRENT MANAGEMENT APPROACHES: Several effective methods of control are available for English ivy, including chemical and non-chemical, depending on the extent of the infestation, the amount of native vegetation on-site, and available time and labor.  Manual and Mechanical. Vines growing as groundcover can be pulled up by hand, with some difficulty, and left on-site or bagged and disposed of as trash. Vines climbing up into the tree canopy are more difficult to manage. First, vines should be cut at a comfortable height to kill upper portions and relieve the tree canopy. A large screw driver or forked garden tool can be used to pry and snap the vines away from the tree trunks. Vines can be cut using an axe or with more difficulty, using a pruning saw. Rooted portions of vines will remain alive and should be pulled, and repeatedly cut. Because cutting will likely promote further growth from the base, vigilance is required to ensure long term control.  Chemical. The systemic herbicide triclopyr (e.g., Garlon) is absorbed into plant tissues and carried to the roots, effectively killing the entire plant in place.  Foliar applications: From summer to fall, apply a 2.5% mixture of triclopyr amine (Garlon 3A) in water to the leaves or cut first, allow to regrow, and apply the same mix to new foliage. Herbicide will also be absorbed through the stem bark for additional effect.  Basal bark applications: A higher rate (15-30%) of triclopyr ester (Garlon 4) may also be applied to stems of vines growing up trees but there is a possibility that the herbicide will be absorbed into the host tree, depending on the thickness of the host tree's bark and the penetration of English ivy rootlets.  Because English ivy is an evergreen vine, and remains active during the winter, herbicide applications can be made to it any time of year as long as temperatures are above 55 or 60 degrees Fahrenheit for a few days. Fall and winter applications will avoid or minimize impacts to many native plant species. Repeat herbicidal treatments are likely to be needed and followup monitoring should be conducted to evaluate the success of treatments. Herbicidal contact with desirable plants should always be avoided. In areas where spring wildflowers or other native plants are interspersed, application of herbicides should be conducted prior to their emergence, or delayed until they have died back  Biological control. There are no biological controls currently available for English ivy.  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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.  NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL. Garlon® is a registered trademark of DowAgro.  For more information on the management of English ivy, please contact:  Sandra Diedrich, sddivy@teleport.com and http://www.noivyleague.com Kris Johnson, Great Smoky Mountains National Park, Gatlinburg, TN, kris\_johnson@nps.gov  Sue Salmons, Rock Creek Park, Washington, D.C., sue\_salmons@nps.gov  Jil Swearingen, National Park Service, Washington, D.C., jil\_swearingen@nps.gov  SUGGESTED ALTERNATIVE PLANTS: Attractive native vines are available that provide nectar for hummingbirds, butterflies, and other insects, serve as host plants for native insects, and provide food for many wildlife species. Vines native to the eastern U.S. include Allegheny pachysandra (Pachysandra procumbens), American or common bittersweet (Celastrus scandens), trumpet creeper (Campsis radicans), Virginia creeper (Parthenocissus quinquefolia), passionflower vine (Passiflora lutea), Dutchman's pipe (Aristolochia macrophylla), and native wisteria\* (Wisteria frutescens).  \* If you wish to plant wisteria, make certain that it is the native species. Two commonly planted ornamental wisterias, [Chinese wisteria](file:///D:\wist1.htm) (Wisteria sinensis) and [Japanese wisteria](file:///D:\wist1.htm) (Wisteria floribunda), are exotic and aggressive invaders. Please consult the native plant society in your state for more information on species native to your particular area.    AUTHORS:  Jil M. Swearingen, U.S. National Park Service, Washington, DC. Sandra Diedrich.  PHOTOGRAPHS:  Jil M. Swearingen, U.S. National Park Service, Washington, DC.  REFERENCES:  Collins, Christi. 1994. 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http://www.nps.gov/plants/alien/fact/hehe1.htm  
Last updated: 12/4/00

[Taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage, Invasive Alien Plant List website, addressed at <http://www.state.va.us/~dcr/dnh/invlist.htm.>]

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**Garlic Mustard**

(Alliaria petiolata (Bieb.) Cavara & Grande)

**Description**

Garlic mustard is a biennial herb in the mustard family. Plants can range in height from 5 to 46 inches. The first year plants form rosettes of kidney-shaped leaves. In its second year, the plant grows a stem with leaves that are triangular and sharply toothed. The flowers are born in a cluster at the end of the stem, and each small flower has four white petals. Seeds are black, oblong and found in rows within a long narrow capsule called a silique. Crushed leaves and stems of this plant give off a distinctive garlic odor.

**Habitat**

Garlic mustard grows in rich, moist upland forests, and wooded streambanks. It is shade tolerant and readily invades disturbed areas such as roadsides and trail edges. Garlic mustard cannot tolerate acidic soils, including undrained peat or muck.

**Distribution**

Native to Europe and Asia, garlic mustard is now found in Canada, south to Virginia, and as far west as Kansas and Nebraska. It is believed to have been brought to North America by European settlers for use in cooking and medicine. In Virginia, garlic mustard is found throughout the state, with notable exceptions of southeastern and northeastern counties.

**Threats**

This species can invade a forest through a disturbance such as treefall or trail construction. Along streambanks, the plant does exceptionally well because of the disturbance created by periodic flooding. Prolific seed production and lack of natural predators which might feed on garlic mustard allow it to quickly dominate the ground cover. Native herbs in competition with garlic mustard may suffer population declines.

**Control**

Light infestations of garlic mustard can be controlled by hand-pulling. Plants should be pulled before seeds have ripened. Care must be taken to insure the entire root is removed and disturbance of the soil is minimal.

Severe infestations can be controlled with herbicides. Garlic mustard is biennial. Its first year growth overwinters as a basal rosette of kidney-shaped leaves, therefore it is still green when many other herbs have died or gone into dormancy. Foliar application of a glyphosate herbicide can be made in late fall to minimize damage to other plants. Follow-up treatments may be necessary over two or three years to get target plants that were missed, as well as new sprouts. Glyphosate herbicides are recommended because they are biodegradable, breaking down into harmless components on contact with soil. However, glyphosate is a nonselective, systemic herbicide and will affect all green vegetation. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. For more information on herbicide use, contact a natural resource specialist or agricultural extension agent.

For more information contact:

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Annandale, VA 22003

Virginia Department of Conservation and Recreation  
Division of Natural Heritage  
217 Governor Street, 3rd Floor  
Richmond, VA 23219

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[Taken from the Southeast Exotic Pest Plan Council website at http://www.se-eppc.org/doc.cfm?id=465.]

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| **Japanese Barberry**  *Berberis thunbergii* DC.  Japanese barberry poses a significant threat to natural areas due to its popularity as a landscape shrub, ability to tolerate full shade, and the dispersal of its prolific seeds by birds. It belongs to the Berberidaceae (Barberry) family, which is represented by one genus in our area.  **Height:** This multi-branched dense shrub grows to 2.5 m (8.2 ft). Seedlings may grow 2-4 ft in one season.  **Leaves:** The semi-evergreen leaves are alternate, or grow in alternate clusters. They are entire, and 1-3 cm (0.4-1.2 in) long. Leaves are bright green to burgundy, and wedge-shaped at the base.  **Stems:** Twigs are brown, three-ridged downward from the node, with simple thorns. Inner bark and wood are yellow.  **Flowers:** Flowers are solitary or in umbel-like clusters, corolla yellow, 8-10 mm (0.3-0.4 in) broad. Blooms March-April.  **Fruits:** Berries are red, ellipsoid to globular, 8-10 mm (0.3-0.4 in) long, and often present through winter. Fruit matures May-September.  **Life History**  Japanese barberry reproduces from prolific seeds, rhizomes, or layering. Seeds have a germination rate as high as 90%, and are distributed by birds including ruffed grouse, bobwhite, pheasant, and wild turkey. Because barberry is shade tolerant, an extensive population can become established in a short time under a closed forest canopy. Severe drought or extreme winters have little effect on overall mortality or seed pro-duction. Deer avoid barberry while often browsing surrounding vegetation, which may effectively increase barberry's competitive advantage.  **Origin and Distribution**  Barberry was introduced to the United States in 1864 as an ornamental. It is prevalentin the northeastern states, but can be found from Nova Scotia and Michigan to North Carolina, Missouri, and throughout Tennessee. It continues to be a popular landscape plant with several varieties sold to the public.  **Similar Species**  Japanese barberry resembles American barberry *(Berberis canadensis* P. Mill.), which grows in dry woods or bluffs. Distinguishing features are the sharply toothed leaves and three pronged spines of American barberry. In most habitats, Japanese barberry is easily recognizable because of its distinctive coloration.  **Habitat**  Barberry tolerates a variety of habitats from damp lowlands to dry roadsides and waste places. Populations do not expand rapidly into oak-dominant forests or on extreme north- facing slopes. Because it is widely dispersed by the nursery industry, barberry has the potential to impact most natural area ecosystems throughout Tennessee.  **Management Recommendations**  **Mechanical Controls**  Hand Pull: This method of control is effective for small populations of Japanese barberry, since plants pull up easily in most forested habitats. Hand-pulling is an extremely effective method of reducing population and seed productivity; this can be done during most of the year. Barberry is especially easy to see in the winter and early spring before deciduous plants leaf out. If plants have fruit present, they should be bagged and disposed of to prevent seed dispersal. Care should be taken to minimize soil disturbance.  Mowing/Cutting: This method is appropriate for initial small populations or environmentally sensitive areas where herbicides cannot be used. Repeated mowing or cutting will control the spread of Japanese barberry but will not eradicate it. Stems should be cut at least once per growing season as close to ground level as possible. Hand-cutting of established clumps is difficult and time consuming due to the long arching stems and prolific thorns.  **Herbicidal Controls**  Foliar Spray Method: This method should be considered for large thickets of barberry where risk to non-target species is minimal. Air temperature should be above 65°F to ensure absorption of herbicides.  Glyphosate: Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pat-tern to reduce spray drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants.  Triclopyr: Apply a 2% solution of triclopyr and water plus a 0.5% non-ionic sur-factant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species. Triclopyr is a selective herbicide for broadleaf species. In areas where desirable grasses are growing under or around Japanese barberry, triclopyr can be used without non-target damage.  Cut Stump Method: This control method should be considered when treating individual bushes or where the presence of desirable species precludes foliar application. Stump treatments can be used as long as the ground is not frozen.  Glyphosate: Horizontally cut barberry stems at or near ground level. Immediately apply a 25% solution of glyphosate and water to the cut stump, covering the outer 20% of the stump.  Triclopyr: Horizontally cut barberry stems at or near ground level. Immediately apply a 25% solution of triclopyr and water to the cut stump, covering the outer 20% of the stump.  **Bibliography**  Anonymous. 'Crimson velvet' barberry quarantine in force. American Nurseryman 167 (12):13; 1988.  Core, E. L.;. Ammons, N. P. Woody plants in winter. Pacific Grove, CA: Boxwood Press; 182-183; 1992.  Laferriere, J. E. Berberidaceae: barberry family. Journal of Arizona Nevada Academy Science 26(1):2-4; 1992.  Melhus, I. E.; Durrell, L. W. The barberry bush and black stem rust of small grains. Circular no. 35 of Iowa State College, Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts; 1917.  Radford, A. E.; Ahles, H. 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## Japanese Honeysuckle

## (Lonicera japonica Thunberg)

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|  | **Description**  Japanese Honeysuckle is a trailing or twining woody vine that can grow to more than 30 feet in length. Young stems are often hairy; older stems are hollow with brownish bark that may peel off in shreds. The simple, opposite leaves are oval to oblong in shape and range from 1.5 to 3 inches in length. In much of Virginia, leaves of Japanese honeysuckle are semi-evergreen and may persist on vines year-round. The extremely fragrant, two-lipped flowers are borne in pairs in the axils of young branches and are produced throughout the summer. Flowers range from 1 to 2 inches in length and are white with a slight purple or pink tinge when young, changing to white or yellow with age. The fruit is a many-seeded, black, pulpy berry that matures in early autumn. Japanese honeysuckle is distinct from our two native honeysuckles, the trumpet honeysuckle (Lonicera sempervirens), and wild honeysuckle (Lonicera dioica). These natives both bear red to orange-red berries, and their uppermost pair of leaves is joined together. |

**Habitat**

Japanese honeysuckle occurs primarily in disturbed habitats such as roadsides, trails, fence rows, abandoned fields and forest edges. It often invades native plant communities after natural or human induced disturbance such as logging, road building, floods, glaze and windstorms, or pest and disease outbreaks.

**Distribution**

Japanese honeysuckle is native to eastern Asia. Introduced to cultivation in 1862 on Long Island, Japanese honeysuckle is now widely naturalized in the eastern and central United States. Japanese honeysuckle was, and in some areas still is, planted as an ornamental ground cover, for erosion control, and for wildlife food and habitat. In Virginia, Japanese honeysuckle is naturalized state wide, being most abundant in piedmont and coastal plain forests.

**Threats**

Where light levels are optimal, such as in forest edges, canopy gaps or under sparse, open forest, newly established Japanese honeysuckle vines grow and spread rapidly. Suppressed vines growing in dense shade, however, are capable of rapid growth and spread when light levels in a habitat are increased by disturbance. In forests, Japanese honeysuckle vines spread both vertically and horizontally by climbing up tree trunks and/or by trailing or clambering over the forest floor and associated vegetation. Trailing vines produce stolons which root when they contact soil, aiding the vegetative spread and persistence of the species.

Dense, strangling growths of Japanese honeysuckle can impact desirable vegetation by decreasing light availability within the habitat, depleting soil moisture and nutrients, or by toppling upright stems through the sheer weight of accumulated vines. Negative effects of Japanese honeysuckle invasion include development of malformed trunks in trees, suppression of plant growth, inhibition of regeneration in woody and herbaceous plants, and alteration of habitats used by native wildlife.

**Control**

Small populations can be controlled by careful hand-pulling, grubbing with a hoe or a shovel, and removal of trailing vines. In old fields and roadsides, twice yearly mowing can slow vegetative spread; however, due to vigorous resprouting, stem density may increase. In pine plantations or in fire-dependent natural communities, Japanese honeysuckle can be controlled by prescribed burning. Burning can greatly decrease the abundance of Japanese honeysuckle within a habitat and limit its spread for one or two growing seasons. Where prescribed burning or mowing are difficult or undesirable, Japanese honeysuckle may be treated with a glyphosate herbicide. Glyphosate is recommended because it is biodegradable and will begin to break down into harmless components on contact with the soil. However, it is nonselective and can affect all green vegetation. Therefore, it is best applied to the semi-evergreen leaves with a spray or wick applicator in late autumn when other vegetation is dormant but Japanese honeysuckle is still physiologically active. Reapplication may be necessary to treat plants missed during the initial treatment. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. Consult a natural resource specialist for more information on herbicide use and prescribed burning techniques.

**Suggested Alternatives**

Some native alternatives to Japanese honeysuckle for use in home landscaping include trumpet creeper (Campsis radicans), Virginia creeper (Parthenocissus quinquefolia), and trumpet honeysuckle (Lonicera sempervirens). Wild ginger (Asarum canadensis) makes an excellent ground cover in shady areas. All these species are easy to cultivate, have wildlife and aesthetic value, and can generally be obtained from commercial sources or propagated by wild-collected seeds or cuttings.

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[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at <http://webriver.com/tn-eppc/manual/micros.htm.>]

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|  | Japanese Stiltgrass or Eulalia *Microstegium vimineum* (Trin.) A. Camus. |
|  | Microstegium is an annual colonial grass that spreads rapidly into disturbed lowland areas. Inconspicuous at first, populations may go unnoticed until they have displaced native communities. It is a C-4 shade tolerant plant that can survive and reproduce under a closed forest canopy.  **Height:** Microstegium is a decumbent and branched annual grass reach-ing a height of 60-100 cm (24-39 in).  **Stem:** Culms are 1.5 m (59 in) long with glabrous nodes and internodes.  **Leaves:** Cauline leaves are alternate, lanceolate, 10 cm (4 in) long, 2-15 mm (0.08-0.6 in) wide, and sparsely pubescent on both surfaces with ciliate margins.  **Flowers:** Racemes are terminal and may be solitary or in a set of two or three. Spikelets are in pairs, one sessile and one pedicellate, and 4.5-5mm (0.17-0.2 in) long. Blooms August-September.  **Seeds:** Grain is yellow to red, ellipsoid, 2.8-3.0 mm (0.1-0.12 in) long. Seeds mature over a period of about two weeks in September-October. |
| **Life History** | Microstegium is an annual C-4 shade tolerant grass in the Poaceae family. It is colonial in nature, rooting from the nodes, and may form dense monotypic stands. Reproduction is exclusively from seed. Each plant may produce from 100-1,000 seeds that remain viable in the soil for five or more years. Seed dispersal is primarily by animals, flooding, and deposition with fill dirt. This plant spreads rapidly into disturbed areas but can invade undisturbed areas by forming satellite populations brought in by animals or flooding. On fertile mesic sites Japanese grass can replace competing ground vegetation within 3-5 years.  Microstegium is adapted to low light conditions. At 18% of full sunlight dry matter production is not significantly reduced from production in full sunlight. It will grow and produce seed in light levels as low as 5% of full sunlight. |
| **Origin and Distribution** | Microstegium is native to Japan, Korea, China, Malaysia, and India. It was first identified in the U.S. at Knoxville, Tennessee in 1919, and in 1933 was collected in western North Carolina. By 1964, the grass had spread to 35 counties in North Carolina. By 1972, it had been identified in 14 eastern states, and in 1978, it was collected in Arkansas. Microstegium can be found throughout the state of Tennessee, primarily in previously disturbed mesic areas. |
| **Similar Species** | Microstegium may be confused with cutgrass (*Leersia virginica* Willd.) or knotweed (*Polygonum persicaria* L.). Cutgrass has distinctly longer leaves (1.5 dm [6.0 in]) and shorter spikelets (2.5-3 cm [1.0-1.2 in]) than microstegium. Knotweed is distinguished from microstegium by pale to dark pink calyx and glossy black nutlets. |
| **Habitat** | Alluvial soil found in flood plains and stream sides is ideal habitat for microstegium. Other typical habitats include damp fields, lawns, mesic woodland edges, roadsides, and ditches. It is commonly found in areas of natural (e.g., flood scouring) or artificial (e.g., mowing, tilling) disturbance, but can invade undisturbed areas. Microstegium has been observed growing at an elevation of 1,200 m (3,840 ft), but typically is not found on upland sites. Deer avoid microstegium, which allows it a competitive advantage in over browsed areas. |
| **Management Recommendations** | **Mechanical Control**  Mow plants as close to the ground as possible using a weedeater or similar grass cutting tool. Treatments should be made when plants are in flower and before seeds are produced. Treatments made earlier may result in plants producing new seed heads in the axils of lower leaves.  **Herbicidal Control**  Herbicide treatments should be made late in the growing season but, before the plants set seed. Treatments made earlier in the growing season may allow a second cohort of plants to produce seeds.  Glyphosate: Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all foliage. Do not spray to the point of runoff. Ambient air temperature should be above 65&deg;F to ensure translocation of the herbicide to the roots. Do not apply if rainfall is expected within two hours following application.  Sethoxydin: Apply a 1.5% solution of sethoxydin and water plus a 1% nonphytotoxic vegetable-based oil to all foliage on a spray-to-wet basis. Do not spray to the point of runoff. Ambient air temperature should be above 65&deg;F. Do not apply if rainfall is expected within one hour following application. |
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[Exotic Plant Management Manual](file:///D:\manual.htm) | [Home](file:///D:\index.htm)

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| Chinese Lespedeza Lespedeza cuneata (Dum.-Cours.) G. Don | International Code - LECU FIA survey code - 6053 |
| Miller, James H. 2003. [Nonnative invasive plants of southern forests: a field guide for identification and control.](http://www.invasive.org/eastern/srs/index.html) Gen. Tech. Rep. SRS–62. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 93 p. |  |

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| **Synonym:** sericea lespedeza  **Plant.** Perennial ascending-to-upright leguminous forb, 3 to 6 feet (1 to 2 m) in height, with one-to-many leafy slender stems often branching at midplant, three-leaflet leaves, and tiny whitish flowers. Plant arising from a woody rootcrown. Dormant brown plants remaining upright during most of the winter.  **Stems.** Often gray green with lines of hairs along the stem.  **Leaves.** Alternate, crowded and numerous, three-leaflet leaves. Each leaflet oblong to linear with a hairlike tip, 0.4 to 0.8 inch (1 to 2 cm) long and 0.1 to 0.3 inch (3 to 8 mm) wide. Green above and dense whitish hairy to light gray green beneath. Hairy petioles 0.2 to 0.6 inch (5 to 15 mm) long, absent for upper leaves. Stipules narrowly linear.  **Flowers.** July to September. Clusters of 1 to 3 pealike flowers crowded in upper leaf axils. Flowers white with purple marks, 0.1 to 0.3 inch (4 to 7 mm) long and shorter than leaves. Hairy five-lobed calyx shorter than petals.  **Fruit and seeds.** October to March. Flat ovate to round single-seeded legume pod 0.12 to 0.15 inch (3 to 4 mm) wide. Pods clustered in terminal axils, scattered along the stem, and clasped by persistent sepals. Green becoming tan.  **Ecology.** Occurs in new and older forest openings, dry upland woodlands to moist savannas, old fields, right-of-ways, and cities. Flood tolerant. Forms dense stands by sprouting stems from rootcrowns that prevent forest regeneration and land access. Cross- and self-pollinates. Spreads slowly from plantings by seeds that have low germination, but remain viable for decades. Nitrogen fixer.  **Resembles** native lespedeza, L. virginica (L.) Britt., which grows in tufted clumps instead of infestations, has crowded clusters of pink-purple to violet flowers and somewhat larger leaflets 0.6 to 1.2 inches (1.5 to 3 cm) long, and brown stems.  **History and use.** Introduced from Japan in 1899—first near Arlington, VA, and soon afterwards in north-central Tennessee—and escaped. Benefited from government programs that promoted plantings for erosion control. Still planted for quail food plots and soil stabilization. Plant improvement breeding programs still underway. | July Photo by T. Bodner   July Photo by J. Miller |

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| September Photo by J. Miller | July Photo by J. Miller |

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| July Photo by J. Miller | February Photo by J. Miller | February Photo by J. Miller |
| States with suspected infestations are shown in gray. | | |

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| Recommended control procedures:   * Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (July to September): Garlon 4 as a 2-percent solution (8 ounces per 3-gallon mix), Escort\* at three-fourths of an ounce per acre (0.2 dry ounces per 3-gallon mix), Transline† as a 0.2-percent solution (1 ounce per 3-gallon mix), a glyphosate herbicide as a 2-percent solution (8 ounces per 3-gallon mix), or Velpar L\* as a 2-percent solution (8 ounces per 3-gallon mix). * Mowing 1 to 3 months before herbicide applications can assist control.   \*   Nontarget plants may be killed or injured by root uptake. †   Transline controls a narrow spectrum of plant species.  [  [Home](http://www.invasive.org/eastern/index.html)  ]   [  [Contents](http://www.invasive.org/eastern/srs/index.html)  ] |

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|  |  |  |  | Bargeron, C.T., D.J. Moorhead, G.K. Douce and R. Reardon (Technical Coordinators). 2003. Invasive Plants of the Eastern United States: Identification and Control. USDA Forest Service - Forest Health Technology Enterprise Team. Morgantown, WV USA. FHTET-2003-08. |

## [Taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage, Invasive alien plant website, addressed at http://www.state.va.us/~dcr/dnh/invlist.htm.]

## Mile-a-minute (Polygonum perfoliatum L.)

**Description**

Also called tearthumb because of the spines on its leaves and stems, this annual vine of the smartweed family can climb up to 15 feet in height. Although similar to two native Polygonum species (arrow-vine and halberd-leaved tearthumb), mile-a-minute differs from these primarily in its leaves and fruits. The leaves are bright green, one to three inches wide, and perfectly triangular. The fruits are berry-like, fleshy, blue, and approximately pea-sized. The most striking feature of this plant is the saucer-shaped sheath at the base of each leaf. This feature is not found on any other Polygonum species. Rapidly growing at about a half a foot per day, mile-a-minute can reach lengths of 20 feet.

**Habitat**

Mile-a-minute thrives in areas with plenty of direct sunlight and damp soil. It is especially prevalent along roadsides, ditches, stream banks, wet meadows, and clearcuts. It generally grows in areas with an abundance of leaf litter on the soil surface. This appears to help keep the soil moist and may aid in the germination of seeds.

**Distribution**

A native of Japan, mile-a-minute was accidentally brought to Pennsylvania in the 1930's with a shipment of rhododendrons. Its seeds were allowed to mature and were soon spread by birds and rodents that ate the fruits. In eight years, from 1981 to 1989, mile-a-minute extended its range in Pennsylvania from five to eleven counties. In recent years it has crept down the coast into Maryland and Washington, D.C., becoming established in more than half of Maryland's counties. Although not widely distributed in Virginia, mile-a-minute has the potential to rapidly colonize roadsides and waste areas and become a pest. So far it has been reported at a few sites in Northern Virginia.

**Threats**

Its rapid growth and viney nature allow mile-a-minute to overtake the native vegetation of an area, smothering seedlings and out competing mature plants for space, nutrients, and sunlight. This competition is a particular concern in wet meadows which may support rare wetland plants. Although it does not appear to be a threat to farmers, it can easily become a pest to gardeners and landscapers, destroying ornamental plants and landscaped yards.

**Control**

Because mile-a-minute is an annual with an shallow root system, this invasive is best removed from lightly infested areas by hand-pulling (with strong gloves to protect hands) and disposing of them before they go to seed. Seed set begins in early August and ends at the first frost. Removal of the plants is also best accomplished before the plant becomes excessively viney. Removal of brush, leaves and woodpiles which may create thick litter is also effective in controlling the spread of the plant.

Herbicides may be used as an alternative in heavily infested areas. Spot applications of biodegradable glyphosate herbicides are recommended before mile-a-minute goes to seed in early August. As glyphosate is a nonselective herbicide which affects all green vegetation, it should be used sparingly to avoid contact with desirable vegetation which may be growing near the mile-a-minute. To be safe and effective, herbicide use requires knowledge of the chemicals and their appropriate concentrations as well as understanding of the method and timing of their application. Consult an agricultural extension agent or a natural resource specialist for more information on these control methods.

For more information contact:

Virginia Native Plant Society  
P.O. Box 844  
Annandale, VA 22003

Virginia Department of Conservation and Recreation  
Division of Natural Heritage  
217 Governor Street, 3rd Floor  
Richmond, VA 23219

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Return to the Virginia Natural Heritage Program [home page](http://www.dcr.state.va.us/dnh/)

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| *Verbascum thapsus* L.  **NATIVE RANGE:** Europe and Asia  **DESCRIPTION:** Common mullein, also known as wooly mullein, is a erect herb in the figwort family, or Scrophulariaceae.  First year mullein plants are low-growing rosettes of bluish gray-green, feltlike leaves that range from 4-12  inches in length and 1-5 inches in width.  Mature flowering plants are produced the second year, and grow to 5 to 10 feet in height, including the conspicuous flowering stalk.  The five-petaled yellow flowers are arranged in a leafy spike and bloom a few at a time from June-August.  Leaves alternate along the flowering stalks and are much larger toward the base of the plant.  The tiny seeds are pitted and rough with wavy ridges and deep grooves and can germinate after lying dormant in the soil for several decades.  **ECOLOGICAL THREAT:** Common mullein threatens natural meadows and forest openings, where it adapts easily to a wide variety of site conditions.  Once established, it grows more vigorously than many native herbs and shrubs, and its growth can overtake a site in fairly short order.  Common mullein is a prolific seeder and its seeds last a very long time in the soil.  An established population of common mullein can be extremely difficult to eradicate.  **DISTRIBUTION IN THE UNITED STATES:** Common mullein was first introduced into the U.S. in the mid-1700's, where it was used as a piscicide, or fish poison, in Virginia.  It quickly spread throughout the U.S. and is well established throughout the eastern states.  Records show that it was first described in Michigan in 1839 and on the Pacific coast in 1876, probably due to multiple introductions as a medicinal herb.  **HABITAT IN THE UNITED STATES:** Common mullein can be found where mean annual precipitation is greater than 3-6 inches and the growing season lasts for a minimum of 140 days.  Intolerant of shade, mullein will grow in almost any open area including natural meadows and forest openings as well as neglected pastures, road cuts, industrial areas.  Common mullein prefers, but is not limited to, dry sandy soils.  **BACKGROUND:** Common mullein is a monocarpic perennial (i.e., takes two or more years to flower and die).  Brought over from Europe by settlers, it was used as a medicinal herb, as a remedy for coughs and diarrhea and a respiratory stimulant for the lungs when smoked.  A methanol extract from common mullein has been used as an insecticide for mosquito larvae.  **BIOLOGY & SPREAD:** During the first summer after germination mullein produces a tap root and a rosette of leaves.   During this vegetative stage, the rosette increases in size during the growing season until low temperatures arrest growth sometime during the autumn and winter.  Beginning the next spring, second year plants bolt into maturity, flower, produce seed during the summer, and then die, completing the plant’s normal life cycle.  Flowers mature from the base to the tip of the stalk.  The length of the flowering period is a function of stalk height; longer stalks can continue to flower into early October.  It is estimated that a single plant can produce 100,000-180,000 seeds which may remain viable for more than 100 years.  The seeds are dispersed mechanically near the parent plant during the autumn and winter.  Seeds at or near the surface are more likely to germinate.  **CURRENT MANAGEMENT APPROACHES:** Although common mullein can be very difficult to eradicate, there are a variety of management methods available, depending on the particular situation.  Because mullein seedling emergence is dependent on the presence of bare ground, sowing sites with early successional native grasses or other plants may decrease seed germination and the chance of successful emergence of mullein seedlings.  Mullein plants are easily hand pulled on loose soils due to relatively shallow tap roots.  This is an extremely effective method of reducing populations and seed productivity, especially if plant is pulled before seed set.  If blooms or seed capsules are present,  reproductive structures should be removed, bagged, and properly disposed of in a sanitary landfill.  Care should be taken, however, to minimize soil disturbance since loose soil will facilitate mullein seed germination.  There are two insects that have possible biological control implications for mullein.  A European curculionid weevil (*Gymnaetron tetrum*), determined by the U.S. Department of Agriculture to be specific to mullein,  has been introduced to North America. The weevil larvae matures in the seed capsules and can destroy up to 50% of the seeds. Another agent, the mullein moth (*Cucullia verbasci*) has been tested in the U.S. and is considered to be a relatively safe control agent because of its consistent feeding and development on mullein species.  Although tests showed limited feeding on other native species, the larvae did not survive significantly longer than those individuals tested in the absence of food.  **Release of biological controls into natural environments is always experimental and should be entered into only after full and careful consideration of potential non-target species impacts.  Once released into nature, biological control agents are difficult if not impossible to control.**  For situations where hand-pulling of plants is not practical or safe, for example, on very steep slopes where hand pulling is dangerous or would cause significant soil disturbance, herbicidal control is an effective option.  Apply a 2% solution of glyphosate (e.g., Roundup) or triclopyr (Garlon) and water plus a non-ionic surfactant, using a tank or backpack sprayer to thoroughly cover all leaves.  Do not apply so heavily that the herbicide drips off the leaf surface.  Use caution as glyphosate is a non-selective herbicide that may kill desirable plants even if partially contacted by spray.  Triclopyr is selective to broadleaf plants and is a better choice if native or other desirable grasses are present.  For some sites, applications can be made during the early spring when most other non-target vegetation is dormant.  Refer to the pesticide manufacturers' label for specific information and restrictions regarding herbicide use.  **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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.**  **NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.**  ***For more information on the management of Common Mullein, please contact:***  Kris Johnson, Great Smoky Mountains National Park, Gatlinburg, TN ([kris\_johnson@nps.gov](mailto:kris_johnson@nps.gov))  **SUGGESTED ALTERNATIVE PLANTS:** Although not a popular ornamental, there are many excellent native plant alternatives for mullein that thrive in full sun and sandy soils.  In the eastern U.S.,  common milkweed (*Asclepias syriaca*), butterflyweed (*Asclepias tuberosa*), joe-pye weed (*Eupatorium dubium*), black-eyed Susan (*Rudbeckia fulgida*), and Ironweed (*Vernonia noveboracensis*), are just a few of the many selections.  You may wish to contact your local native plant society for further suggestions.  **AUTHOR:**   Tom Remaley, Great Smoky Mountains National Park, Gatlinburg, TN.  **EDITOR:**  Jil M. Swearingen, U.S. National Park Service, Washington, DC.  **REFERENCES:**  Baskin, J.M. and C.C. Baskin.  Seasonal changes in germination responses of buried seeds of *Verbascum thapsus* and *V. blattaria* and ecological implications.  Can. J. Bot. 59: 1769-1775; 1981.  Haragan, Patricia D. Weeds of Kentucky and Adjacent States. Lexington, KY: The Univ. Press of Kentucky; 1991: 136-7.  Martin, Alexander C.  1987.  A Golden Guide: Weeds. Golden Press, New York, p. 106.  Maw, M.G. *Cucullia verbasci* an Agent for the Biological Control of Common Mullein (*Verbascum thapsus*).  Weed Sci. 28(1): 27-30; 1980.  Radford, A. E., H. E. Ahles, and C. R. Bell.  Manual of Vascular Flora of the Carolinas.  Chapel Hill, NC: Univ. of North Carolina Press; 1968.  Semenza, R. J., J. A. Young, and R. A. Evans.  Influence of  Light and Temperature on the Germination and Seedbed Ecology of Common Mullein (*Verbascum thapsus*).  Weed Sci. 26(6): 577-81; 1978.  **Plant Conservation Alliance, Alien Plant Working Group.** |

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| *Rosa multiflora* Thunb.  **NATIVE RANGE:** Japan, Korea, and eastern China  **DESCRIPTION:** Multiflora rose is a thorny, perennial shrub with arching stems (canes), and leaves divided into five to eleven sharply toothed leaflets. The base of each leaf stalk bears a pair of fringed bracts. Beginning in May or June, clusters of showy, fragrant, white to pink flowers appear, each about an inch across. Small bright red fruits, or rose hips, develop during the summer, becoming leathery, and remain on the plant through the winter.  **ECOLOGICAL THREAT:** Multiflora rose is extremely prolific and can form impenetrable thickets that exclude native plant species. This exotic rose readily invades open woodlands, forest edges, successional fields, savannas and prairies that have been subjected to land disturbance.  **DISTRIBUTION IN THE UNITED STATES:** Multiflora rose occurs throughout the U.S., with the exception of the Rocky Mountains, the southeastern Coastal Plain and the deserts of California and Nevada.  **HABITAT IN THE UNITED STATES:** Multiflora rose has a wide tolerance for various soil, moisture, and light conditions. It occurs in dense woods, prairies, along stream banks and roadsides and in open fields and pastures.  **BACKGROUND:** Multiflora rose was introduced to the East Coast from Japan in 1866 as rootstock for ornamental roses. Beginning in the 1930s, the U.S. Soil Conservation Service promoted it for use in erosion control and as "living fences" to confine livestock. State conservation departments soon discovered value in multiflora rose as wildlife cover for pheasant, bobwhite quail, and cottontail rabbit and as food for songbirds and encouraged its use by distributing rooted cuttings to landowners free of charge. More recently, multiflora rose has been planted in highway median strips to serve as crash barriers and to reduce automobile headlight glare. Its tenacious and unstoppable growth habit was eventually recognized as a problem on pastures and unplowed lands, where it disrupted cattle grazing. For these reasons, multiflora rose is classified as a noxious weed in several states, including Iowa, Ohio, West Virginia, and New Jersey.  **BIOLOGY & SPREAD:** Multiflora rose reproduces by seed and by forming new plants that root from the tips of arching canes that contact the ground. Fruits are readily sought after by birds which are the primary dispersers of its seed. It has been estimated that an average multiflora rose plant may produce a million seeds per year, which may remain viable in the soil for up to twenty years. Germination of multiflora rose seeds is enhanced by passing through the digestive tract of birds.  **CURRENT MANAGEMENT APPROACHES:** Mechanical and chemical methods are currently the most widely used methods for managing multiflora rose. 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 effective in achieving high mortality of multiflora rose. In high quality natural communities, cutting of individual plants is preferred to site mowing to minimize habitat disturbance. Various herbicides have been used successfully in controlling multiflora rose but, because of the long-lived stores of seed in the soil, follow-up treatments are likely to be necessary. Application of systemic herbicides (e.g., glyphosate) to freshly cut stumps or to regrowth may be the most effective methods, especially if conducted late in the growing season. Plant growth regulators have been used to control the spread of multiflora rose by preventing fruit set.  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 and is thought to hold the potential for eliminating multiflora rose in areas where it grows in dense patches. An important drawback to both the rose rosette fungus and the European rose chalcid is their potential impact to other rose species and cultivars.  **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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.**  **NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.**  ***For more information on multiflora rose management, please contact:***  Stratford Kay, Aquatic and Noncropland Weed Management, Crop Science Department, Box 7620, North Carolina State University, Raleigh, NC  27695, (919) 515-5645  [Stratford\_Kay@ncsu.edu](mailto:Stratford_Kay@ncsu.edu)  **SUGGESTED ALTERNATIVE PLANTS** Using native shrubs and trees for land restoration and landscaping purposes is one way to prevent invasions by multiflora rose.  **AUTHORS:**  Carole Bergmann, Montgomery County Department of Parks, Silver Spring, MD.  Jil M. Swearingen, U.S. National Park Service, Washington, DC.  **REFERENCES:**  Albaugh, G.P., W.H. Mitchell, and J.C. Graham. 1977. Evaluation of glyphosate for multiflora rose control. Proceedings of the New England Weed Science Society, vol. 31, pp. 283-291.  Amrine, J.W., Jr. and T.A. Stasny. 1993. Biological control of multiflora rose. Pp. 9-21. In McKnight, B.N.(ed.). Biological Pollution. Indiana Acad. Sci., Indianapolis. 261 pp.  Evans, J.E. 1983. A literature review of management practices for multiflora rose (*Rosa multiflora*). Natural Areas Journal 3(1):6-15.  Fawcett, R.S. 1980. Today's weed--multiflora rose. Weeds Today 11: 22-23.  Szafone, R. 1991. Vegetation Management Guidelines: Multiflora rose (*Rosa multiflora Thunb.*). Natural Areas Journal 11(4):215-216.  The Nature Conservancy. [Multiflora Rose: Element Stewardship Abstract](http://www.nps.gov/cgi-bin/intercept?http://tncweeds.ucdavis.edu/esadocs/rosamult.html). In: Wildland Weeds Management & Research Program, Weeds on the Web.  Wyman, D. 1949. Shrubs and vines for American gardens. New York:MacMillan Co., 613 pp.  **Plant Conservation Alliance, Alien Plant Working Group.** |

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| Species Management and Control Information  Norway maple  *Acer platanoides* L.   |  | | --- | | **Source:** The following information is taken from a number of sources and those sources are identified at the beginning of the referenced information. The intent of this resource is to provide the user with as much of the information that exists for management and control of this species as is practical. It is important to note that new and improved methods are added regularly which will require you to visit the websites provided for updates on this information. Bibliographies and resources referenced by these sources are not included here, but are included at the websites from which this information was extracted. |  |  | | --- | | **READ THIS FIRST!**  Before administering any of the following management and control options, it is imperative that you are familiar with the background information provided under the [General Management and Control](http://www.dcnr.state.pa.us/forestry/invasivetutorial/Management_intro.htm) Section.  For additional, and potentially more current, information on management and control of this species, use the Mid-Atlantic Exotic Pest Plant Council (MA-EPPC) listserve or any of the other listserves identified in the [Resource - Listserve](http://www.dcnr.state.pa.us/forestry/invasivetutorial/Resources.htm) section of this tutorial. You will find directions for subscribing to the list serve there. The MA-EPPC listserve has an archives feature that saves past discussions (beginning in 1999) about specific species control. These messages are at: <http://groups.yahoo.com/group/ma-eppc/messages>. |   GENERAL MANAGEMENT CONSIDERATIONS:  USDA Forest Service - Northeastern Area - Invasive Plants: Weeds of the Week - Norway maple - <http://www.na.fs.fed.us/fhp/invasive_plants/weeds/>  Don't plant Norway maple.  MANUAL AND MECHANICAL CONTROL:  Delaware River Invasive Plant Partnership - Invasive Plant Fact Sheets - Norway maple - <http://www.paflora.org/DRIPP.html> - Authors: Ann F. Rhoads and Timothy A. Block - April 2002.  Use of the weed wrench to pull young trees out of the ground is effective. Girdling the trunk will also kill Norway maples.  USDA Forest Service - Northeastern Area - Invasive Plants: Weeds of the Week - Norway maple - <http://www.na.fs.fed.us/fhp/invasive_plants/weeds/>  Pull seedlings when soil is moist. Dig out larger plants, including the root systems. Cut down large tree. Grind out the stump, or clip off re-growth. Girdle tree by cutting through the bark and growing layer (cambium) all around the trunk. Girdling is most effective in spring.  BIOCONTROL:  Delaware River Invasive Plant Partnership - Invasive Plant Fact Sheets - Norway maple - <http://www.paflora.org/DRIPP.html> - Authors: Ann F. Rhoads and Timothy A. Block - April 2002.  No biological control options are currently known.  CHEMICAL CONTROL\*:  Delaware River Invasive Plant Partnership - Invasive Plant Fact Sheets - Norway maple - <http://www.paflora.org/DRIPP.html> - Authors: Ann F. Rhoads and Timothy A. Block - April 2002.  Cutting followed by treatment of the cut stem with triclopyr is recommended. Trees up to 4 inches in diameter can be controlled by an application of triclopyr in oil to the bark for a distance of 12-18 inches at the base of the trunk. This treatment is most effective between February 15 and March 31 or from June 1 to September 30.  USDA Forest Service - Northeastern Area - Invasive Plants: Weeds of the Week - Norway maple - <http://www.na.fs.fed.us/fhp/invasive_plants/weeds/>  Cut down, and paint the cut stem or stump with Gylphosate (or triclopyr). Clip off re-growth or paint with glyphosate. Follow label directions.  \* Mention of pesticide products in this document does not constitute endorsement of any particular material.  [Return to List](http://www.dcnr.state.pa.us/forestry/invasivetutorial/List.htm) |

[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at <http://webriver.com/tn-eppc/manual/celast.htm>.]

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|  | Oriental Bittersweet *Celastrus orbiculata* Thunb. |
|  | Oriental bittersweet is a serious threat to plant communities due to its high reproductive rate, long range dispersal, ability to root sucker, and rapid growth rate. Climbing Oriental bittersweet vines severely damage native vegetation by constricting and girdling stems. Vines can shade, suppress, and ultimately kill native vegetation. Oriental bittersweet has been shown to hybridize with the relatively rare American bittersweet (*Celastrus scandens* L.). Hybridization may lead to the loss of American bittersweet's genetic identity through introgression. Both are members of the Celastraceae (Stafftree) family.  **Height:** Oriental bittersweet is a deciduous woody vine that may become a spreading, trailing shrub. Maximum height can reach 19 m (60 ft) depending on surrounding vegetation. Vines grow up to 10 cm (4 in) in diameter.  **Leaves:** Leaves are alternate and are variable in size and shape from oblong-obovate to suborbicular. Margins are crenate-serrate and base cuneate to obtuse. Petioles are 1-3 cm (0.4-1.2 in) long.  **Stem:** Stems and branches are round, glabrous, light to dark brown with discernible lenticels.  **Flowers:** Inflorescence is a few-flowered (3-7) axillary cyme. Flowers have 5 sepals and 5 petals, and are greenish-yellow in color. Varieties can be dioecious or mon-ecious. Blooms in May.  **Fruit:** Fruit is green changing to bright yellow upon maturity. The globose fruits are 6-8 mm (0.2-0.3 in) in diameter, three valved with each fruit containing one to three seeds. Matures August-September. |
| **Life History** | Oriental bittersweet flowers in May in Tennessee. Hymenopterous insects, especially bees, are the primary pollinators, but wind pollination is also successful. Fruit ripens in August through September and remains on the stem into the winter. Seed dispersal is by birds or small mammals. Seedling germination is generally high (up to 95%) and begins in mid to late spring. The highest rate of seed germination is in lower light intensities. Seedlings increase photosynthesis two-fold when exposed to direct sunlight. The plants develop and expand by layering stolons and rootsuckers. Annual growth rate is from 0.3-3.0 m (1-12 ft) with little additional growth after about seven years. |
| **Origin and Distribution** | Oriental bittersweet is native to Japan, Korea, and northern China. It was introducedinto the U.S. in 1860. Naturalized plants were first collected in Connecticut in 1916. Oriental bittersweet has become naturalized in 21 of 33 states in which it is cultivated. Present distribution is throughout the northeastern and southeastern U.S. extend-ing to the southeastern Great Plains. |
| **Similar Species** | Oriental bittersweet is similar in appearance to American bittersweet and anyone surveying for Oriental bittersweet should verify identification. Oriental bittersweet differs from American bittersweet by having axillary inflorescences instead of terminal flower clusters. However, inflorescences are sometimes terminal in male Oriental bittersweet plants. A less reliable difference is the color of the outer covering of the fruit. The fruit of Oriental bittersweet is yellow while American bittersweet fruit is orange. |
| **Habitat** | Oriental bittersweet has a wide range of habitat preferences including roadsides, old homesites, thickets, and alluvial woods. Oriental bittersweet is shade tolerant, readily germinating and growing under a closed forest canopy. |
| **Management Recommendations** | Since Oriental bittersweet produces numerous seeds, extensive seed reserves canbecome established in the soil within a year or two. Seeds of Oriental bittersweet remain viable for several years and control actions must continue until seed sources are eliminated.  **Mechanical Control**  Cutting: Cut climbing or trailing vines as close to the root collar as possible. This technique is feasible on small populations; as a pretreatment on large impenetrable sites; in areas where herbicide cannot be used; or if labor resources are not sufficient to ade-quately implement herbicidal control. This treatment will prevent seed production and strangulation of surrounding woody vegetation. Oriental bittersweet will resprout unless cut so frequently that its root stores are exhausted. Treatment should begin early in the growing season and be repeated at two-week intervals until autumn.  Grubbing: This method is appropriate for small initial populations or environmentally sensitive areas where herbicides cannot be used. Using a pulaski or similar digging tool, remove the entire plant, including all roots and runners. Juvenile plants can be hand pulled depending on soil conditions and root development. Any portions of the root system not removed will potentially resprout. All plant parts, including mature fruit, should be bagged and disposed of in a trash dumpster to prevent reestablishment.  **Herbicidal Control**  Stump Treatment: Use this method in areas where vines are established within or around non-target plants, or where vines have grown into the canopy.  Glyphosate: Cut the stem 5 cm (2 in) above ground level. Immediately apply a 25% solution of glyphosate and water to the cross-section of the stem. This procedure is effective at temperatures (as low as 40&deg;F) and may require a subsequent foliar application of glyphosate.  Triclopyr: Cut the stem 5 cm (2 in) above ground level. Immediately apply a 25% solution of triclopyr and water to the cross-section of the stem This procedure remains effective at low temperatures (<60&deg;F) as long as the ground is not frozen. A subsequent foliar application may be necessary to control new seedlings.  Foliar Spray Method: Use this method to control large populations. It may be necessary to precede foliar applications with stump treatments to reduce the risk of damaging non-target species.  Glyphosate: Apply a 2% solution of glyphosate and water plus 0.5% non-ionic surfactant to thoroughly wet all foliage. Do not apply so heavily that herbicide will drip off leaves. Glyphosate is a non-selective systemic herbicide that may kill non-target partially sprayed plants. Ambient air temperature should be above 65&deg;F.  Triclopyr: Apply a 2% solution of triclopyr and water to thoroughly wet all foliage. Do not apply so heavily that herbicide will drip off leaves. The ideal time to spray is after surrounding native vegetation has become dormant (October-November) to avoid affecting non-target species. A 0.5% concentration of a non-ionic surfactant is recommended in order to penetrate leaf cuticle. Ambient air temperature should be above 65&deg;F. |
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[Taken from the *Tennessee Exotic Plant Management Manual*. c. 1997. Southeast Exotic Pest Plant Council, Nashville, TN. Pp. 119. Accessed on the web at [http://webriver.com/tn-eppc/manual/ligust.htm](http://webriver.com/tn-eppc/manual/pueria.htm).]

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|  | Privet *Ligustrum* spp. L. |
|  | Several species of privet have been widely planted in Tennessee, primarily as a hedge in landscaping. They are difficult to distinguish and include common privet (*L. vulgare* L.), Chinese privet (*L. sinense* Lour.), and Japanese privet (*L. japonicum* Thunb.). All belong to the Oleaceae (Olive) family and easily escape cultivation to invade adjacent areas and form dense monocultural thickets.  **Height:** Privet can grow up to 5 m (16 ft) tall and to a diameter of 2.5-25 cm (1-10 in).  **Bark:** Privet bark is whitish-tan to gray in color and smooth in texture. Young branches are minutely hairy.  **Twigs:** Slender twigs are straight, rounded or four-angled below the nodes, and gray-green in color. Terminal buds are present.  **Leaves:** These deciduous or half-evergreen plants hold foliage into winter, but drop it before spring. Leaves are elliptic to ovate in shape. They are oppositely arranged on slender twigs and have 4-5 pairs of indistinct veins. Privet leaves are less than 6 cm (2.5 in) long, glabrous, leathery and thick, with a glossy cuticle on upper surface.  **Flowers:** The perfect flowers are small and white. Bloom time is June-July.  **Fruit:** The black, berrylike fruits contain 1-4 seeds and are borne in terminal clusters. Fruits are subglobose or ovoid and are 6-8 mm (0.25 in) long. The fruit clusters ripen during September and October and persist through the winter. Mature specimens can produce hundreds of fruit. |
| **Life History** | Privet is a perennial shrub that readily grows from seed or from root and stump sprouts. Privet escapes cultivation by movement of seed, which is eaten and subsequently transported by wildlife, particularly birds. The seeds are reported to have a low germination rate: 5%-27% in two tests. |
| **Origin and Distribution** | The privets are native to Europe, North Africa, and Asia. This ornamental landscapeplant has been cultivated since ancient times and has been developed into several horticultural varieties. Date of introduction to the United States is unknown as is any record of introduction to Tennessee. Current range maps show *L. vulgare* (L.) in four central and six eastern Tennessee counties and *L. sinense* (Lour.) in three central and two eastern Tennessee counties; however both species are suspected to have wider distributions. |
| **Similar Species** | The leaves of the native shrub coralberry, *Symphoricarpos orbiculatus* (Moench.), are similar in shape to common privet. Coralberry is distinguished by its very slender twigs, deciduous leaves, red berries borne in axillary clusters, and the lack of a terminal bud. |
| **Habitat** | Privet is often seen along roadsides and other areas of disturbed soil at elevations less than 915 m (3000 ft). Privet also becomes established in old fields and landscapes that have abundant sunlight. Blunt-leaved privet, *L. obtusifolium* (Sieb. and Zucc.), was found invading an old field succession site in Illinois. The field had an average of more than 6,082 plants per ha (2.5 acres). Privet can also spread into forests, though it does not produce fruit in low light. |
| **Management Recommendations** | **Mechanical Controls**  Mowing/Cutting: This method is appropriate for small initial populations or environmentally sensitive areas where herbicides cannot be used. Repeated mowing or cutting will control the spread of privet, but will not eradicate it. Stems should be cut at least once per growing season as close to ground level as possible.  Hand Pulling: Privet is effectively controlled by manual removal of young seedlings. 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 (2.5 in), can be removed using a Weed Wrench or similar uprooting tools. The entire root must be removed since broken fragments may resprout.  **Biological Controls**  Privet has no known biological controls. A foliage-feeding insect native to Europe, *Macrophya punctumalbum*, is a known pest. Privet is also susceptible to a fungal leaf spot, *Pseudocercospora ligustri*, and a common root crown bacteria, *Agrobacterium tume-faciens*.  **Herbicidal Controls**  Foliar Spray Method: This method should be considered for large thickets of privet where risk to non-target species is minimal. Air temperature should be above 65&deg;F to ensure absorption of herbicides. The ideal time to treat is in late fall or early spring when many native species are dormant.  Glyphosate: Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species. Glyphosate is a non-selective systemic herbicide that may kill non-target partially-sprayed plants.  Triclopyr: Apply a 2% solution of triclopyr and water plus a 0.5% non-ionic surfactant, to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species. Triclopyr is a selective herbicide for broadleaf species. In areas where desirable grasses are growing under or around privet triclopyr can be used without non-target damage.  Cut Stump Method: This control method should be considered when treating individual bushes or where the presence of desirable species preclude foliar application. This treatment is effective as long as the ground is not frozen.  Glyphosate: Horizontally cut privet stems at or near ground level. Immediately apply a 25% solution of glyphosate and water to the cut stump making sure to cover the entire surface.  Triclopyr: Horizontally cut privet stems at or near ground level. Immediately apply a 25% solution of triclopyr and water to the cut stump making sure the entire surface is covered.  Basal Bark Method: This method is effective throughout the year as long as the ground is not frozen. Apply a mixture of 25% triclopyr and 75% horticultural oil to the basal parts of the shrub to a height of 30-38 cm (12-15 in) from the ground. Thorough wetting is necessary for good control; spray until run-off is noticeable at the ground line. |
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# Invasive Alien Plant Species of Virginia Canada Thistle

(Cirsium arvense (L.) Scop.))

**Description**

Canada thistle is a herbaceous perennial in the aster (Asteraceae) family which may grow up to five feet in height. It is characterized by sharp, bristly, dark green leaves which are often woolly on the undersides. The purple, occasionally white, flowers are 1/2 to 1 inch long. Plants bear either male or female flowers. Both male and female plants must be present in an area to produce viable seed. The fragrant flowers attract honeybees, the primary pollinator for this species. A single plant may produce up to 1,500 seeds annually, however, the plant's main means of reproduction is its well developed lateral root system. These roots can grow up to 18 feet in one growing season and send up new shoots every 3 to 6 inches. Canada thistle may be confused with native thistle species. Therefore, consult a natural resource expert for accurate identification before attempting control measures.

**Habitat**

Canada thistle grows in most soil conditions except saturated soils. It prefers an open site with full sun. It is found in open disturbed areas such as roadsides, ditch banks and pastures. It will also invade barrens, glades, savannahs, meadows and dunes.

**Distribution**

A native of Eurasia, Canada thistle was introduced to North America in the late 17th century. Today it is found from Canada to Virginia, and all states across the northern half the country. In Virginia this species is reported from most counties in the Blue Ridge and Shenandoah Valley region and northern piedmont.

**Threats**

Canada thistle's rapid growth aggressively competes with native plants and crops for nutrients, moisture and light. It releases chemicals toxic to other plants. The result is a loss of natural diversity. It is known to harbor other pest species, e.g., insects, and has long been recognized as an agricultural pest. Both natural and human-caused disturbances can create the opportunity for Canada thistle to become established in natural communities.

**Control**

Methods used for control of Canada thistle include mechanical, chemical and biological. Mowing may be the most restrictive method. When timed correctly, mowing can prevent seed set and starve the root starch reserves. However, this method is labor intensive and costly. Prescribed fire may be effective, but results have varied in response to the timing of the burn and the region in which it is conducted. The extensive root system of this plant reduces the effectiveness of herbicides. Glyphosate, a non-selective herbicide with a short residual life span, was found most effective when applied to the stems rather than the leaves. Effectiveness was reduced during dry periods in water-stressed plants. Various biological control agents, including insects and fungi, have been used but have had little effect. Consult an agricultural extension agent or natural resource specialist for the best approach to your situation.

For more information on native plant conservation, contact the Virginia Native Plant Society at the address below. For information on Virginia's natural areas and natural heritage resources, contact the Virginia Department of Conservation and Recreation's Natural Heritage Program at the address below.

This fact sheet was prepared with the assistance of Laura A. Peters and Nicole M. LaChance in the process of their fulfilling course requirements at Virginia Polytechnic Institute and State University.

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For more information contact:

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| Virginia Native Plant Society 400 Blandy Farm Lane, Unit 2 Boyce, VA 22620 (540) 837-1600 |  | Virginia Natural Heritage Program 217 Governor St., Third Floor Richmond, VA 23219 (804) 786-7951 FAX (804) 371-2674 |  |

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Visit the Virginia Natural Heritage Program [home page](http://www.state.va.us/~dcr/vaher.html)

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**Tree-of-heaven**

(Ailanthus altissima (Miller) Swingle)

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|  | **Description**  Tree-of-heaven is a small to medium-sized tree in the mostly tropical Quassia family. It has smooth gray bark. Leaves are compound, alternate, odd-pinnate, with 11-25 lanceolate leaflets. Most leaflets have one to three coarse teeth near their base. Tree-of-heaven leaves may be confused with those of sumac or black walnut. Flowers occur in panicles at the ends of branches; male flowers produce a strong odor which has been described as "the smell of burnt peanut butter." The leaves when crushed also produce this distinctive, offensive odor. Seeds are centered in a papery sheath called a samara. The samaras are slightly twisted or curled, and twirl as they fall to the ground. They can be borne on the wind great distances from the parent plant. |

**Habitat**

Tree-of-heaven establishes itself readily on disturbed sites. These include vacant lots of the inner city, railroad embankments, highway medians, fence rows and roadsides. In naturally forested areas, disturbance created by severe storms or insect infestations can open the way for tree-of-heaven infestation.

**Distribution**

Tree-of-heaven is native to a region extending from China south to Australia. It was imported into the United States in 1784 by a Philadelphian gardener. In the western states it was brought over by Chinese immigrants who use it for medicinal purposes. Due to its rapid growth and prolific seed production, it quickly escaped from cultivation.

**Threats**

One tree-of-heaven can produce up to 350,000 seeds in a year. Seedlings establish a taproot three months from germination. Thus, they quickly outrace many native plant species in competition for sunlight and space. Tree-of-heaven also produces a toxin in its bark and leaves. As these accumulate in the soil, the toxin inhibits the growth of other plants. This toxin is so effective it is currently being studied as a possible source for a natural herbicide. These factors combine to make tree-of-heaven a very aggressive invasive plant able to displace native tree and herb species. Furthermore, the root system is capable of doing damage to sewers and foundations.

**Control**

Tree-of-heaven is very difficult to remove once it has established a taproot. It has persisted in certain areas despite cutting, burning and herbiciding. Therefore, seedlings should be removed by hand as early as possible, preferably when the soil is moist to insure removal of the entire taproot. Larger plants should be cut; two cuttings a year may be necessary, once in the early growing season and once in the late growing season. Initially, this will not kill the plant; it will vigorously resprout from the roots, but seed production will be prevented and the plants will be lowered in stature. If continued over a period of several years, cutting during the growing season stresses the plants and may eventually kill them.  
A glyphosate herbicide, either sprayed onto the leaves or painted onto a freshly cut stump will kill the plant. However, to insure the herbicide gets into the root system, it is best to apply this herbicide in the late growing season while the plant is translocating nutrients to its roots. Glyphosate herbicides are recommended because they are biodegradable, breaking down into harmless components on contact with the soil. However, glyphosate is nonselective, systemic and will affect all green vegetation. To be safe and effective, herbicide use requires careful knowledge of the chemicals, appropriate concentrations, and the effective method and timing of their application. Consult a natural resource specialist or agricultural extension agent for more information before attempting herbicide control of tree-of-heaven.

For more information contact:

Virginia Native Plant Society  
P.O. Box 844  
Annandale, VA 22003

Virginia Department of Conservation and Recreation  
Division of Natural Heritage  
1500 East Main Street, Suite 312  
Richmond, VA 23219

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| *Rubus phoenicolasius* Maxim  **NATIVE RANGE:** Japan, Korea and China.  **DESCRIPTION:** Wineberry, or wine raspberry, is a typical species in the genus *Rubus*, which contains blackberry and raspberry. The name *Rubus phoenicolasius* translates as "blackberry with purple hairs." The mature plant has long stems (canes) that are upright and arching and covered with distinctive glandular red hairs and small spines. The hairs give the canes a reddish color when seen from a distance. Under favorable conditions, canes may grow to a length of 9 feet. Leaves consist of three heart-shaped, serrated leaflets with purplish veins and are silvery white tomentose on the underside. Small greenish flowers with white petals and reddish hairs occur in Spring. The very edible raspberry like fruit is bright red and ripens during June and July.  **ECOLOGICAL THREAT:** Wineberry is a vigorous grower and can form dense thickets covering large areas, displacing many native plants in the process. Wineberry poses a threat to the native plants that grow in forest, field, stream and wetland edge habitats, open woods, and savannas and prairies.  **DISTRIBUTION IN THE UNITED STATES:** Wineberry is found from New England and eastern Canada south to North Carolina and west to Michigan and Tennessee. It is considered an invasive plant of natural areas in Maryland, Pennsylvania, Tennessee, Virginia, North Carolina, West Virginia, and the District of Columbia.  **HABITAT IN THE UNITED STATES:** Like other members of Rubus, wineberry prefers moist conditions and adequate sunlight. Many species of birds and mammals use the brambles for nesting and shelter.  **BACKGROUND:** Wineberry was introduced into the United States in 1890 as breeding stock for new *Rubus* cultivars. It is used today by berry breeders to add specific genes to berry varieties or species. Wineberry is an example of one man's flower being another man's weed. Given containment, wineberry has desirable and useful qualities, but due to its invasive nature, it is considered a significant pest of agricultural and natural ecosystems. Wineberry has been used as a virus indicator for raspberry yellow spot and wineberry latent virus and numerous plant viruses have been isolated from it.  **BIOLOGY & SPREAD:** Wineberry reproduces by seeds, and through vegetative means including root buds and the sprouting of new plants from where canes touch the soil. The drupes are sought after and dispersed by various birds and mammals (including humans).  **CURRENT MANAGEMENT APPROACHES:** Manual, mechanical and chemical means of control are available. Removal of plants by hand pulling or use of a 4-prong spading fork can be effective especially if the soil is moist and the roots and any cane fragments are removed. Branches with berries should be bagged but the remaining plant material can be left to compost. Do not plant wineberry unless you are prepared to contain it vigilantly to prevent unintentional spread.  **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. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.**  **NOTICE: MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.**  ***For more information on the management of Wineberry, please contact:***  Marc Imlay ialm@erols.com  Neal R. Spencer, Entomologist, USDA/ARS, Federal Nutrition Lab. Ithaca, NY 14853; nrs23@cornell.edu.  **AUTHORS:**  Neal R. Spencer, Entomologist, USDA/ARS, Federal Nutrition Lab. Ithaca, NY.  **EDITOR:**  Jil Swearingen, National Park Service, National Capital Region, Washington, DC.  **PHOTOGRAPHS:**  Marge Talt, mtalt@clark.net.  **REFERENCES:**  Dendrology at Virginia Tech. 2001. Wine raspberry Rosaceae *Rubus phoenicolasius* <http://www.nps.gov/cgi-bin/intercept?http://www.fw.vt.edu/dendro/dendrology/syllabus/rphoenicolasius.htm>  Padley, Eunice, and Jan Schultz. 1998. Hiawatha National Forest. September, 1998 Listed noxious weeds and invasive non-native plants - Eastern Region, USDA-Forest Service <http://www.nps.gov/cgi-bin/intercept?http://www.fs.fed.us/r9/weed/nox-weed.htm>  Randall, John M. & Janet Marinelli Ed. 1996. Invasive Plants: - Weeds of the Global Garden. Brooklyn Botanic Garden 21st-Century Gardening Series. Brooklyn, NY.  Talt, Marge. Clearing Woods - Shrubs Part 4 - Brambles Part 1, by Marge Talt, Gardening in Shade on Suite101.com <http://www.nps.gov/cgi-bin/intercept?http://i5ive.com/article.cfm/shade_gardening/57038>.  USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland. Available: <http://www.nps.gov/cgi-bin/intercept?http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?32416>  **Plant Conservation Alliance, Alien Plant Working Group.** |

[**FACT SHEET LIST**](http://www.nps.gov/plants/alien/fact.htm) | [**APWG HOME PAGE**](http://www.nps.gov/plants/alien/index.htm)

**Comments, suggestions, and questions about the website should be directed to the** [**webmaster**](mailto:plant@plantconservation.org)**.**  
http://www.nps.gov/plants/alien/fact/ruph1.htm  
Last updated: 7/15/02

[This text was taken from the Virginia Department of Conservation and Recreation, Division of Natural Heritage website. The web address is [http://www.dcr.state.va.us/dnh/bookeduc.htm#invasive.](http://www.state.va.us/~dcr/dnh/invlist.htm.)]

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**Invasive Alien Plant Species of Virginia**

**Winged Burning Bush (***Euonymus alatus* (Thunb.) Siebold**)**

**Winged Burning Bush (***Euonymus alatus* (Thunb.) Siebold**)**

**Description**

Winged burning bush is a deciduous

shrub that will grow to 15 to 20 feet

tall and equally as wide. It is a

member of the Staff-tree family

(Celastraceae) with elliptic to

obovate leaves, which are opposite

or sub-opposite, 1 to 3 inches long

and ½ to 1¼ inches wide. The leaves

turn a bright red in the fall before

dropping. Occurring in May to early

June, the small green flowers are

inconspicuous. The green to brown

stems have two to four prominent

corky wings.

**Habitat**

Native to northeastern Asia to

central China, winged burning bush,

also known as winged euonymus

and burning bush euonymus, was

introduced into this country about

1860 as an ornamental shrub. It is

very adaptable to a variety of soils,

including being pH adaptable,

performing best in well drained soils

and poorest in waterlogged soils. It

grows well in full shade and full sun

but shows stress in soils subject to

drought.

**Distribution**

Winged burning bush, because of its

spectacularly red autumn foliage, is

one of the most popular shrubs on

the market. Consequently, its

distribution is limited only by its

hardiness, extending from New

England south to northern Florida

and the Gulf Coast. It is commonly

used in landscaping, especially for

malls and highways. However,

reports suggest winged burning bush

may spread by seed from wherever

it is used as an ornamental shrub.

**Threat**

The threat to natural areas from

burning bush euonymus is that it

shades out native herbs and crowds

out native shrubs. Unfortunately,

birds are very fond of the 1/4- to 1/

3-inch long red fruit and

consequently distribute the seeds

across the countryside where plants

readily sprout and establish

themselves, enhancing the extent of

the plant’s distribution. According

to the *Atlas of Virginia Flora*, 3rd

edition (1992), it appears in only

four counties of Virginia. That

information is not up-to-date. The

shrub may become one of our most

troublesome plants because of the

ease with which its seeds are spread,

the readiness of germination, its

adaptability to various soils, its

tolerance of full shade and its

spectacular fall foliage. Even

Fernald recognized this in his 8th

edition of *Gray’s Manual of Botany*

printed in 1950 as noted by his

comment, “spreads from

cult[ivation].” It appears entirely

predictable that we will be unable

to persuade either landscapers or

nurserymen to voluntarily abandon

either the use or sale of this plant.

**Control**

Control is therefore considered

difficult once a parent plant has

become established. It will probably

not be much of a problem in cities,

towns or thickly developed areas,

but any nearby woodland where

birds can roost may quickly become

infested. Therefore, abstaining from

using the plant becomes the most

important step toward control.

Continued use of winged burning

bush may result in it becoming a

widespread invasive. No

information on control of this

species was found researching this

fact sheet. Attempt control as for any

shrub species.

**Alternative Plants**

A native shrub of rather limited

availability that is not invasive to

natural landscapes is red chokeberry

(*Aronia arbutifolia*). It is spectacular

in October when the foliage turns a

brilliant red. The growth is more lax

and less compact than the winged

burning bush. The cultivar

“Brilliantissima” is recommended

for more brilliant red foliage in the

fall. Another choice would be the

non-invasive exotic Koreanspice

Viburnum (*Viburnum carlesii*),

which may have reddish to wine-red

fall color; however, fall selection is

advised to be certain of the color one

may expect.

For more information on native

plant conservation, contact the

Virginia Native Plant Society at the

address below. For information on

Virginia’s natural areas and natural

heritage resources, contact the

Virginia Department of

Conservation and Recreation’s

Natural Heritage Program (*see*

*address below*).

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**For more information, contact the Department of Conservation and Recreation or the Virginia Native Plant Society.**

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